FORD **Transit City**
Body and Equipment Mounting Manual



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1.1 About This Publication

This Body and Equipment Mounting Manual (BEMM) is the publication for Transit City which is available from Q3 2026.

April 2026

1st Edition

It is recommended to review this manual in full.

Before starting any conversion, it is the Vehicle Convertor's responsibility to review the most relevant BEMM for the product being modified. This may require looking at older versions available on the Ford Pro Special Vehicles website, or contacting FPSVHelp@ford.com for vehicles older than those published online. This BEMM is for European and related markets sourced vehicles.

1.1.1 EV Training

Ford Customer Service Division (FCSD) develops the training and deploys it to the Ford Dealer Network. We will forward and/or provide our convertor partners the information to obtain training through links in Ford Service Info https://www.fordserviceinfo.com.

1.2 About this Manual

This section has information about the purpose of the manual, how to navigate the document, and how to contact technical support. It also explains essential safety instructions, including requirements for working on high-voltage vehicles, and how to request CAD models.

1.2.1 Introduction

This manual gives the convertor information for vehicle conversion or modification. Ford does not give additional information to private or individual users.

If you are a convertor and you need information that is not in this manual, or if you have more questions, then contact your National Sales Company representative or your local Ford dealer. If your National Sales Company representative or your local Ford dealer cannot help you, then contact FPSVHelp@ford.com.

This guide is published by Ford Motor Company and gives general descriptions and advice for converting vehicles.

A competent person must make any changes to the vehicle. On completion, the vehicle must be returned to a safe state.

There are references to the Ford Workshop Manual and Wiring Diagrams throughout the BEMM. Therefore, it is strongly recommended to subscribe and obtain access to these resources from Ford Service Info at https://www.fordserviceinfo.com/.

Any change to the base vehicle that does not meet the enclosed guideline standards may severely inhibit the ability of the vehicle to do its function. Mechanical failures, structural failure, component unreliability, or vehicle instability leads to customer dissatisfaction. Appropriate design and application of the body, equipment, or accessories is key to make sure that customer satisfaction is not adversely affected.

This publication gives recommendations to follow when vehicle modifications are undertaken. Certain modifications may invalidate legal approvals and re-certification may be necessary.

Ford Motor Company cannot guarantee the operation of the vehicle if you install non-Ford approved electrical systems. Ford electrical systems are designed and tested to function under operational extremes. The systems are subjected to the equivalent of ten years of driving under such conditions.

This manual may contain references to features and options that are not fitted to your particular vehicle. Variations occur across territories. External factors can also cause variations.

1.2.2 How to Use This Manual

This manual covers vehicle conversion procedures.

The pages at the start of this manual list the content, by group. A group covers a specific portion of the vehicle. The manual is divided into five groups:

- General Information
- Chassis
- Powertrain
- Electrical
- Body and Paint

Each title that is listed in the contents links to the relevant section of the manual.

Some sections refer you to additional sections for information. The links are blue text. Page numbers are also available. An alphabetical index is at the back of the manual.

All left-hand and right-hand references to the vehicle are from the position of the driver seat and looking forward, unless stated otherwise.

All references to ADR vehicle standards are only applicable to the Australian and New Zealand markets. If no ADR is specified, use the EU standard.

This manual contains **WARNINGS**, **CAUTIONS**, and **NOTES**.

WARNING: Warnings indicate that failure to follow a procedure correctly may result in death or personal injury.

CAUTION: Cautions indicate that failure to follow a procedure correctly may result in damage to the vehicle or equipment.

NOTE: Notes provide additional essential information that is required to do a complete and satisfactory conversion.

Megaphone icon/text in bold black indicates the updated area in the document.

 / Abc = Updated/New content

1.2.3 Important Safety Instructions

Appropriate conversion procedures are essential for the safe, reliable operation of all vehicles as well as the personal safety of the individual carrying out the work.

This manual cannot anticipate all such variations and provide advice or cautions as to each. You must establish that your choice of methods, tools, or components does not compromise your personal safety or the vehicle integrity if you do not follow the instructions in this manual.

NOTE: Write any modifications to the vehicle in the owner handbook or include new descriptive literature with the owner documentation.

WARNING: Only work on High-Voltage Electrical Vehicles after you complete the appropriate training:

"Working on Electrical Vehicles" includes doing mechanical work, doing electrical work, and switching activities on these vehicles.

"Electrical Vehicle" includes all possible types such as HEV (Hybrid Electric Vehicle), PHEV (Plug-In Hybrid Electric Vehicle), and BEV (Battery Electric Vehicle) or other versions.

"Appropriate training" means that you have sufficient knowledge about the risks and the required safety measures to do the work in a safe way. You must make sure your training competencies are current and not expired.

WARNING: Orange-coloured cables are HV system (450V DC for BEV, 400V DC for PHEV) parts. Do not modify or reroute them.

CAUTION: Limitations exist when you add additional electrical devices. You must control any power take-off consumption within the guidelines. Extra equipment and usage may have an impact on weight and vehicle driving range.

1.2.4 CAD Models

To enable the virtual development of your vehicle, Ford provides 3D data models in STEP and JT formats through CoLab upon request at FPSVHelp@ford.com.

1.3 Commercial and Legal Aspects

This section has information about terminology, warranty obligations, and compliance with emissions and type approval regulations. It also explains the legal liabilities of the convertor and gives important safety instructions for vehicle modifications.

1.3.1 Terminology

Convertor refers to any party that alters the vehicle. This includes converting the body and adding or modifying any equipment not originally specified or supplied by Ford Motor Company.

Unique component or similar wording refers to non-Ford specified or after-sale fitments that are not covered by Ford warranty.

In this document, Ford refers to Ford Motor Company.

1.3.2 Warranty on Ford Vehicles

Contact the National Sales Company in the country where the vehicle is registered for details of the terms of any applicable Ford warranty.

The convertor must warrant its design, materials, and construction for a period at least equal to any applicable Ford warranty.

The convertor must make sure that any alteration made to a Ford vehicle or component does not reduce the safety, function, or durability of the vehicle or any component.

The convertor is solely responsible for any damage that results from any alteration made by the convertor or any of its agents to a Ford vehicle.

The convertor releases Ford from all claims by any third party for any cost or loss, including any consequential damages, that arise from work that a convertor does, unless Ford gives its prior written consent to such liability.

1.3.3 Worldwide Harmonised Light Vehicle Test Procedures (WLTP)

WLTP takes into account individual optional equipment for weight, aerodynamics, and rolling resistance. These have an impact on the fuel consumption and exhaust emissions. For incomplete and complete conversions, WLTP uses the completed option equipment. Convertors must recalculate the CO_2 and fuel consumption for any completed vehicle. Use a tool that the OEM provides or contact the OEM to get new values.

To determine the new values in line with WLTP, registered customers can access Ford's multi-stage WLTP calculation tool through Ford Service Info. You can access the WLTP calculator at https://www.fordserviceinfo.com/. You must log in to use it.

Conversion designs should control the vehicle weight but do not deteriorate other vehicle attributes and functions, especially those related to safety and durability. Also, contact your local type approval authority for any questions related to the application of WLTP to multi-stage conversions under Regulation (EU) 2018/858 and single vehicle approvals.

For additional information, refer to the sections that follow:

- 1.7 Vehicle Duty Cycle Guidelines
- 1.12 Package and Ergonomics

1.3.4 Whole Vehicle Type Approval Regulations - EU Markets Only

WARNING: For non-European Union territories, please refer to local legislation.

Fitment of Parts and Accessories

NOTE: The Certificate of Conformity (CoC) covers Ford parts that are fitted in the plant. The objective of Regulation (EU) 2018/858 or applicable local legislation is to make sure that new vehicles, components, and separate technical units put on the market give a high level of safety and environmental protection. This helps to make sure that the fitting or converting of certain parts or equipment does not damage any vehicles after they are on the market or in service.

Convertors must check whether the fitment of parts requires either type approval or Individual Vehicle Approval (IVA) before the vehicle is registered.

- Type Approval requires a Conformity of Production (CoP) inspection to be carried out at the conversion location to demonstrate that all vehicles of the same type will conform to the type approved specification.

- IVA requires inspection of an individual vehicle to establish compliance.

1.3.5 Compliance and Vehicle Type Approval

All components embodied on Ford vehicles are approved in accordance with the applicable regulatory requirements.

Ford vehicles have Type Approval for the intended marketing territories. The full range of vehicles shown in this manual are not necessarily released in all territories. Check with your National Sales Company representative.

WARNING: Exception - Incomplete vehicles require more approval when the convertor completes them.

Significant changes to the vehicle may affect its regulatory compliance. You must strictly adhere to the original design intent for brakes, weight distribution, lighting, occupant safety, and hazardous materials compliance.

Quote the following information when the conversion needs a new approval:

- All dimensional, weight and centre of gravity data.
- The fixing of the body to the donor vehicle.
- Operating conditions.

The responsible Technical Service may require additional information or testing.

ECE Regulation No. 155 is now applicable to all vehicles with an EU Whole Vehicle Type Approval with respect to the Cyber Security of a Vehicle Type. Some markets and special purpose vehicles may have an introduction date at a later point in time. For any assistance, contact your Technical Service or Approval Authority. Fitting additional CAN-BUS via Ethernet, Wireless or other connected hardware may impact the existing Vehicle Type Approval. The convertor should seek advice from their Technical Service or approval authority to understand the impact to ECE Regulation No. 155 for any additional modifications.

1.3.6 Multi Stage Type Approval

The convertor must agree all modifications and impacted regulatory requirements with the relevant approval authority and technical service. The convertor must advise the customer of any changes to the vehicle operating conditions.

1.3.7 Legal Obligations and Liabilities

The convertor must consult with its legal advisor on any questions about its legal obligations and liabilities.

1.3.8 General Product Safety Requirement

WARNING: Do not exceed the gross vehicle mass or axle plates mass.

WARNING: Do not change the tyre size or load rating.

WARNING: Do not modify the steering system.

WARNING: Do not restrict the travel and function of pedals.

WARNING: Do not modify or remove heat protection shields.

WARNING: Do not remove or change the location of original vehicle warning labels. Make sure they remain clearly visible and in full view of the driver.

WARNING: Do not route any electrical cables with the Anti-Lock Braking System and Traction Control System cables because of extraneous signal risk. Do not hang electrical cables from existing harnesses or pipes.

WARNING: For component traceability, you must refit components that you remove during the conversion process to the same vehicle. Follow the Ford Workshop Manual procedures.

CAUTION: Make sure that components removed during conversion are kept clean and dry.

The convertor must make sure that any vehicle it places in the market complies with the European General Product Safety Regulation (EU GPSR) 2023/988, as amended periodically, or applicable local legislation.

The convertor must also make sure that any alteration it makes to a Ford vehicle or component does not reduce its compliance with the EU GPSR or applicable local legislation.

The convertor releases Ford from all liability for damages that result from the items that follow:

- Failure to comply with these Body and Equipment Mounting directives, in particular warnings.
- Faulty design, production, installation, assembly or alteration not originally specified by Ford.
- Failure to comply with the basic fit-for-purpose principles inherent in the original product.

1.3.9 Product Liability

The convertor is liable for any product liability that arises from any alteration to a Ford vehicle or component made by the convertor or any of its agents. This includes liability for death, personal injury, or property damage. Ford is not liable for any such liability, except as provided by law.

The convertor or original equipment manufacturer is liable for the items that follow:

- Operational reliability and road-worthiness of the vehicle to its original intent.
- Operational reliability and road-worthiness of any component or conversion, not listed in original Ford documentation.
- Operational reliability and road-worthiness of the vehicle as a whole. For example, the body changes or additional equipment must not have a negative effect on the driving, braking or steering characteristics of the vehicle.
- Subsequent damage that results from the conversion or attachment and installation of unique components, including unique electrical or electronic systems.
- Functional safety and free movement of all moving parts. For example, axles, springs, shafts, steering mechanisms, brake and transmission linkage, and retarders.
- Functional safety and freedom of the tested and approved flexibility of the body and integral chassis structure.

1.3.10 Restraints System

WARNING: Do not modify the restraints system.

WARNING: Airbags are explosive. For safe removal and storage during conversion follow the procedures in the Ford Workshop Manual.

WARNING: Do not alter, modify or relocate the airbags, sensors and modules of the restraints system or any of its components.

WARNING: Attachments or modifications to the front end or B-pillar of the vehicle may affect the airbag deployment timing and result in uncontrolled deployment.

For additional information, refer to 5.8.2 Restraints Control Module (RCM).

1.3.11 Drilling and Welding

WARNING: Do not drill, cut or weld boron steel parts. Refer to F50103 in section 5.1.3 Boron Steel Parts.

You must follow the guidelines in the sections 5.1.2 Welding and 5.12 Frame and Body Mounting to drill and weld frames and body structure.

1.3.12 Requirements for Braking System

WARNING: Do not modify the braking system.

Changes to the Anti-lock Braking System (ABS), Traction Control System (TCS) and Electronic Stability Control ESC (also known as ESP) system are not permitted.

1.3.13 Road Safety

Strictly observe the instructions to maintain operational and road safety of the vehicle.

1.3.14 Acoustic Vehicle Alerting System

WARNING: Do not move or modify components of the Acoustic Vehicle Alerting System (AVAS). AVAS is a regulatory requirement.

Refer to 4.19 Acoustic Vehicle Alerting System (AVAS).

1.4 Contact Information

If you need information that is not in this manual, contact your Conversion Development Manager, National Sales Company representative or your local Ford dealer. If they cannot help you, then contact FPSVHelp@ford.com.

Market	Conversion Development Manager (CDM)	Email/ Phone/ Address
Austria	Hannes Konrad	hkonra12@ford.com
Belgium	Luc Vanneste	lvannes4@ford.com
Britain	Keith Doxey	kdoxey@ford.com
	Robert Jinks	rjinks1@ford.com
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Turkiye	Mehmet Kalp	mkalp@ford.com.tr
South America	Hebert Ribeiro	hribei12@ford.com
Australia	FoA Customer Team	foacust1@ford.com 13 FORD or 13 36 73 Ford Customer Relationship Centre Private Mail Bag 5 Campbellfield VIC 3061
New Zealand	FoNZ Customer Team	nzinfo@ford.com +64-9-2718500 Private bag 76912 Manukau City NZ - 2241

1.5 Conversion Type

This section lists the order codes for special vehicle options and gives reference tables that link specific conversion types to the applicable sections of this manual.

1.5.1 Order Codes

The tables that follow show overviews of the available options which help in your conversion. Consider the anticipated usage of the modified vehicle to choose the appropriate specification of the base vehicle.

Make sure that your Ford dealer orders the base vehicle with all required options. The availability of options varies by territory.

Electrical	
Order Code	**Option Name**
ZJ1AB	Volumetric Alarm (Dealer Installed Option)

Exterior	
Order Code	**Option Name**
AALPV	Float Dropside RHD
AALPT	Box Body Low Roof & 1 SLD (Germany)
AALPU	Box Body Low Roof & DSLD (Germany)
AALTS	Box Body High Roof (Germany)
AALTT	Box Body High Roof & SLD (Germany)
AALJV	Box Body (UK)
AALUG	Box Body (except Germany)

Interior	
Order Code	**Option Name**
AALE6	Service Van Pack (dual racking)

1.5.2 Conversion Type - Reference Tables

The BEMM contains general and specific recommendations that cover different types of conversions. The tables that follow contain the relevant links by conversion type.

NOTE: The tables are for guidance only. You must make a full reference to the BEMM before you start any conversion.

NOTE: For any conversions that require electrical power, refer to the relevant Electrical sections of the BEMM.

Delivery and Distribution	
Box/Luton Van Refrigerated Vehicles Last-Mile Delivery	1.3 Commercial and Legal Aspects
	1.6 Electromagnetic Compatibility (EMC)
	1.8 End of Life Vehicle (ELV) Directive
	1.12 Package and Ergonomics
	1.14 Load Distribution
	4.2 Wiring Installation and Routing Guides
	4.4 LV Charging System (12 V)
	4.6.1 Interior Lights and 12V Sockets
	4.7 Climate Control System
	4.11 Exterior Lighting
	4.16 Fuses and Relays
	4.17 Electrical Connectors and Connections
	4.20 Park Aid Sensor Installation Guidance
	4.21 Cameras
	5.1.1 Body Structures - General Information
	5.2 Racking Systems
	5.3 Loadspace
	5.6 Interior Trim
	5.10 Roof
	5.12 Frame and Body Mounting

Construction & Utility Conversions	
Dropsides	1.14 Load Distribution
	4.5 Battery Systems
	4.6 Battery Protection
	4.11 Exterior Lighting
	4.17 Electrical Connectors and Connections
	4.21 Cameras
	5.1.1 Body Structures - General Information
	5.1.6 Integrated Bodies and Conversions
	5.1.7 Chassis Cab
	5.11 Corrosion Prevention
	5.12 Frame and Body Mounting
Mobile Workshops	4.5 Battery Systems
	4.6 Battery Protection
	4.11 Exterior Lighting
	4.17 Electrical Connectors and Connections
	5.2 Racking Systems
	5.10 Roof
	5.11 Corrosion Prevention

Glass Carrying / Racking Conversions	5.1 Body
	5.2 Racking Systems
	5.11 Corrosion Prevention
Recovery Vehicles	1.14 Load Distribution
	4.5 Battery Systems
	4.6 Battery Protection
	4.11 Exterior Lighting
	4.17 Electrical Connectors and Connections
	4.21 Cameras
	5.1.1 Body Structures - General Information
	5.1.6 Integrated Bodies and Conversions
	5.1.7 Chassis Cab
	5.11 Corrosion Prevention
	5.12 Frame and Body Mounting

1.6 Electromagnetic Compatibility (EMC)

This section has information about Electromagnetic Compatibility (EMC), safety instructions for equipment mounting, and cable routing. It details the responsibilities of the convertor regarding legislation and interference testing, and specifies approved frequency bands and permitted antenna locations.

WARNING: Do not place objects or mount equipment on or near the airbag cover, on the side of the front or rear seat backs, or in areas that may come into contact with a deploying airbag. Failure to follow these instructions may increase the risk of personal injury in the event of a crash.

WARNING: Do not fasten antenna cables to original vehicle wiring, pipes, or hoses.

WARNING: Keep antenna and power cables at least 100mm from any electronic modules and airbags.

NOTE: Ford tests and certifies vehicles to meet electromagnetic compatibility legislation. The convertor is responsible to make sure that any equipment installed on your vehicle complies with applicable local legislation and other requirements. The installation of some aftermarket electronic devices could degrade the performance of vehicle functions which use radio frequency signals. Examples include the broadcast radio receiver, tyre pressure monitoring system, push-button start, Bluetooth® connectivity, or satellite navigation.

NOTE: Any radio frequency transmitter equipment in the vehicle, such as cellular telephones and amateur radio transmitters, must follow the parameters in the illustrations and table that follow. Ford does not give any other special provisions or conditions for installations or use.

NOTE: After the installation of RF transmitters, check for disturbances from and to all electrical equipment in the vehicle, both in the standby and transmit modes.

NOTE: Only fit one antenna in the positions shown to the roof of your vehicle.

NOTE: For EMC on Police conversions with rear-view cameras, contact your National Sales Company representative or local Ford dealer.

Check all electrical equipment:

- With ignition **ON**
- With the drive ready mode
- During a road test at various speeds

Check the electromagnetic fields that are generated inside the vehicle cabin by the installed transmitter do not exceed applicable human exposure requirements.

Frequency Overview

Frequency Band MHz	Maximum Output Power Watts (Peak RMS)	Antenna Position
1-30[1]	50W	1
50-54	50W	2, 3
68-87	50W	2, 3
144-174	50W	2, 3
380-512	50W	2, 3
806-940	10W	2, 3

[1] For battery electric vehicles and plug-in hybrid vehicles, this frequency is not approved when your vehicle is plugged-in and charging.

Permitted Antenna Locations



F10054

Item	Description
1	Antenna Location 1
2	Antenna Location 2
3	Antenna Location 3

1.7 Vehicle Duty Cycle Guidelines

Consider the customer usage profile and the anticipated vehicle duty cycles of the modified vehicle to choose the appropriate specification of the base vehicle.

Consider battery operating range and time, maximum payload, maximum speed, charging time, minimal operational lifetime, and operating temperature range to optimise charging and discharging requirements.

1.7.1 Vehicle Ride and Handling Attributes

CAUTION: Do not exceed the axle plate or gross vehicle mass limits.

NOTE: Raising the centre of gravity will affect ride and handling.

NOTE: The vehicle should be evaluated for safe operation before the sale.

1.8 End of Life Vehicle (ELV) Directive

The European End-of-Life Vehicle (ELV) directive requires that the development process of new components and vehicles integrates environmental and recycling aspects. This includes requirements with respect to the items that follow:

- The overall recyclability (85%) and recoverability (95%) of vehicles.
- Limited use of hazardous substances including the elimination of prohibited substances such as lead, hexavalent chromium, cadmium, and mercury.
- Publication of dismantling information.
- Parts Marking according to the corresponding ISO Standards: ISO 1043-1, 1043-2, and 11469 for plastics and ISO 1629 for rubber materials.
- Increasing use of recycled materials.
- Producers meet all, or a significant part of, the costs to take back End-of-Life Vehicles.

In addition to the requirements that result from the End-of-Life Directive, take other environmental targets into consideration, such as the items that follow:

- Minimise costs and environmental burden along the product life-cycle.
- Maximise use of renewable materials, for example, natural fibres.
- Minimise the presence of substances that impact vehicle interior air quality, clean compartment, or allergenic reactions. This refers to aspects like smell, fogging, toxicity, and allergy that come from materials in the interior.
- Eliminate use of prohibited substances which are listed in the Global Automotive Declarable Substance List (GADSL) at http://www.gadsl.org.

For continued legal compliance and environmental performance of all Ford products, any conversion of the vehicle must comply with the requirements listed above.

This is not a definitive list of all legal requirements to be met by every converted vehicle.

1.9 Jacking and Lifting

This section has information about the safety warnings and procedures for jacking and lifting the vehicle. It describes the correct jacking and lifting points and hoist locations for different vehicle variants.

1.9.1 Jacking

WARNING: Position the vehicle on a hard, level surface. If the vehicle must be jacked up on a soft surface, use load-spreading blocks under the jack. Always chock the wheel diagonally opposite the jacking point. Failure to follow these instructions may result in personal injury.

WARNING: When you jack electric vehicles, do not place the jack under the High-Voltage Battery, the Battery Cradle, the Side Impact Protection Bars, or the Electric Drive Assembly. Only use the specified jacking points for jacking up and supporting the vehicle. Jacking locations are identified in the Owner's Manual.

WARNING: Never place blocks of wood or similar underneath the vehicle jack to jack up the vehicle on soft ground. Failure to observe this instruction can lead to injuries.

CAUTION: It is important that you only always use the correct jacking and support locations. Other positions may damage the body, steering, suspension, high-voltage battery, electrical drive assembly, braking system or high-voltage cable.

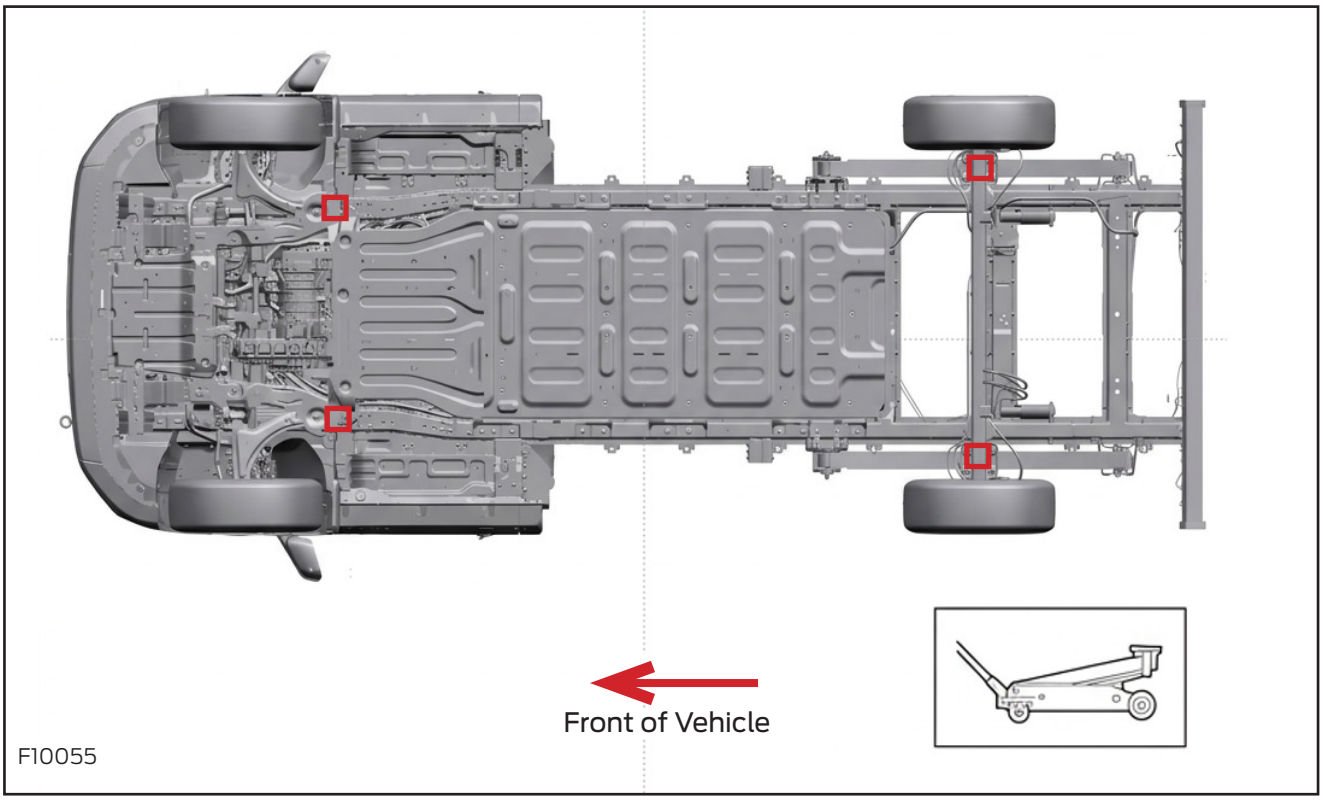
CAUTION: Make sure there is sufficient clearance when you position the jacking equipment to prevent damage to any underfloor components.

NOTE: When you use the vehicle jack, refer to the Owner's Manual for correct operating instructions.

NOTE: Install reinforcements to maintain the integrity of the original body structure for or at jacking points.

NOTE: Write any modifications to the vehicle in the owner handbook or include new descriptive literature with the owner documentation.

Jacking Points Front Wheel Drive - Van and Chassis Cab



1.9.2 Lifting

WARNING: You must not lift the vehicle using the High-Voltage Battery, Battery Cradle, Side Impact Protection, Megabrace or Electric Drive Assembly as a lifting point. Do not lift on any of the high-voltage components. Using any of these components as a lifting point could result in electric shock, personal injury, fire or death.

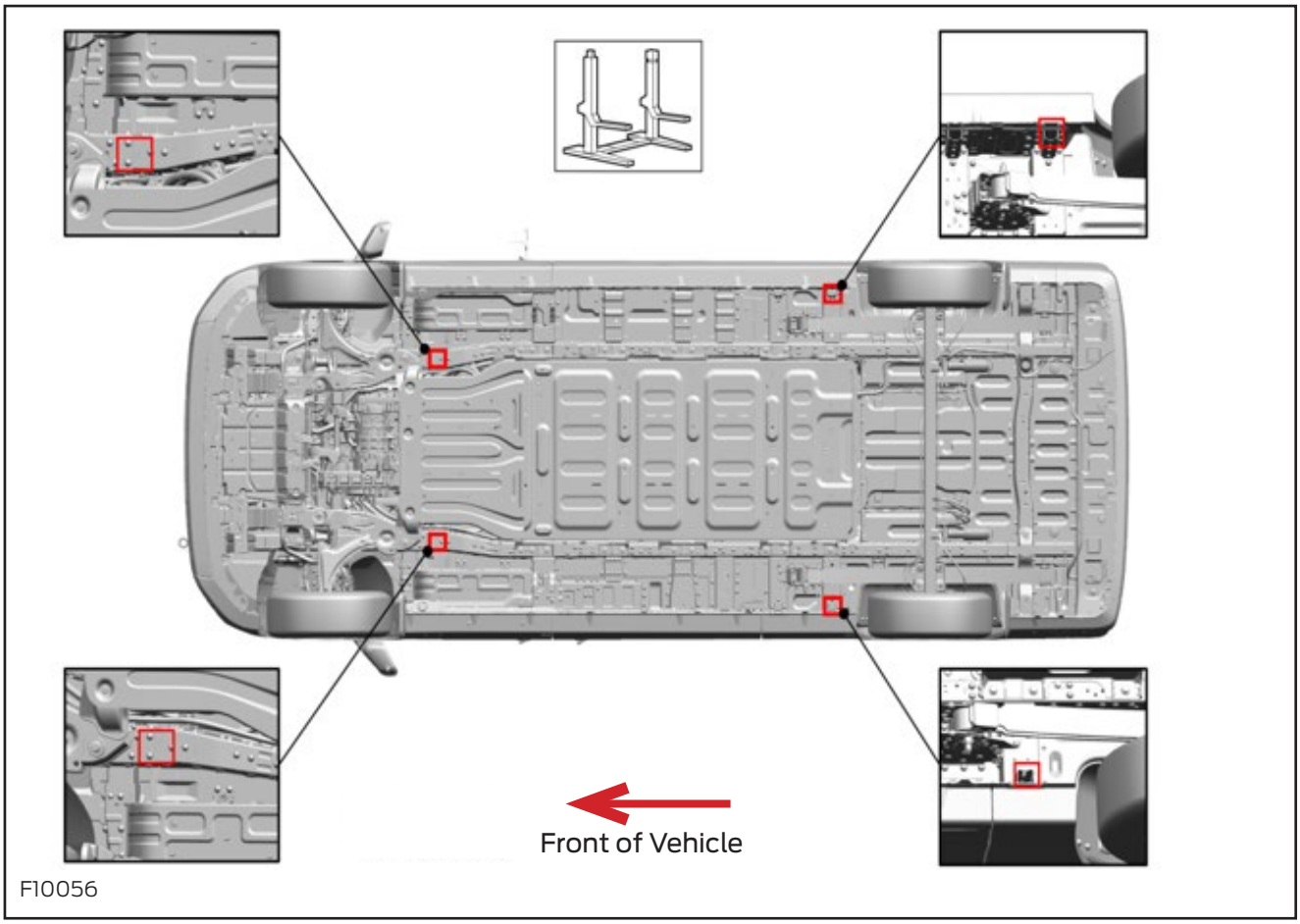
CAUTION: When you lift the vehicle with a two-post lift, you must use vehicle lift arm adapters under the lifting points.

CAUTION: When lifting the vehicle with a two-post lift, the maximum kerb weight must not be exceeded.

CAUTION: It is important that you always use the correct lifting and support locations.

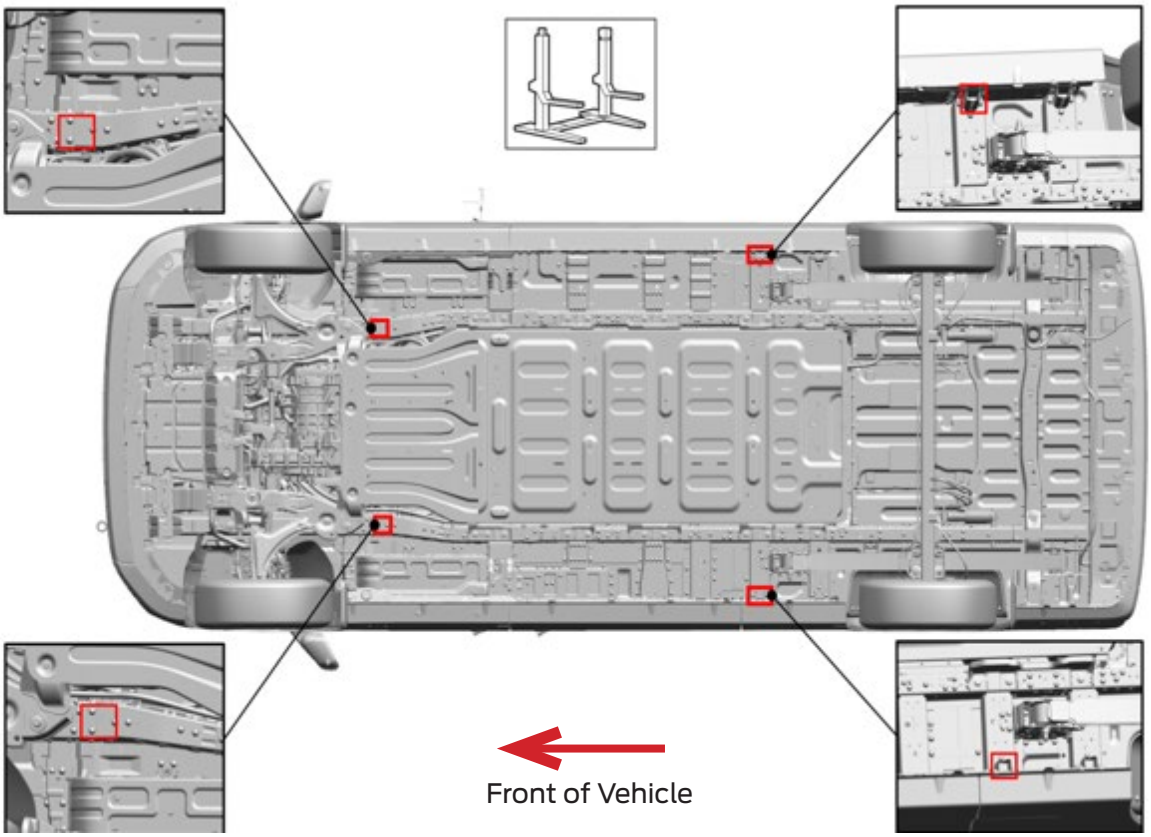
CAUTION: Make sure there is sufficient clearance when you position the lifting equipment to prevent damage to any underfloor components.

Lifting Points L1 SWB - Van



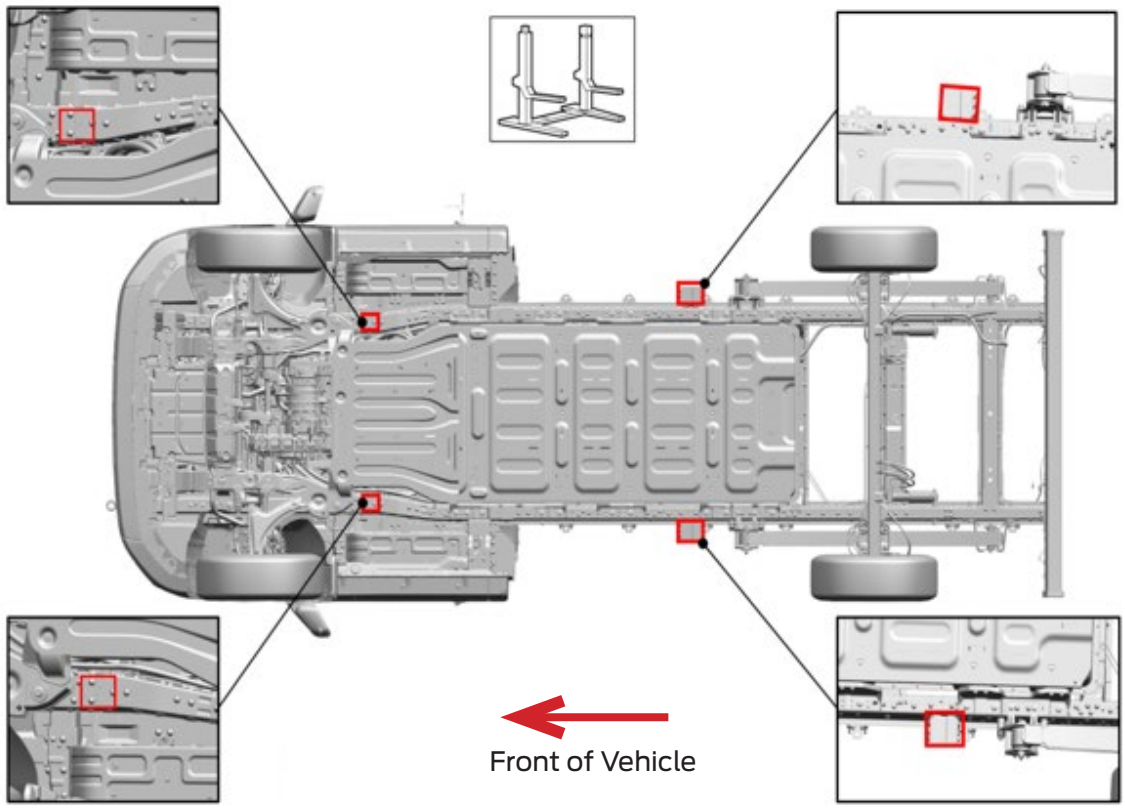
F10056

Lifting Points L2 LWB - Van



F10057

Lifting Points Chassis Cab



F10058

1.10 Noise, Vibration and Harshness (NVH)

WARNING: Make sure that the modified vehicle complies with all relevant regulatory requirements.

You must verify the exterior noise level of the converted vehicle.

The conversion must not increase interior noise levels. Reinforce panels and structures as appropriate to avoid vibrations. Consider the use of sound-deadening material on panels.

1.11 Vehicle Transportation Aids and Vehicle Storage

CAUTION: Do not remove the protective cover from an incomplete vehicle until the conversion starts. Keep the protective cover in position when you store the incomplete vehicle outdoors or when the vehicle is inactive during the conversion.

CAUTION: If the Chassis Cab variant leaves the factory without a protective cover, then the convertor must source one. The cover protects the exposed area of the battery before the conversion starts.

CAUTION: Do not put loads on or step on the protected area or structure.

In addition:

- Lift the windscreen wipers off the glass and set them right up.
- Close all air intakes.
- To avoid flat-spotting, increase tyre pressures but DO NOT exceed the maximum tyre pressure that is marked on the tyre sidewall.
- Fully release brakes and parking brake.
- Apply suitable wheel chocks to prevent roll away.

A significant risk during storage is the deterioration of vehicle bodywork. Therefore, you must observe appropriate storage procedures, including periodic inspection and maintenance.

Claims that arise from deterioration that is caused by incorrect storage, maintenance, or handling are not the responsibility of Ford.

NOTE: Refer to the Owner's Manual for more information on how to prepare the vehicle for storage.

Convertors must determine their own procedures and precautions. This is particularly true where vehicles are stored in the open, as they are exposed to airborne contaminants.

Short term storage (up to 14 days):

- If possible, store vehicles in an enclosed, dry, well-ventilated area. This area must be on firm, well-drained ground that is free of long grass or weeds. If possible, protect the area from direct sunlight.
- Do not park vehicles near or under foliage or close to water as additional protection may be necessary for certain areas of the vehicle.

Long term storage (over 14 days):

- Maintain the integrity of the 12V battery. You can disconnect the battery, but do not remove it from the vehicle. Maintain a minimum charge level by using a mains trickle charger or solar charger. After the vehicle is fully charged, do not keep the batteries on charge.
- Remove the wiper blades and place them inside the vehicle. Make sure the wiper arms are suitably prevented from resting on the windscreen.
- Remove wheel trims, where fitted, and store them in the luggage compartment.
- Engage first gear for manual transmission or place in park position ‘P’ for automatic transmission and release the parking brake completely. Chock the wheels first if the vehicle is not on level ground.
- Set climate controls to the ‘open’ position to give ventilation, if possible.
- Where protective film has been applied at manufacturing, it must be left on the vehicle until it is prepared for delivery. It must be removed after a maximum storage period of six months. The film is date-stamped to indicate the required removal date.
- Make sure that all windows, doors, bonnet, liftgate, tailgate, luggage compartment lid, convertible top, and roof opening panel are completely closed.
- Lock the vehicle.

Action/Time in Storage	Receiving	Every 15 Days	Monthly	Every 3 Months	Before Shipping
Check vehicle is clean	X	-	X	-	X
Remove external contamination	X	-	X	-	X
Visually check tyres	X	-	X	-	X
Check interior for condensation	X	-	-	X	X
Check high-voltage battery state of charge, recharge if necessary	X	X	-	-	X
Check Chassis Cab Protective Cover in place	X	X			X

The Pre-Delivery Inspection (PDI) is the final opportunity to make sure a battery is fit for purpose before the customer takes delivery of their new vehicle. Check the battery and take appropriate action before the vehicle is handed over to the customer. Record test results on the PDI repair order.

CAUTION: Prevent LV battery discharge during the conversion process and while the vehicle is in storage. Battery discharge causes premature failure and reduces the life of the battery.

LV Battery Drain Prevention:

Follow these guidelines to prevent battery discharge:

- Leave the vehicle in Transport Mode for as long as possible.
- Reduce the frequency and duration of door ajar events.

You must check the battery voltage when you receive the vehicle and again before you ship the vehicle. You must also check the battery during the conversion process and while the vehicle is in storage.

1. Turn the ignition **OFF**.
2. Make sure that no loads are active. For example, turn off all interior and exterior lights.
3. Measure the voltage.
4. If the voltage of the 12 V battery is below 12.4 V, then recharge the battery with an appropriate charger.

Refer to 4.5 Battery Systems

- Do not let the vehicle sit with the key in the ignition and the engine not running.
- Do not leave the vehicle with push-button start in accessory or run mode.
- Turn all electrical features to the off position.
- Completely close all doors and hatches.
- Keep the ignition off. Remove blade keys from the ignition cylinder.
- Do not use indicators, fuel doors, or headlights to "mark" a vehicle's status, for example, to signal that a repair is finished or a vehicle is ready for collection.
- Make sure the automatic transmission gear shifter is in Park (P) when the vehicle is stationary.
- Make sure Roll-Away Protection is active before you exit the vehicle. Car Wash Mode or Neutral Mode will be deactivated.

For more information about Transport mode, refer to 4.5.2 Guidelines When Converting Vehicles

HV Batteries: Subsequent stage manufacturers and convertors who work with BEV should develop a plan to charge these vehicles, if necessary.

Charging stations may be particularly important at vehicle receiving locations in case vehicles arrive with insufficient charge to manoeuvre through the manufacturing process.

Ford recommends charging stations at vehicle storage locations.

Convertors should also check the high-voltage vehicle state of charge when it arrives and leaves their facility. If the high-voltage battery state of charge is less than 20%, charge it to 40%.

When you store the vehicle longer than 30 days, the state of charge should be approximately 50%.

1.12 Package and Ergonomics

This section has information about package and ergonomics guidelines, including driver visibility and vehicle entry. It explains the Worldwide Harmonised Light-Duty Vehicle Test Procedures (WLTP) calculation inputs, specifically regarding vehicle mass, frontal area, and aerodynamic constraints. The section also lists essential dimension data and body extension rules for various chassis configurations.

1.12.1 General Component Package Guidelines

WARNING: Do not modify, drill, cut, or weld any suspension components. Specifically, do not modify the steering gear system, subframe, anti-roll bars, springs, or shock absorbers, including mounting brackets.

The convertor must make sure that sufficient clearance is maintained, under all drive conditions, to moving components such as axles, fans, steering, and the braking system.

The convertor is responsible for all components installed during the conversion. Confirm the durability by completing appropriate test procedures.

1.12.2 Driver Reach Zones

Locate controls and equipment that you use while you drive within easy reach of the driver. DO NOT impair driver control.

1.12.3 Driver Field of View

WARNING: The modified vehicle must comply with all relevant regulatory requirements.

1.12.4 Conversion Effects on Parking Aids

WARNING: Make sure that monitors that are mounted in the cabin meet the interior package and safety requirements.

WARNING: The system does not function if an aftermarket rear step or other rear-mounted equipment is installed.

On conversions that require a rear camera, you can take the reverse signal as detailed in the electrical section, described in 'reversing lamps'. Refer to 4.11 Exterior Lighting.

1.12.5 Aids for Vehicle Entry and Exit

Steps

WARNING: Make sure that the modified vehicle complies with all relevant regulatory requirements.

WARNING: If this modification alters the homologated dimensions, a new approval may be necessary.

CAUTION: Make sure that you install reinforcements to maintain the integrity of the original body structure.

Where you install additional steps, maintain the required ground clearance line.

The convertor must make sure that a movable step is set in the stored position when the vehicle runs. The step surface must be non-slip.

1.12.6 Worldwide Harmonised Light-Duty Vehicle Test Procedures (WLTP) Calculation Inputs

The attributes that follow are required as part of the WLTP calculation for completed vehicles.

Mass of the Completed Vehicle

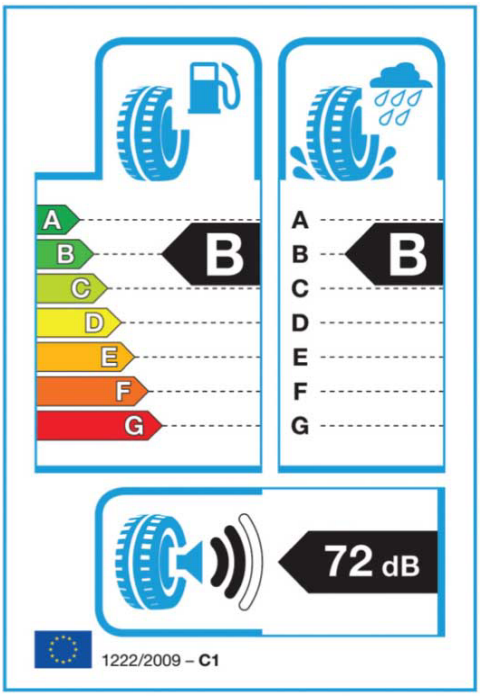
Consider all modifications and changes that affect the actual mass of the vehicle. The definition of actual mass is described under the provisions of regulation 2017/1151 Annex XXI. The actual mass of the completed vehicle needs to be provided for the front and rear axle. This weight split is important where the completed vehicle has mixed tyres between the front and rear.

Frontal Surface Area

Consider all modifications and changes that affect the frontal surface area of the completed vehicle. For more information, see later in this section.

Tyre Rolling Resistance

Consider any changes in tyres that are fitted to the completed vehicle. The efficiency class and tyre class are needed to determine the correct calculation. You can find this on the tyre label as per the example in E309537.



E309537

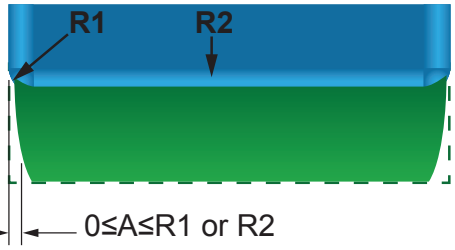
Exceeding Attribute Limits

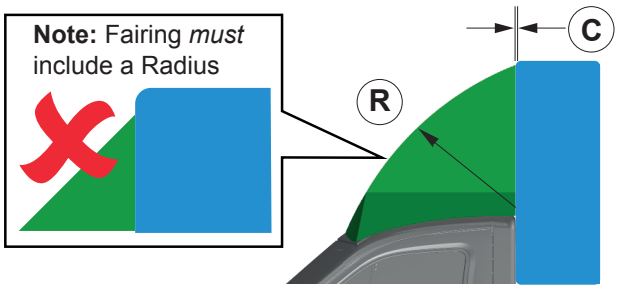
As a requirement for the convertor to use the base vehicle approval, the convertor must stay within the defined limits of the BEMM and the Emissions Type Approval that are applicable to the vehicle. The convertor is responsible to stay within these defined limits to remain compliant with the emissions performance. If the convertor wants to exceed the limits, the convertor must get clarification with the relevant technical service or type approval authority. In this case, the base approval may become invalid and the convertor may need to re-certify the vehicle against the exceeded limits.

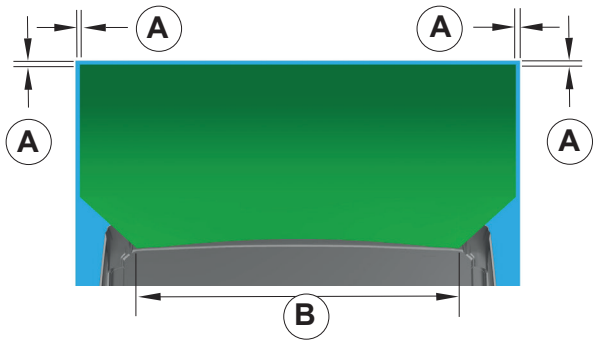
WLTP Constraints

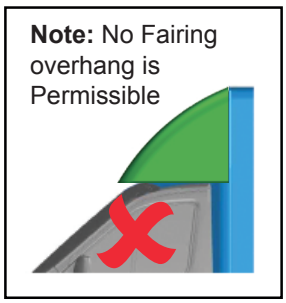
Please Note: If the front/top edge of the box body (R2) has a radius between 60-200 mm, the fairing top edge should be placed at the lowest point of that radius- see Ref 1 image (bottom)

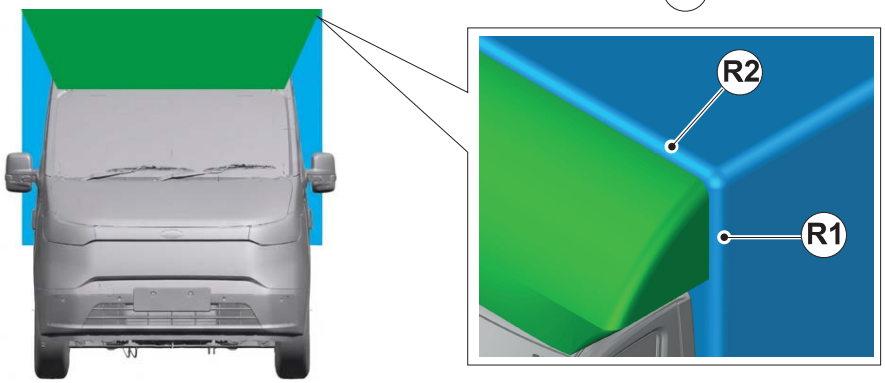
Gap between fairing and body (C) should be limited to a maximum of 20 mm

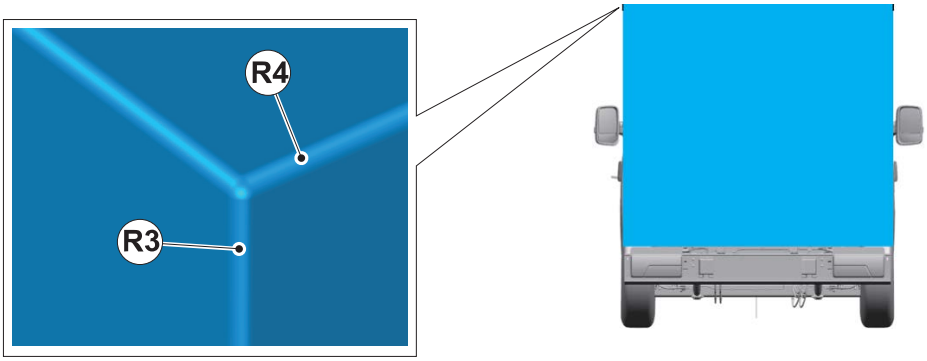


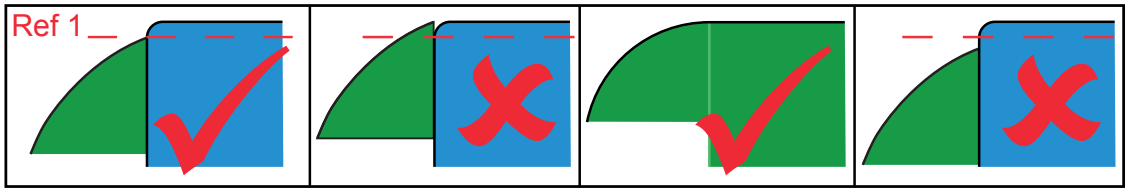












Fairing aligned to lower point of radius (R2)

Fairing with sharp edge above radius (R2)

Fairing tangential to top of box. No raised edge. Applicable to integrated fairing/box only

Fairing below lowest point of radius (R2)

F10015

Item	Description	Item	Description
A	Distance between Fairing/Edge of Box Body: 0≤A≤R1 or R2	R1	Front Box Body Edge - Radius LHS/ RHS
B	Fairing Width (Min: 850mm/Max: Width of Box body)	R2	Front Box Body Edge - Radius Top

C	Gap between Fairing and Body: Max 20mm	R3	Rear Box Body Edge - Radius LHS/RHS
R	Radius of Fairing Range 1000mm - 3000mm	R4	Rear Box Body Edge - Radius Top

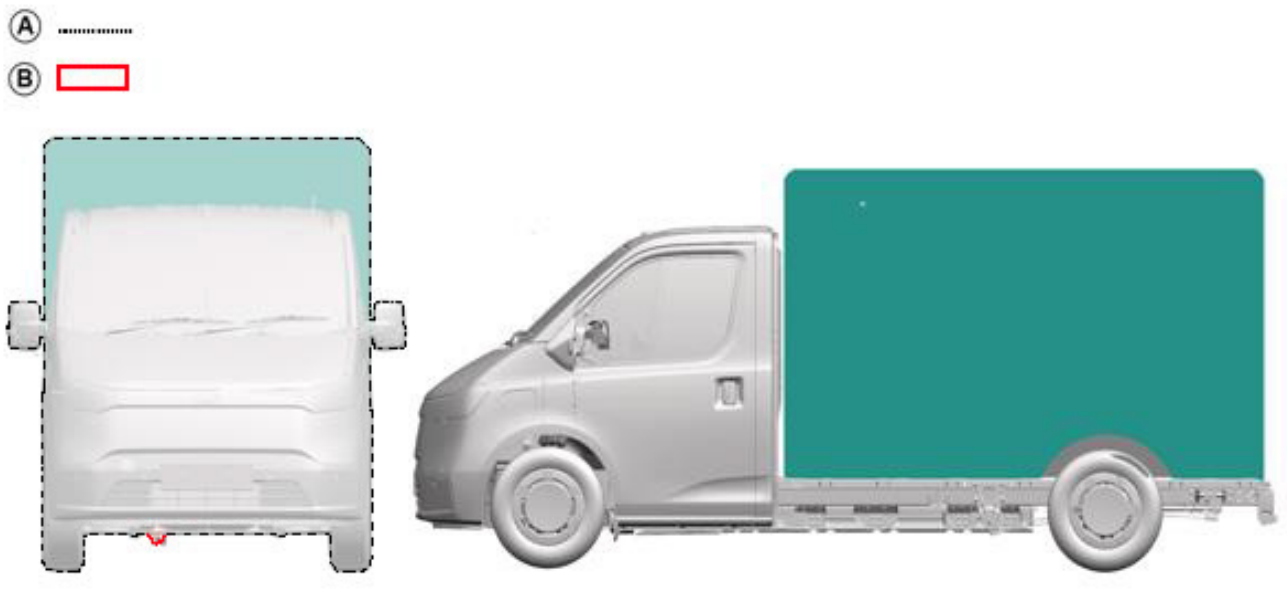
Total Frontal Area Calculation

NOTE: You can access the WLTP calculator at https://www.fordserviceinfo.com/ You need to register or login to use it.

Recognised options to calculate frontal area are CAD, pixel counting, or a certified laboratory wind tunnel testing.

To find the front surface area use calculation (m^2): A - B

Total Frontal Area Calculation



F10061

Item	Description
A	Total frontal area to be calculated*
B	Example area to be excluded in calculation

*The front surface area must be taken from the highest point of the conversion.

1.12.7 Vehicle Dimensions Key

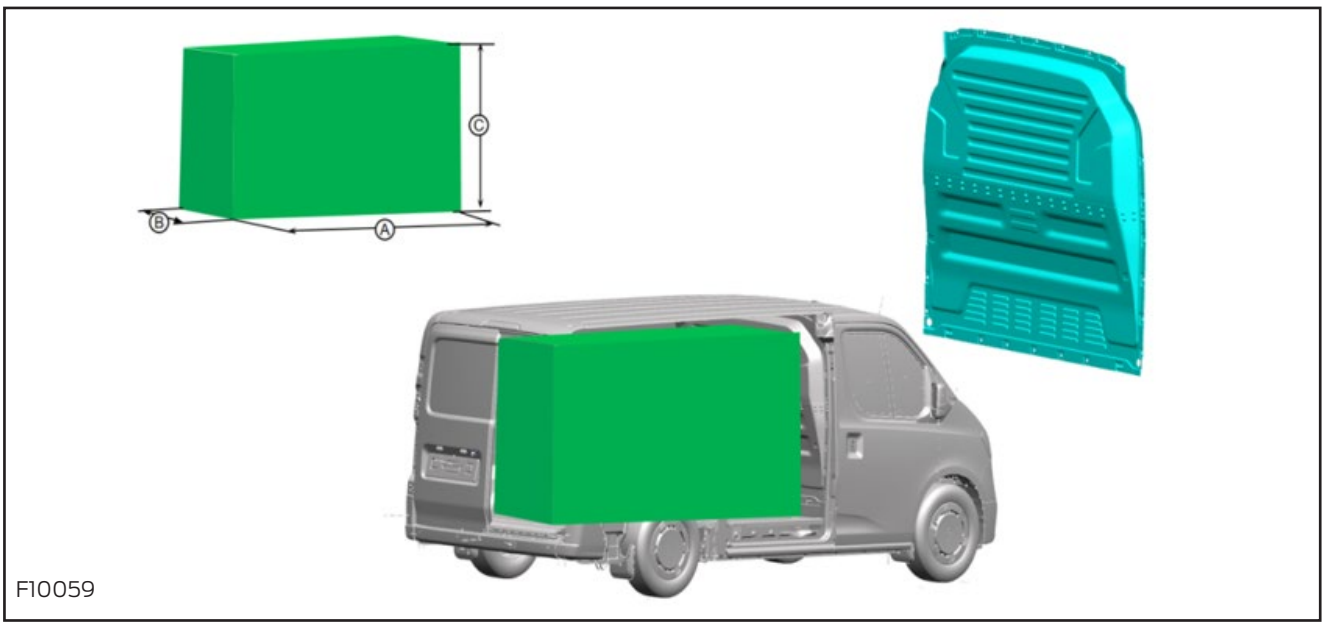
Van			
Wheelbase	**Overall Length (mm)**	**Overall Height (mm)**	
		H1	H2
L1 - 3060	4985	1991	-
L2 - 3360	5285	-	2285

Single Chassis Cab H2		
Wheelbase	**Overall Length (mm)**	**Overall Height (mm)**
L2 - 3360	5200	2000

All dimensions are subject to manufacturing tolerances and refer to minimum specification models. They do not include additional equipment. Height dimensions show the range for the minimum to maximum weight range and are for guidance only.

1.12.8 Recommended Main Load Area Dimensions

H1 - Low Roof Height

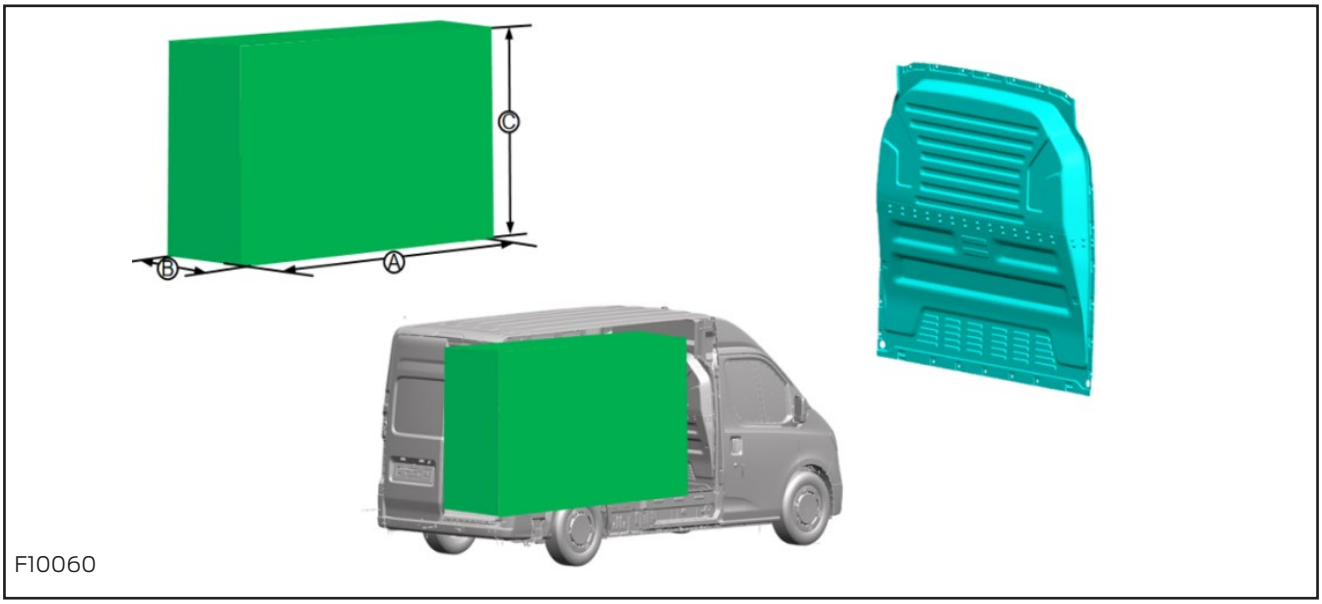


F10059

Vehicle	A (mm)	B (mm)	C (mm)
L1 - H1	2640	1740	1450

For vehicle heights see 'Vehicle Dimension Key' table in this section of this manual.

H2 - High Roof Height



F10060

Vehicle	A (mm)	B (mm)	C (mm)
L2 - H2	2940	1740	1710

For vehicle heights see 'Vehicle Dimension Key' table in this section of this manual.

1.12.9 Vehicles with Roof Mounted Units

Vehicle with Roof Mounted Units Frontal Area Calculation

NOTE: You can access the WLTP calculator at https://www.fordserviceinfo.com. You will need to register or login to use it.

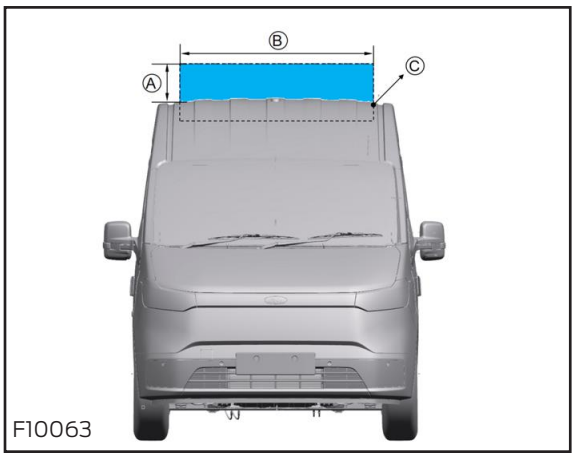
NOTE: All standard or optional equipment has already been taken into account, for example, base vehicle frontal area including mirrors.

To minimise the effect on the frontal area, you can recess roof-mounted systems into or below the original roof line of the vehicle.

For the height measurement (A), only measure the part of the unit that protrudes above the roof line. The convertor only needs to calculate the frontal area of the mounted unit (AxB) in m².

This additional frontal area needs to be added to the WLTP calculator.

Frontal Area Calculation



Item	Description
A	Roof Mounted Unit Height
B	Roof Mounted Unit Width
C	Integrated Roof Mounted Unit

Vehicle Type	Body Style	Propulsion Type	Battery Energy	Max Frontal Area m²
N1	Van L1H1	BEV-FWD	56kWh/110kW	3.35
	Van L2H2	BEV-FWD	56kWh/110kW	3.85
	CCab L2	BEV-FWD	56kWh/110kW	5.26

Refer to section 3.1 E-Drive table for further information.

1.12.10 Chassis Cab Body Extensions

WARNING: Do not modify the wheelbase.

WARNING: Do not allow Centre of Gravity of the body payload to fall behind the rear axle centre line.

NOTE: The maximum front surface area for an incomplete Chassis Cab is shown in frontal area table.

All dimensions are subject to manufacturing tolerances and refer to minimum specification models and do not include additional equipment. The illustrations are for guidance only.

Chassis Cab Body WLTP Constraints

CAUTION: For WLTP compliance, convertors must use the highest efficiency class tyre that is available and that meets local legislation. Any tyre with a category F or G risks not being in the WLTP energy range.

NOTE: You can access the WLTP calculator at https://www.fordserviceinfo.com/. You need to register or login to use it.

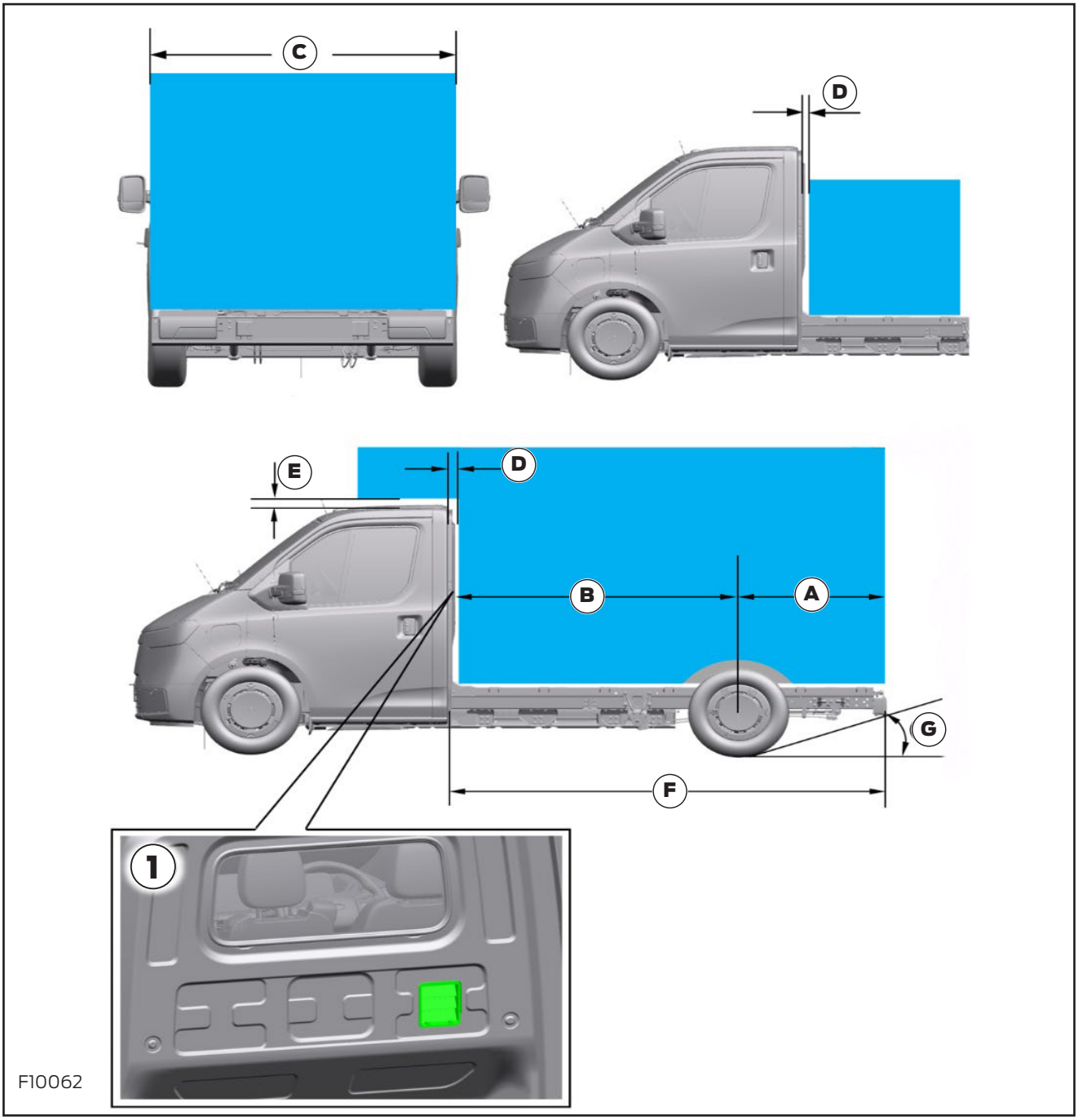
To meet WLTP requirements that depend on the frontal area, aerodynamic measures are necessary for the box body as specified by the following tables.

WLTP Constraints Table

Max Af (m²)	Fairing	Minimum Radius (mm)*			
		R1	R2	R3	R4
5.26	No	15	15	15	15

*Refer to figure F10015 for R1/R2/R3/R4 in section 1.12.6 Worldwide Harmonised Light-Duty Vehicle Test Procedures (WLTP) Calculation Inputs

Maximum Conversion Dimensions



F10062

Description		L2
A	Maximum recommended rear overhang	1290 mm
B	Back of cab to rear axle	1955mm
C	Maximum external body width	2000 mm
D	Minimum clearance between back of the cab and second unit body	30mm
E	Minimum clearance between top of roof and bottom of conversion overhang	30mm
F	Frame length behind back of cab (not including rear light cross member)	2885mm
G	Departure angle	It is recommended to make sure that a minimum departure angle of 14° at RGAWR* of the converted vehicle or any additional part of the conversion is maintained.
1	Vents to be free from obstruction	

*RGAWR: Rear Gross Axle Weight Rating

1.13 Hardware

For hardware material and strength specification, refer to ISO 898-1. For nuts refer to: ISO 898-2. For torque information, follow the procedures in the Ford Workshop Manual. You can access the manual through Ford Service Info at https://www.fordserviceinfo.com.

1.14 Load Distribution

This section has information about load distribution and the limits for the position of the centre of gravity. It also gives instructions on how to measure and calculate the vertical centre of gravity height.

1.14.1 Load Distribution

WARNING: Uneven load distribution could result in unacceptable handling and braking characteristics.

WARNING: Load distribution outside of the permitted range may result in unacceptable steering, handling and braking characteristics.

CAUTION: Do not exceed the axle plated weights.

CAUTION: Do not exceed the gross vehicle weight.

CAUTION: In front wheel drive (FWD) vehicles, the front axle load must, in all load cases, exceed 42% of the actual vehicle weight.

NOTE: Overloading of the vehicle could result in unacceptable ground clearance.

NOTE: The centre of mass of the payload should be located within the wheelbase of the vehicle.

NOTE: Avoid one-sided load distribution.

1.14.2 Centre of Gravity Position

The position of the centre of gravity changes when you add or remove masses from the vehicle. This may influence the steering characteristics, handling behaviour, and the brake performance.

Lateral Position

WARNING: The difference from right to left must not exceed 4%. This is the absolute difference from right to left, divided by the total weight, in per cent.

It is important to keep the Centre of Gravity laterally within given limits. The vertical wheel forces difference, from right to left, determines the lateral centre of gravity. The right side is the front-right mass added to the rear-right mass. The left side is the front-left mass added to the rear-left mass.

Vertical Position - Centre of Gravity Height

The mass of the base delivered vehicle and the added and removed masses determine the centre of gravity height of the vehicle. In physics, this relation is described by Steiner's theorem.

The centre of gravity height influences axle weights while braking. The centre of gravity height influences roll stability. Safety systems work properly within the centre of gravity boundaries that are specified in the warnings that follow.

WARNING: The table below shows maximum vertical centre of gravity CoG_z heights by vehicle and tyre type. If the CoG_z is equal to or less than the values that are stated and no modifications have been made to the components of the braking system, suspension, wheels, or tyres, the converted vehicle complies with ECE R140 or ADR 35 applicable local legislation.

WARNING: If the CoG_z of the converted vehicle is above the values that are stated, Ford makes no representation as to conformity with ECE R140 or ECE R13, as appropriate for the category of the vehicle, or ADR 35 or applicable local legislation.

1.14.3 Centre of Gravity Height Test Procedure

Measurement

The vehicle must be loaded according to the test specifications of either ECE R140 or ECE R13, as appropriate for the category of the vehicle, or ADR 35 or applicable local legislation.

NOTE: To check the centre of gravity height, use four scales. It is possible to use two scales but this requires more preparation and provides a less accurate measurement.

1. Place the vehicle in a horizontal position.

2. Measure the weight of the vehicle.
3. Lift the front of the vehicle.

NOTE: A greater lifting height provides a more accurate measurement. Potential contact between vehicle parts and the roof, the ground, or surrounding objects restricts the maximum lifting height.

To improve the accuracy, prepare the vehicle for measurement

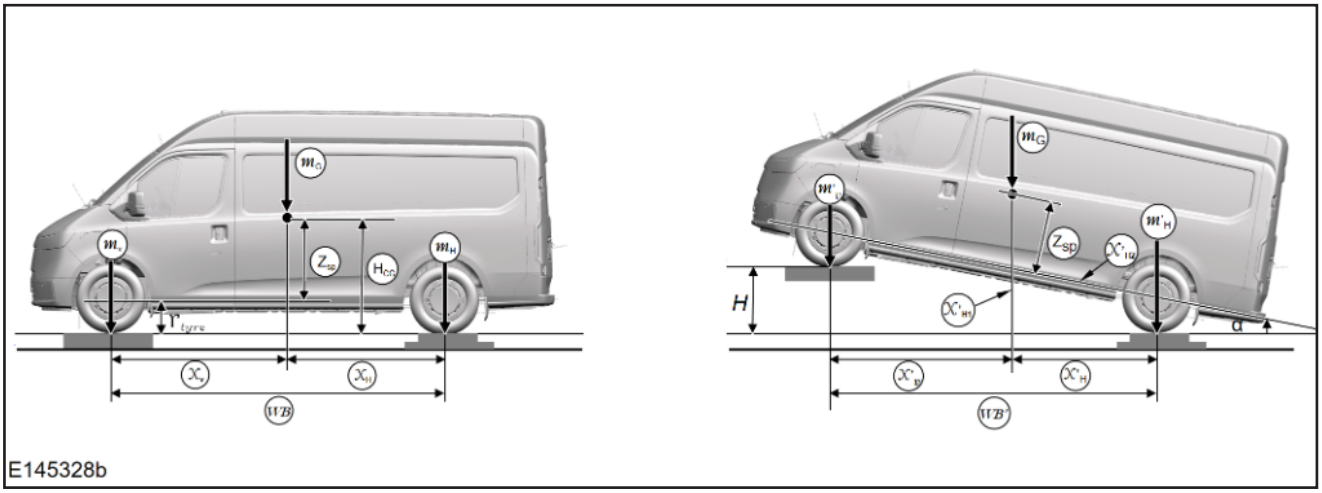
1. Secure the wheel travel. For example, use solid shocks or spring fixtures.
2. Increase the tyre pressure to the maximum allowed value.
3. Remove all loose items from the vehicle or secure them properly.
4. Close all doors.
5. Turn off the engine.

After you lift the vehicle, roll the vehicle freely to release tension in the tyres and suspension.

Calculation

To estimate the resulting centre of gravity (CoGz), you need to measure the axle load twice. The first measurement is in the horizontal plane and the second measurement is after the front is lifted. To get a consistent result, do this test three times independently with different heights.

To improve accuracy, repeat the test the other way around, where the rear end is lifted.



E145328b

Inclination Angle:

$$\alpha = \arcsin\left[\frac{H}{WB}\right]$$

E146623

Centre of Gravity Height Z:

$$z_{SP} = \frac{m_H - m_H'}{m_G \cdot H} \cdot WB^2 \cdot \cos\alpha$$

$$z = H_{CG} = z_{SP} + r_{tyre}$$

E146624

1.14.4 Centre of Gravity Height Calculation

Given or measured parameter	
Wheelbase	WB
Front axle weight	m_V
Rear axle weight	m_H
Front height	H
Calculated and auxiliary parameter	
Centre of Gravity (CoG_Z) height	Z_{SP}
Total vehicle mass	m_G
Distance front axle to CoG (horizontal)	X_V
Distance rear axle to CoG (horizontal)	X_H
Wheelbase (projected in horizontal)	WB'
Front axle weight	m'_V
Rear axle weight	m'_H
Distance front axle to CoG (projected in horizontal direction)	X'_V
Distance rear axle to CoG (projected in horizontal direction)	X'_H
Inclination angle	arc sin
Front part of 'distance rear axle to CoG (horizontal)'	X_{H1}
Rear part of 'distance rear axle to CoG (horizontal)'	X_{H2}

1.14.5 Formulas

Masses and lengths. Total vehicle mass is the sum of front and rear axle weights: $m_G = m_V + m_H$

The longitudinal distances between the Centre of Gravity and the centres of wheels equal:

$$x_V = \frac{m_H}{m_G} WB$$

$$x_H = \frac{m_V}{m_G} WB$$

E146626

In inclined system, the main variable is the inclination angle, which is the quotient of the lifting height and the wheelbase:

$$\sin \alpha = \frac{H}{WB}$$

E146627

Similar to the equation for the horizontal system, the distance projected into the ground plane can be determined using the sum of moments around front and rear wheel centre:

$$x_V' = \frac{m_H'}{m_G} WB'$$

$$x_H' = \frac{m_V'}{m_G} WB'$$

E146628

The following equations apply:

$$WB' = WB \cos \alpha$$

$$x_{H2} = \frac{x_H'}{\cos \alpha}$$

$$x_{H1} = x_H - x_{H2}$$

E146629

Using the rule of proportion leads to the Centre of Gravity height formula:

$$\frac{x_{H1}}{z_{SP}} = \frac{H}{WB'}$$

$$z_{SP} = \frac{m_V - m_V'}{m_G \cdot H} \cdot WB^2 \cdot \cos \alpha \quad , \quad \alpha = \arcsin \left[\frac{H}{WB} \right]$$

or

$$z_{SP} = \frac{m_H' - m_H}{m_G \cdot H} \cdot WB^2 \cdot \cos \alpha \quad , \quad \alpha = \arcsin \left[\frac{H}{WB} \right]$$

E146630

2.1 Suspension System

WARNING: Do not modify, drill, cut or weld any suspension components. This includes the steering gear system, subframe, lower control arm or anti-roll bars, springs or shock absorbers including mounting brackets.

WARNING: Do not interchange springs, shock absorbers and jounce bumpers, including between different Transit variants. Changes in vehicle dynamic performance can affect the Electronic Stability Program (ESP) system.

CAUTION: Do not modify the suspension system. Any modification reduces vehicle handling and durability.

2.2 Front Suspension

This section has information about the front suspension springs and spring mounting. It gives instructions on prohibited modifications and safety precautions for these components.

2.2.1 Springs and Spring Mounting

WARNING: Do not modify, drill, cut or weld any suspension components. This includes the steering gear system, subframe, lower control arm or anti-roll bars, springs or shock absorbers including mounting brackets.

WARNING: Do not interchange springs, shock absorbers and jounce bumpers, including between different Transit variants. Changes in vehicle dynamic performance can affect the Electronic Stability Program (ESP) system.

CAUTION: When you weld, cover the springs to protect them from weld spatter.

CAUTION: Do not touch springs with welding electrodes or welding tongs.

CAUTION: Reassemble all components correctly after you loosen or remove them. Set the torque to the manufacturer's requirements.

NOTE: Do not modify the wheelbase and track width.

NOTE: Do not damage the surface or corrosion protection of the spring during disassembly and installation.

2.3 Rear Suspension

This section has information about the rear suspension springs and spring mounting. It gives safety warnings against modifying or interchanging components on internal combustion and electric vehicles.

2.3.1 Springs and Spring Mounting

WARNING: Do not interchange springs, shock absorbers and jounce bumpers, including between different Transit variants. Changes in vehicle dynamic performance can affect the Electronic Stability Program (ESP) system.

WARNING: The rear leaf springs are pre-stressed during manufacture. Do not alter them for rate or height during vehicle conversion. Adding or removing leaves or any other spring type can cause failure or reduced function of the spring. It can also cause other vehicle-related issues for which Ford is not responsible.

WARNING: Do not modify, drill, cut, or weld any suspension components. This includes the steering gear system, subframe, springs, or shock absorbers, including mounting brackets.

CAUTION: When you weld, cover the springs to protect them from weld spatter.

CAUTION: Do not touch springs with welding electrodes or welding tongs.

CAUTION: Reassemble all components correctly after you loosen or remove them. Set the torque to the manufacturer's requirements.

NOTE: Do not modify the wheelbase and track width.

NOTE: Do not damage the surface or corrosion protection of the spring during disassembly and installation.

NOTE: Do not add any additional axles.

2.4 Wheels and Tyres

This section has information about wheel and tyre specifications, including proper clearance, approved tyre types, and the Tyre Pressure Monitoring System. Additionally, details are covered regarding spare wheels, tyre repair kits, jacking kits, and guidelines for painting road wheels.

2.4.1 Wheel Clearance

You must make sure there is enough clearance between the tyre and the mudguard or wheel arch.

This includes conditions when you install snow or anti-skid chains and the suspension is fully compressed with axle twist.

NOTE: Fit only approved wheels or permissible tyre sizes.

NOTE: Make sure there is access to the wheel and wheel jack. Provide enough clearance in the wheel arch to change the wheels after conversion.

For standard wheelhouse dimensions: Refer to 5.1.6 Integrated Bodies and Conversions.

Tyre Manufacturers

Use replacement tyres that have the same make, size, tread pattern, and load rating as the original equipment. If you use these tyres, the original tyre label is satisfactory. If you change the specified tyres or inflation pressures then fit a new label over the original label.

2.4.2 Tyre Pressure Monitoring System (TPMS)



F20004

The Ford TPMS is a direct system that uses physical pressure sensors. Ford calibrates the TPMS according to the correct tyre pressure for the Gross Vehicle Mass (GVM) of the vehicle. If you order the spare wheel on a base vehicle with TPMS, Ford does not supply the tyre with a TPMS sensor.

NOTE: If you replace a road wheel with the spare wheel, then the system identifies a fault. This fault is a reminder to repair and refit the original wheel and tyre. To restore the correct operation of the system, refit the repaired wheel and tyre assembly to the vehicle.

NOTE: If you install new tyres, you must make sure that you install the TPMS sensors correctly as the service literature describes. For additional information, refer to the Owner's Manual or contact your local Ford Dealer.

The TPMS receiver is located on the back side of the front headliner, near the front dome light.

2.4.3 Tyre Repair Kit

A temporary mobility kit is made up of a compressor with sealant, and located under the passenger seat. If the passenger seat is removed and the resultant space is converted, please make sure access to the kit is maintained or the kit is relocated to an easily accessible alternate location. For more information and usage of the tyre repair kit please refer to the Owner's Manual.

2.4.4 Painting Road Wheels

CAUTION: Do not paint wheel clamp surfaces that are in contact with other wheels, the brake drum or disc, the hub and holes, or surfaces under the wheel nuts. Any additional treatment in these areas can affect the wheel clamp performance and the vehicle safety. Mask the wheel when changing the colour or repairing paint.

2.5 Brake System

This section has information about the general requirements for the brake system, including the brake fluid reservoir, hoses, and parking brake. It details the restrictions on modifying the hydraulic brakes and the stability assist systems.

2.5.1 General - Brake System

After you complete the vehicle conversion, make sure that the brake system works correctly.

Check the items that follow:

- The vehicle brake operating modes
- The warning system
- The parking brakes

Ford certifies the brakes to 71/320EEC and ECE R13H requirements as amended, ADR 35, or applicable local legislation.

WARNING: Do not restrict the airflow and cooling to the brake system.

CAUTION: Spoilers and wheel covers must not affect the brake cooling performance.

CAUTION: If you significantly alter the vehicle mass or geometry of a converted vehicle with Advanced Emergency Braking System (AEBS), a Ford dealer must check the radar vertical alignment and system functionality. For more information, refer to the Ford Workshop Manual or Owner's Manual.

NOTE: The brake fluid reservoir of the donor vehicle is translucent. This allows you to check the fluid level without you opening the reservoir and reduces the risk of contamination. Do not move the brake fluid reservoir.

NOTE: Do not obstruct the view of the brake fluid reservoir level.

NOTE: Make sure the brake fluid reservoir is accessible for servicing and for adding brake fluid.

2.5.2 Brake Hoses General

WARNING: Make sure the front and rear brake hoses are not twisted. Make sure the hoses are located correctly, away from body and chassis components.

WARNING: Front and rear brake hoses must not rub, chafe, or rest on body or chassis components. Make sure there is clearance under all operating conditions, from full compression to full extension and from full lock to full lock.

WARNING: Brake lines must not be used to support or secure any other component.

2.5.3 Parking Brake

WARNING: Do not modify the brakes.

WARNING: Do not splice into the parking brake actuation cables.

WARNING: Do not modify the Electronic Parking Brake (EPB).

2.5.4 Hydraulic Brake - Front and Rear Brakes

WARNING: Do not modify the brakes.

WARNING: Do not modify the disc inflow and outflow of cooling air.

2.5.5 Anti-Lock Control — Stability Assist

WARNING: Do not modify any part of the braking system, including Anti-Lock Brake System (ABS), Traction Control System (TCS) and Electronic Stability Control (ESC), also known as Electronic Stability Program (ESP) or the Automatic Emergency Braking system (AEB).

3.1 E-Drive

CAUTION: Follow the equipment supplier’s instructions for safety, warranty and legal compliance.

CAUTION: Do not modify the Electric Drive Assembly (including but not limited to drilling, cutting, welding or affixing additional parts to the unit).

Do not modify the oil fill level or oil type from the manufacturer's specification.

CAUTION: Do not modify the Halfshafts in the Electric Drive Assembly.

CAUTION: Do not add any additional components or structures that may in any way impede the function of the Electric Drive Assembly or restrict or otherwise block air flow to and from it.

CAUTION: Do not remove any NVH covers, shields or dams fitted to the Electric Drive Assembly.

3.2 High Voltage System and Electrified Drivetrain

This section gives information about the health and safety precautions for high-voltage systems and gives an overview of the high-voltage system. This section describes the high-voltage battery, the venting and grounding, the cooling system, and the charging of the electric vehicle.

WARNING: Before you begin any vehicle modifications, refer to the High Voltage System Health and Safety Precautions section that follows.

3.2.1 High Voltage Health and Safety Precautions

WARNING: Do not touch the orange high-voltage cables, components, fasteners, channels, strain relief, ground wire or connectors.

WARNING: Do not drill, modify or obscure the orange high-voltage cables, components, fasteners, channels, strain relief, ground wire or connectors.

WARNING: Service of the high-voltage system on this vehicle is restricted to qualified personnel. The required qualifications vary by region. Always observe local laws and legislative directives regarding electric vehicle service. Failure to follow this instruction may result in serious personal injury or death.

WARNING: To prevent the risk of high-voltage shock, always follow all warnings and service instructions. This includes instructions to de-energise the system. The high-voltage system uses approximately 400V DC. It provides this voltage through high-voltage cables to its components and modules. The high-voltage cables and wiring have orange harness tape or an orange wire covering. All high-voltage components have high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions can result in serious personal injury or death.

WARNING: Any work on the high-voltage system requires the removal of Manual Service Disconnect (MSD) and storage in safe place. Failure to follow these instructions may result in serious personal injury or death. See figure F30058 for location.

WARNING: Extreme heat, such as from paint drying ovens, causes damage to the high-voltage battery. You must remove the high-voltage battery before you use paint drying ovens for longer than 45 minutes or with temperatures above 60°C. Failure to follow this instruction can result in damage to the high-voltage battery. This damage can cause serious personal injury or death in a fire or explosion. Please refer to the Ford Workshop Manual.

WARNING: A de-energisation of the high-voltage system does not dissipate the voltage inside the high-voltage battery. The battery pack remains live and dangerous. Contact with the high-voltage battery pack internals can result in serious personal injury or death.

WARNING: Do not modify powertrain software calibrations. This includes Central Control Unit, Motor Control Module, Battery Management System, Electric Vehicle Communication Controller and Anti-lock Braking System Control Module.

WARNING: Avoid direct contact with high-voltage components. Do not step on, lean on, or place any tools or equipment on high-voltage components.

“High-voltage” is defined in UN ECE 100 as:

- Greater than 60 V for Direct Current (DC) circuits.
- Greater than 30 V RMS for Alternating Current (AC) circuits.

Convertors must not connect to or modify the high-voltage system or components in any way. Integrate with the vehicle electrical system only through the 12 V low-voltage electrical system.

Only qualified Ford service personnel can diagnose or repair any high-voltage components or systems. Train all personnel who work on or near vehicles with high-voltage systems in basic HV safety principles. This includes personnel who are involved in engineering, subsequent stage manufacturing, modifying, or servicing vehicles with high-voltage systems.

Emergency Response Guides, which contain information for first responders, can be helpful to develop an emergency response plan in case a vehicle with an high-voltage system is damaged.

The manufacturing operations that follow are not recommended on vehicles with high-voltage systems:

- Welding anywhere on the chassis or installed body.
- Cutting or drilling operations near HV components.
- Operations that generate significant heat near HV components, especially near the HV battery.

- Paint curing operations above 60°C or for longer than 45 minutes.

For information about welding, drilling, or cutting, refer to the sections that follow:

- 5.1.4 Precautionary Drilling/Welding
- 5.1.5 Precautionary Floor Drilling: Vans

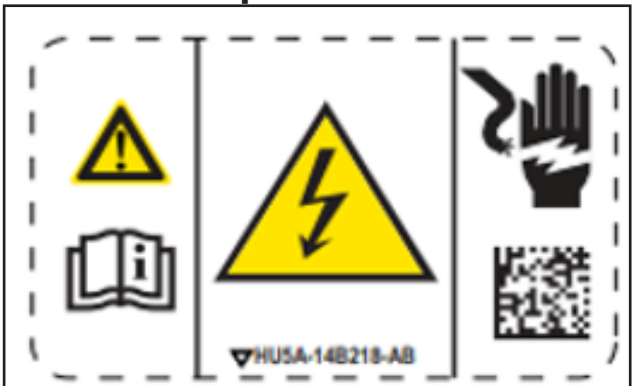
High-Voltage Labels

Warning labels are located on high-voltage components throughout the electric vehicle.

WARNING: Do not obscure or alter high-voltage warning symbols.

Examples of warning labels:

HV Label Example 1



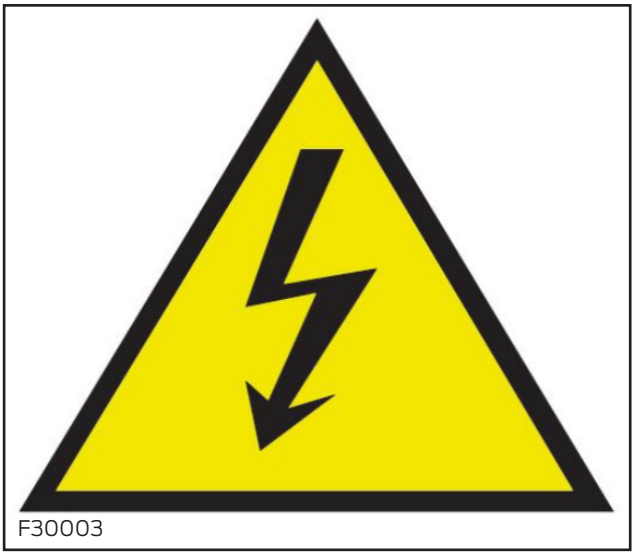
F30001

HV Label Example 2



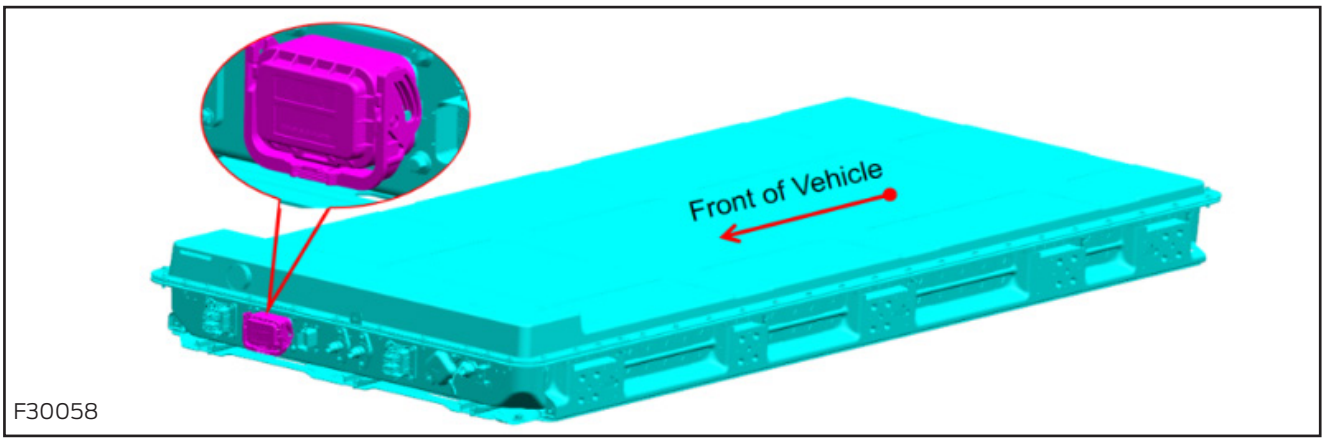
F30002 rev1

HV Label Example 3



F30003

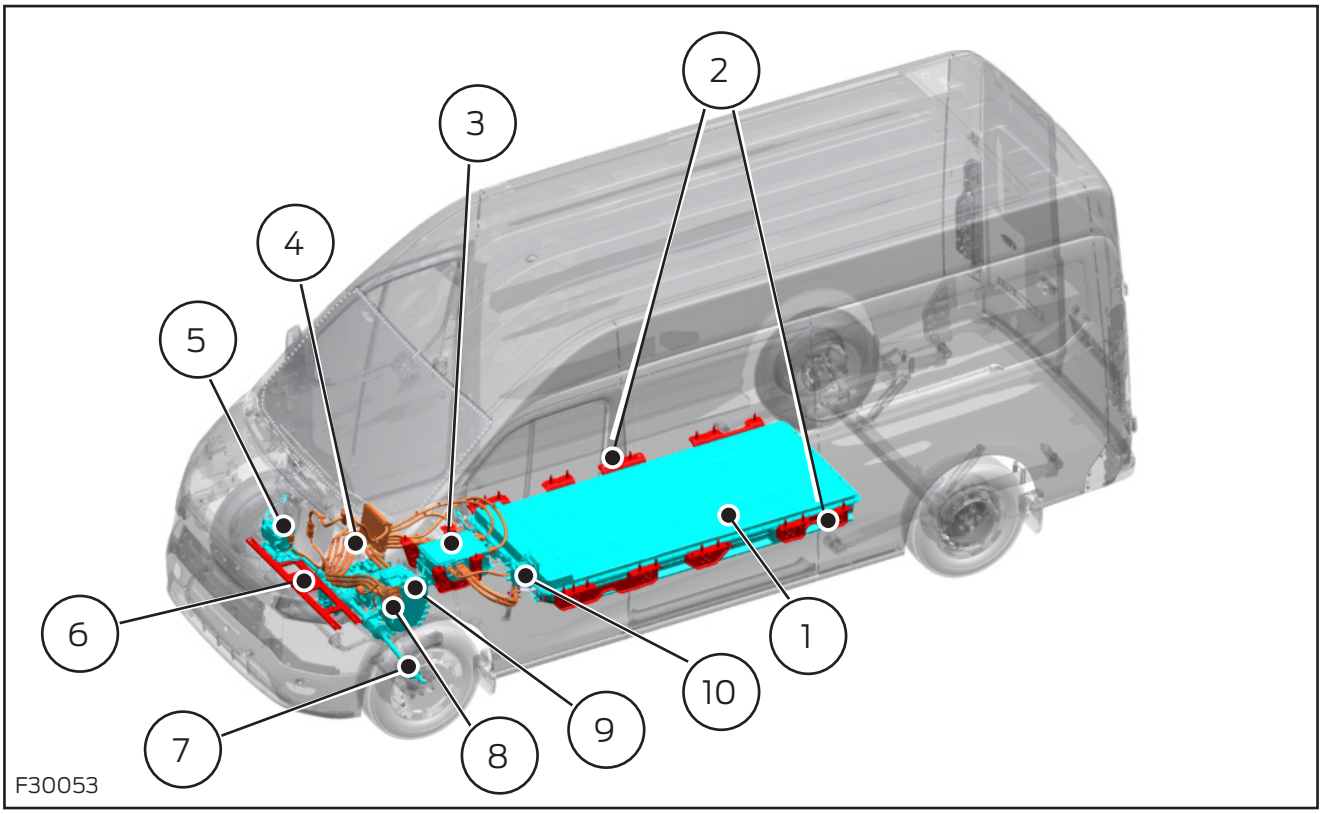
Manual Service Disconnect (MSD) Location



3.2.2 High Voltage System Overview

The high-voltage system consists of a high-voltage battery pack, a 'stack' of HV control systems and an Electric Drive Assembly providing drive to the front wheels. These parts connect with orange high-voltage cables and a system for cooling the components of the high-voltage system.

High-Voltage System Overview



Item	Description
1	High-Voltage Battery
2	High-Voltage Battery Bracket
3	PDU- Power Distribution Unit
4	High-Voltage Cable
5	Compressor
6	EVCC- Electrical Vehicle Communication Controller
7	Halfshafts
8	Charge Port
9	Drive Motor
10	PTC

3.2.3 HV System De-Energising

Refer to the Ford Workshop Manual for HV Battery Disconnect and Connect procedure.

WARNING: A de-energisation of the high-voltage system does not dissipate the voltage inside the high-voltage battery. The battery pack remains live and dangerous. Contact with the high-voltage battery pack internals can result in serious personal injury or death.

NOTE: When the HV system is de-energised, the 12 V low-voltage system remains live.

3.2.4 HV System Cooling

WARNING: Do not modify the HV battery cooling system.

3.2.5 High Voltage Battery

Obey the precautions that follow when you work on or around high-voltage batteries:

- Do not cut the high-voltage battery case. Do not penetrate the batteries or the case.
- The high-voltage battery pack is installed below the vehicle.
- The total voltage of the HV battery pack can be up to approximately 400 V DC.
- The battery case is water resistant.
- The battery cells contain liquid electrolyte that is absorbed in a special porous polymeric film. The electrolyte does not leak from the battery under most conditions. However, if the battery is crushed, it is possible for a small amount of electrolyte to leak.
- If possible, isolate and avoid contact with any electric vehicle components. If you cannot avoid contact with the high-voltage system, you must use Personal Protective Equipment (PPE) when you handle damaged batteries. PPE includes a splash shield or safety goggles, butyl gloves, an apron or overcoat, and rubber boots. Exposure to the electrolyte can cause skin or eye irritation and burns. If you have exposure to the electrolyte, rinse the affected area with large amounts of water for 10 to 15 minutes.

The high-voltage system has a floating return reference. This reference is designed to completely isolate the HV system from the vehicle chassis and non-HV components and circuits. As part of the safety features that are built into the HV system, the system monitors measurements between the HV bus and the vehicle ground during the 'key-on' state. This monitoring detects HV leakage or stray current to the chassis.

The power terminals of the high-voltage battery are only activated when necessary for vehicle operation, including:

- When the vehicle is in the 'key-on' or 'accessory' state.
- When the 12 V battery has a low state of charge, the HV battery activates to charge the 12 V battery through the DC-to-DC convertor. This happens even in the vehicle 'key-off' state.
- When the vehicle is plugged into a charging station, the charge unit, HV battery, and the wiring between these components can be active. High-voltage is present even in the vehicle 'key-off' state.

HV Battery Venting

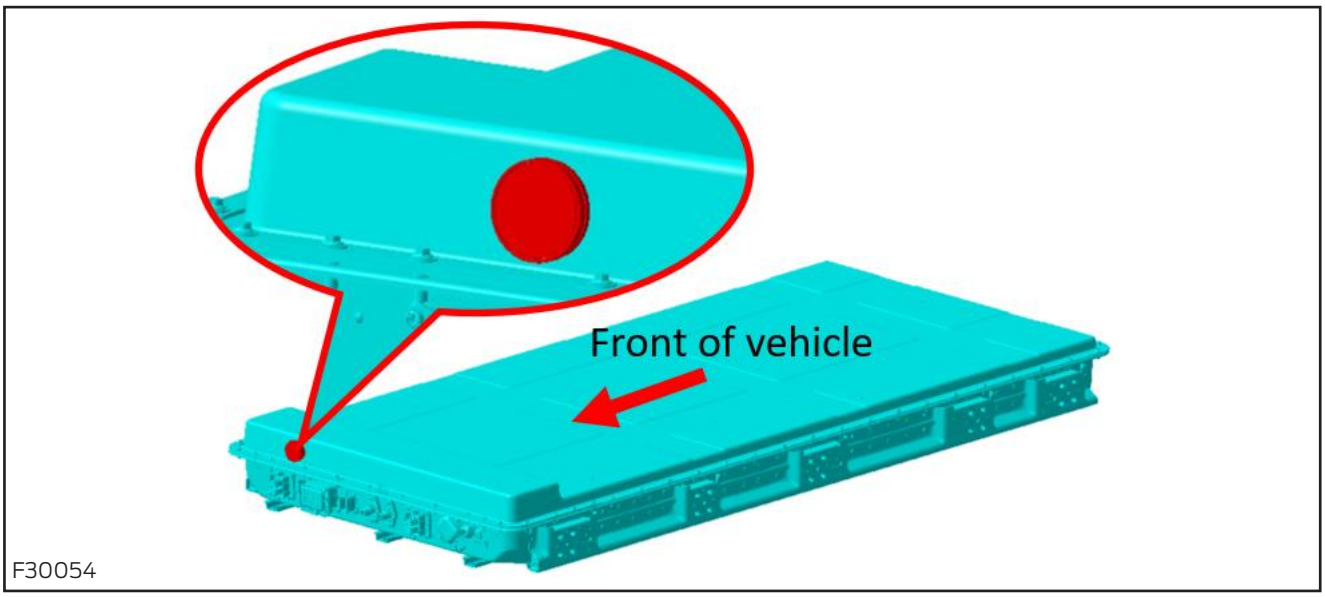
WARNING: The high-voltage battery has an exhaust vent. Do not install additional components or obstructions within 150 mm of the battery or the exhaust vent. Do not install components that contain combustible liquids or gases within 300 mm of the battery or the exhaust vent.

WARNING: Do not make modifications or install components that confine the air space near the outside of the HV Battery. Do not obstruct the free flow of air around the battery.

WARNING: Seal any cutouts or openings that you create between the occupant space and the vehicle underbody. This seal prevents air from passing from under the vehicle into the occupant space.

WARNING: If any primary entry or exit paths for occupant spaces are above or behind the rear axles, add a metallic shield. This shield must obstruct any airflow from the battery toward those paths. It must also redirect that airflow toward a side or rear area that is not a primary entry or exit path.

HV Battery Venting



HV Battery Grounding

WARNING: The illustrations show the grounding points for the high-voltage battery and cradle. Do not use these points as additional or auxiliary grounding points for the 12 V LV system.

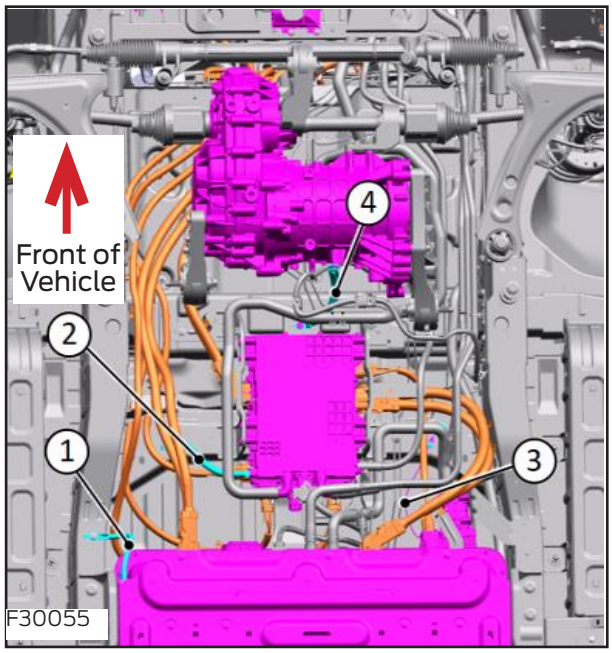
WARNING: Do not alter or modify the electrical ground paths for high-voltage components. These paths include case grounds, ground straps, and low-voltage wiring. Do not tamper with or modify any of these HV component fastener joints or ground points.

WARNING: If you remove fasteners, you must replace them with the same fastener type.

WARNING: The HV system safety features use these ground paths to measure the HV circuitry against the vehicle ground. Do not alter the HV systems ground paths.

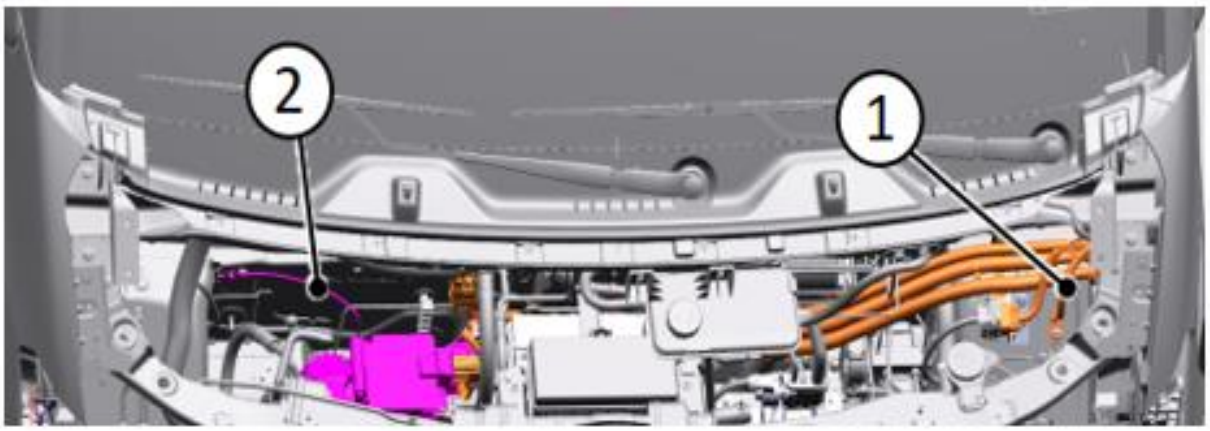
Refer to 4.2.13 Precautionary Drilling - Cable Grounding.

HV Components to Chassis Grounding : Van and Chassis Cab



Items	Description
1	High-Voltage Battery Pack Grounding
2	PDU Grounding
3	PTC (Battery Pack Heating) Grounding
4	Driver Monitor Grounding

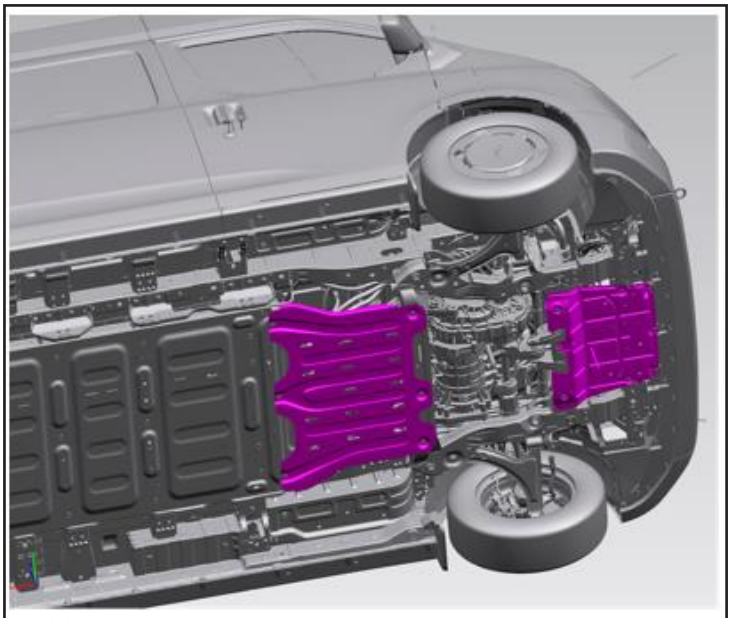
Front Compartment HV Components to Chassis Grounding: Van and Chassis Cab



F30056

Items	Description
1	Charge Port Harness Grounding
2	AC Compressor Grounding

PDU and Drive Motor Shields


F30057

CAUTION: The PDU and Drive Motor shields must NOT be removed.

3.2.6 EV Charging

Please refer to the Owner's Manual.

4.1 Electrical System Overview

WARNING: Obey the guidelines in the electrical sections of this manual. Incorrect design, for example, overloaded ground paths or insufficient mechanical protection for third-party wiring, can cause vehicle fire, serious injury, or death.

CAUTION: Do not fit voltage boosters or other devices to enhance alternator or DCDC output. The fitment of such devices invalidates vehicle warranties. These devices can also damage the alternator, the Engine Management System, Power Control Module, and possibly affect vehicle legal compliance. Check local legislation.

NOTE: Ford does not control the modification or installation process of auxiliary electrical systems therefore cannot take responsibility for these installations.

4.2 Wiring Installation and Routing Guides

This section provides a wiring installation and routing guide for conversions that affect electrical components or electrical systems. These guidelines help to maintain robust integration of auxiliary systems without a compromise to existing systems by the control of splicing techniques, module package location, and electromagnetic compatibility (EMC). The convertor must test the installation and make sure the design and function complies with all legal and homologation requirements.

4.2.1 General Wiring and Routing

Temperature requirements: Wiring systems in the vehicle interior function over the temperature ranges of -40 ºC to 85 ºC for exposure and -40 ºC to 75 ºC for operation. For the engine compartment and underbody, the minimum temperature is -40 ºC. The maximum temperatures are 125 ºC for exposure and 105 ºC for operation.

Make sure the insulation is compatible with any fluids it can encounter, such as petrol, oil, antifreeze, brake fluid, transmission fluid, and power steering fluid.

If a connector is in a wet area, then use a sealed connector. Wet areas include the following:

- engine compartment
- wheel wells
- underbody
- doors

Maintain a distance of less than 300 mm between retention points for wiring that is not in a rigid shield. For wiring inside the doors, reduce this distance to 150 mm.

Minimum clearances:

- 250mm from exhaust system
- 25mm from all sharp edges
- 30mm to all (motion envelope) rotating or moving components
- 25 mm from fluid lines
- 15mm from weld points
- 10mm from static components

If you cannot meet these clearances, then protect the wires with a convolute or a heat shield, or both.

For conversions with walkthroughs, provide appropriate protection on the floor in the walkway.

Do not use connecting blocks with screws or spring retention. Low-frequency vibration in certain vehicles can cause terminals to become loose.

Use a secondary clamp design on all eyelets to help avoid strain and the break of a single conductor strand.

Use a set ratchet crimp tool for the required crimp force.

Crimp all connections. Do not use soldering as the only retention method. Only use soldering as an additional retention method to reduce impedance.

If you route wiring through drilled metal, then protect all holes with a grommet or protective edging to avoid chafing.

Provide a secondary form of mechanical protection for all single or multiple wires, such as cotton, PVC tape, conduit, or sleeving, that depends on the routing environment in the vehicle.

Use edge clips where required to control the routing of all cables in weather zone areas of the vehicle. Do not use edge clips for non-weather zone areas of the vehicle.

4.2.2 Connector Pin Out Practices

If you design a harness to connect a component, then install the female terminals in the harness side connection and the male terminals in the component side. If you determine the connector pinouts, then make sure that the power and ground circuits are not adjacent to each other. Maintain a minimum separation of 5 mm between the power and ground circuits.

WARNING: Do not use connectors that cut through the outer covering and into the core wire.

CAUTION: Only use Ford approved connectors.

Do not cut into vehicle wiring because:

- The base vehicle specification is not applicable for incremental loads.
- There is a long term risk of a faulty connection.
- There is a potential fire risk from overloading.

Permanently insulate all connections into existing wiring. Make exterior connections waterproof.

When you design or alter electrical circuits, you must consider the points that follow:

- The current rating of the wiring. Refer to the table 'Current Rating of Wire Sizes' in this section.
- The voltage drop in the circuit must not lower the terminal voltage at the consumption point to below 95% of the battery voltage.
- Do not cut into the original harness.
- Include additional ground returns to support new equipment.
- Add a supplementary circuit diagram and instructions to the owner's handbook or a separate manual for each unique component.
- If you must extend wires, use break-in points and only Ford-approved connectors.
- Use Ford-approved jumper harnesses.

4.2.3 Unused Connectors

Harnesses can have several unused connectors that depend on the features that you order on the donor vehicle, such as heated seats. Ford does not recommend the use of these connectors for any purpose other than the intended design.

4.2.4 Grounding

If you require a new grounding point, do not place it in a wet area, especially for high-current grounds. Route ground connections back close to the location of the +12V supply. This procedure helps to reduce the electromagnetic field that is generated by inrush current and improves electromagnetic compatibility.

- Drill point screws are not to be used for any ground attachments
- Do not ground to moving structures, such as doors, deck lids, and lift gates. The ground return path through the hinges is not reliable.
- Do not exceed two eyelet or crimp terminals per stud connection for high-current applications. Refer to: 4.5 Battery Systems
- Connect a dedicated ground for each individual third-party load directly to the vehicle body ground or to the battery negative spare stud.
- Do not connect multiple grounds to an interim splice to a main ground cable.

For identification of suitable grounding points, refer to 4.18 Grounding

4.2.5 Prevention of Squeaks and Rattles

You must positively retain wiring every 300 mm. When the wiring is inside a door, you must retain it every 150 mm. You must positively retain all connectors. Use tapes that do not squeak against metal or plastic.

4.2.6 Water Leakage Prevention

Make sure the harness design includes drip-loops to prevent water seepage into the vehicle interior when wiring passes from the outside to the inside of the vehicle. The drip-loop is a section of wiring that is deliberately formed to route below the point of entry into the vehicle. Water droplets on the harness migrate under gravity to the lowest part of the harness.

Route wiring from the door to the passenger compartment so that the door entry point is below the passenger compartment entry point. This procedure creates a type of drip loop.

4.2.7 Wiring Splicing Procedures

TYCO-RAYCHEM crimp splices



E131081

Ford strongly advises against the use of wire splicing due to the variable and unpredictable nature of the joint. If a wire splice is unavoidable, then you must make it with **DuraSeal Heat-Shrinkable, Environmentally Sealed, Nylon-Insulated Crimp Splices** from TYCO-RAYCHEM, for example, the D406 series. To improve the splice integrity, further seal the splice with a suitable heat shrink tubing. See Figure E131081.

4.2.8 Wiring Specification

Current Rating of Wire Sizes

ISO Conductor Size mm² CSA	Conductor Resistance mOhm/m					
	Maximum			Minimum		
	Plain Copper	Tinned Plated Copper	Nickel Plated Copper	Plain Copper	Tinned Plated Copper	Nickel Plated Copper
0.13	136	140	142	-	-	-
0.22	84.8	86.5	87.9	-	-	-
0.35	54.4	55.5	56.8	-	-	-
0.5	37.1	38.2	38.6	-	-	-
0.75	24.7	25.4	25.7	22.7	23.3	23.6
1	18.5	19.1	19.3	17.0	17.6	17.7
1.5	12.7	13.0	13.2	11.7	11.9	12.1
2.0	9.42	9.69	9.82	8.66	8.91	9.03
2.5	7.60	7.82	7.92	6.99	7.19	7.28
3	6.15	6.36	6.41	5.66	5.85	5.89
4	4.71	4.85	4.91	4.33	4.46	4.52
5	3.94	4.02	4.11	3.62	3.70	3.78
6	3.14	3.23	3.27	2.89	2.97	3.01
8	2.38	2.52	2.60	2.19	2.32	2.39
10	1.82	1.85	1.90	1.68	1.70	1.75
12	1.52	1.60	1.66	1.40	1.47	1.53
16	1.16	1.18	1.21	1.07	1.09	1.12
20	0.955	0.999	1.03	0.870	0.919	0.948
25	0.743	0.757	0.774	0.688	0.701	0.716
30	0.647	0.684	0.706	0.595	0.629	0.650
35	0.527	0.538	0.549	0.489	0.500	0.510

40	0.473	0.500	0.516	0.435	0.460	0.475
50	0.368	0.375	0.383	0.343	0.350	0.357
60	0.315	0.333	0.344	0.290	0.306	0.316
70	0.259	0.264	0.270	0.243	0.248	0.254
95	0.196	0.200	0.204	0.185	0.189	0.193
120	0.153	0.159	0.159	0.146	0.149	0.152

When designing wire installations for additional equipment use the cable size recommended by the equipment manufacturer or select a suitable size from the 'Current Rating of Wire Sizes' table.

4.2.9 Electromagnetic Compatibility (EMC) Awareness

WARNING: Do not route other wiring near or close to the electrical cables for the Anti-lock Brake System and Traction Control System because of the risk of extraneous signals. Do not hang extra wiring from existing looms or pipes.

The installation and routing of Ford wiring is fully validated and passes the required EMC tests. Ford is not responsible for the vehicle's EMC immunity when you install non-Ford-approved systems.

Maintain the clearances that follow for single or bunched looms:

- 10 mm from static components, unless clamped to it
- 30 mm from rotating or moving components

Fix wiring suitably without a detrimental effect on other wiring.

Refer to 1.6 Electromagnetic Compatibility (EMC).

4.2.10 Wiring Through Sheet Metal

CAUTION: Route harnesses that pass through sheet metal through protective grommets that also make sure a watertight seal. Use a windscreen-type sealer. Do not use adhesive or tape.

NOTE: The holes must permit the appropriate connector to pass through.

NOTE: The maximum diameter of an additional wire bundle is 6mm.

4.2.11 Precautionary Drilling - HV Cables

WARNING: Do not touch the orange HV cables, fasteners, channels, strain relief, ground wire or connectors.

WARNING: Do not drill, modify or obscure the orange HV cables, fasteners, channels, strain relief, ground wire or connectors.

WARNING: Install fasteners so that they point away from the high-voltage battery to avoid causing damage to the battery.

WARNING: Do not install any component or structure that results in contact, penetration, separation, or other damage to the high-voltage electrical system or any portion of it when the vehicle is tested in any manner. Penetration especially refers to added fasteners that point towards the high-voltage battery or other electrical components.

WARNING: Do not modify the high-voltage charge port inlet connector or mounting bracket.

WARNING: Do not modify the high-voltage or low-voltage grounding locations, joints, or fasteners of the charge port harness package grounds.

WARNING: Do not modify the length of any of the orange high-voltage cables.

WARNING: Do not remove the fasteners and the protective shield from the harness of the charge port inlet.

CAUTION: If you drill or do any other operation in or near a high-voltage cable, then you must avoid causing damage to the cable.

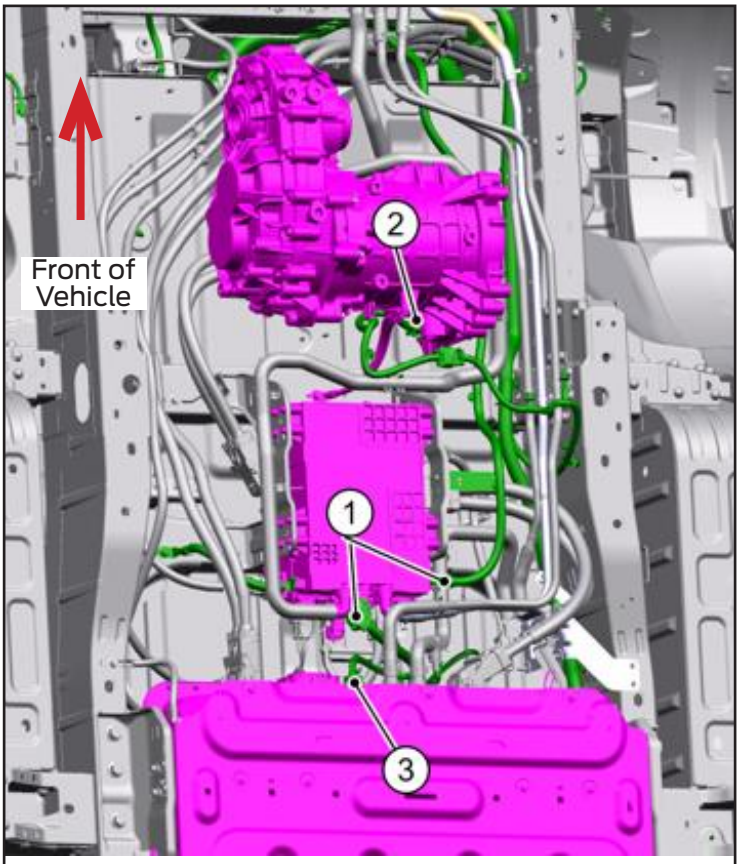
4.2.12 Precautionary Drilling - HV Modules, LV Cables and Connectors

WARNING: Do not modify any existing low-voltage cable connections.

CAUTION: If you drill or do any other operation in the areas shown, then you must avoid causing damage to any components.

CAUTION: Be careful when you drill or do any operation near the LV cable that connects to the high-voltage modules. Damage can negatively impact vehicle performance. The LV cable also includes a ground for HV components.

LV Connectors: PDU, HV Battery & Drive Motor



F40401

Items	Description
1	LV Connector to PDU
2	LV Connector to Drive Motor
3	LV Connector to HV Battery

4.2.13 Precautionary Drilling - Cable Grounding

WARNING: Do not touch the HV grounding points in the vehicle.

WARNING: The high-voltage circuitry is not grounded to the body or chassis in the same way as the low-voltage (12 V) system. As part of the safety features in the HV system, the system measures between the HV circuitry and vehicle ground using these ground paths. Therefore, do not alter the HV module ground paths.

WARNING: Do not modify high-voltage or low-voltage grounding locations, joints, or fasteners of the charge port harness package grounds.

CAUTION: If you drill or do any other operation in or around the high-voltage stack or the electric drive assembly, then you must avoid causing damage to any components.

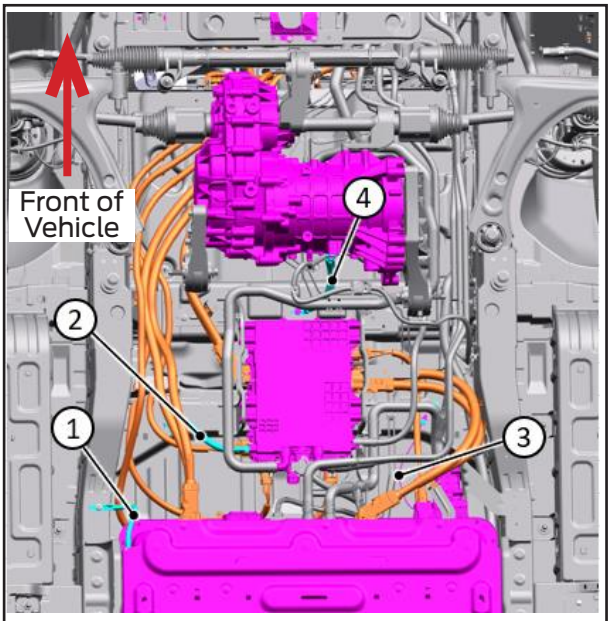
Cable Grounding: Charge Port Harness & AC Compressor



F40402

Items	Description
1	Charge Port Harness Grounding
2	AC Compressor Grounding

Cable Grounding: HV Modules and Electric Drive Assembly



F30055

Items	Description
1	High-Voltage Battery Pack Grounding
2	DCDC Grounding
3	PTC (Battery Pack Heating) Grounding
4	Drive Motor Grounding

4.2.14 Precautionary Drilling - Rear Cargo Area

CAUTION: Do not drill into the vehicle before you check the precautionary drill zones and electrical wire routing.

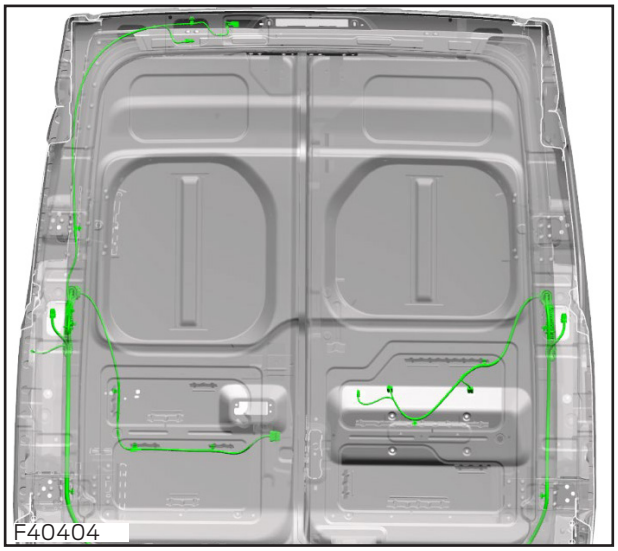
NOTE: Refer also to section 5.9.2 B-Pillar Precautionary Drilling for details of the restrictions in the area around the Seat Belt installation.

The illustrations that follow show the routing of cabling in the rear cargo area. These illustrations indicate Precautionary Drilling zones where you must avoid wire routing when you install items such as cladding and racking. Take the same care when you use self-tapping screws. Not all derivatives are shown, but the routing is the same for the roof line and wheelbase for the B, C, and D pillars or roof bows and doors. The side of the vehicle where the side loading door is located will vary according to territory. Other non-electrical systems can also be present. It is important to check before you drill.

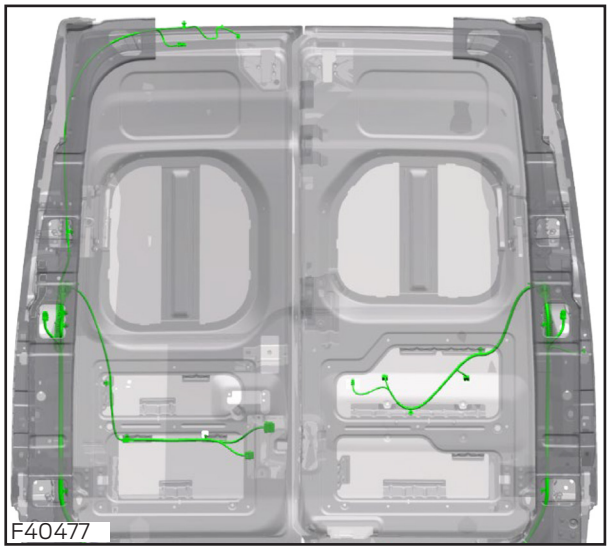
For additional information refer to the links that follow:

- 5.1 Body Precautionary Drilling
- 5.2 Racking Systems
- 5.3 Loadspace Load Compartment Tie Downs
- 5.5 Body Closures Precautionary Drilling- Closures

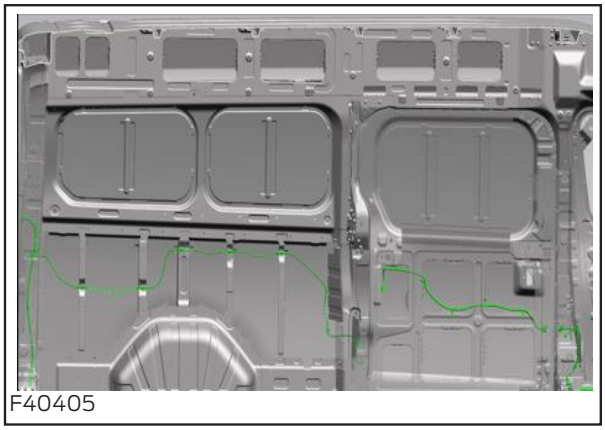
L2/H2(LHD) - Rear Cargo Doors



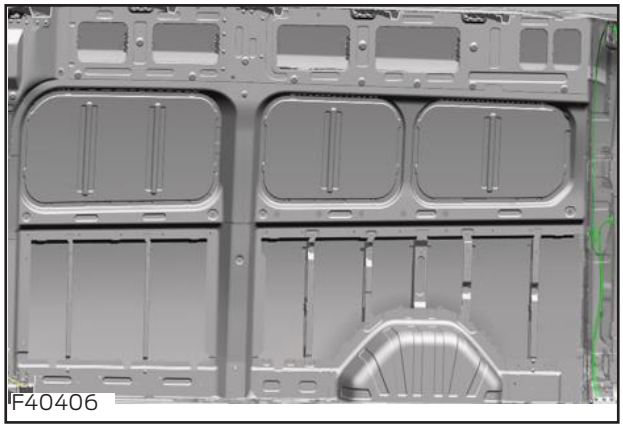
L2/H2(RHD) - Rear Cargo Doors



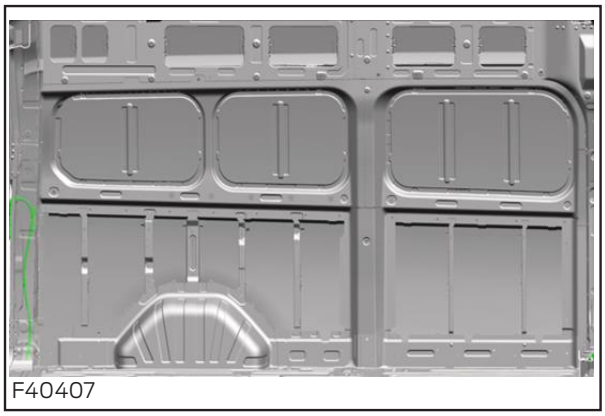
L2/H2(RHD) - Left Bodyside



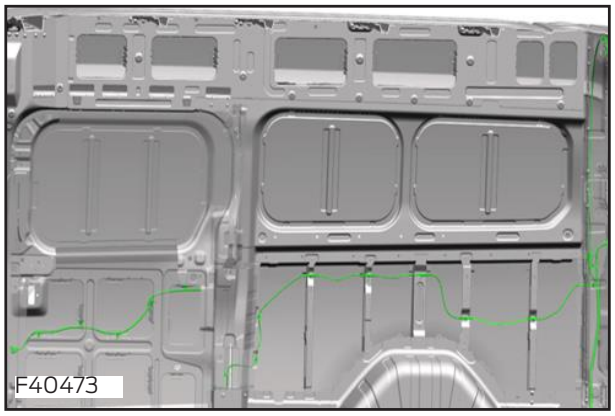
L2/H2(RHD) - Right Bodyside



L1/H1(LHD) - Left Bodyside



L1/H1(LHD) - Right Bodyside



4.3 Communications Network

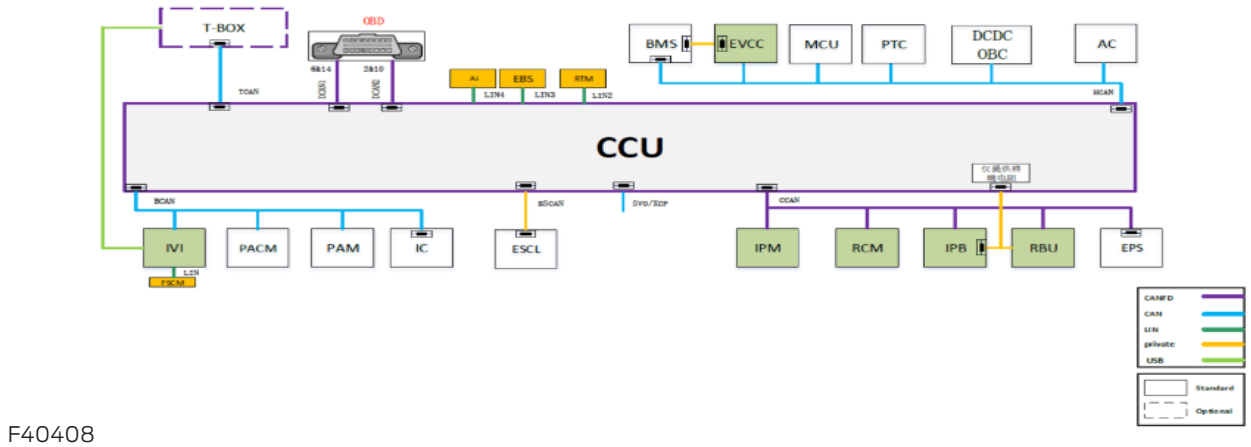
This section has information about the CAN-Bus system description and interface. It also describes the Central Control Unit locations and output specifications.

4.3.1 CAN-Bus System Description and Interface

WARNING: Do not tamper with, cut into or connect to any of the CAN-Bus interface wiring or connectors. The addition of unapproved CAN-Based modules could impact the safe operation of the vehicle.

Controller Area Network (CAN) uses proprietary message sets to communicate between the devices shown, via High Speed (HS), Private and Public Buses. In addition, there is localised application of Local Interconnect Network (LIN).

CAN-Bus System



F40408

Communication Network System

Items		Description
CCAN	RCB	Restraints Control Module
	IPB	Integrated Power Brake
	RBU	Redundancy Brake Unit
	EPS	Electric Power Supply
	IPM	Image Processing Module
BCAN	IVI	In Vehicle Information
	PAM	Park Assistant Module
	ESCL	Electrical Steering Column Lock
	IC	Instrument Cluster
	PACM	Pedestrian Alert Control Module
TCAN	TBOX	Telematics Box
CCU	CCU	Central Control Unit
ESCAN	ESCL	Electrical Steering Column Lock
HCAN	BMS	Battery Management System
	MCU	Motor Control Unit
	OBC	On Board Charger
	DCDC	Direct Current Direct Current
	AC	Air compressor
	EVCC	Electric Vehicle Communication Controller
	PTC	Positive Temperature Coefficient

LIN	EBS	Electronic Battery Sensor
	FSCM	Front Seat Control Module
	Ai	Alcohol Interlocks
	RTM	Radio Transceiver Module

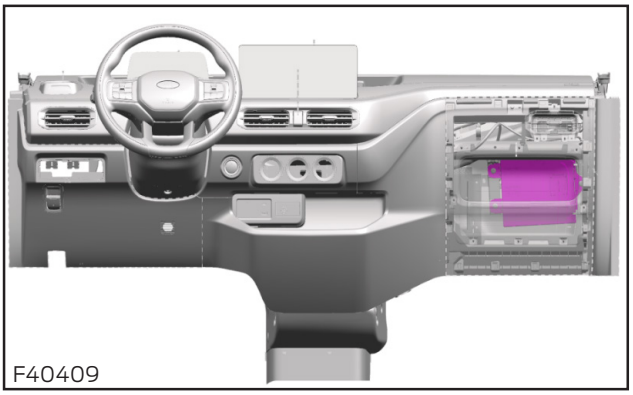
4.3.2 Central Control Unit (CCU)

WARNING: Do not make an unapproved or incorrect connection to the mating wiring. An incorrect connection can cause the associated systems to shut down because of overload protection or damage the Central Control Unit (CCU) and affect safety-critical systems. This can cause personal injury.

WARNING: Do not modify the vehicle CCU configuration after the vehicle leaves a Ford production plant. Only make changes with the integrated diagnostic systems equipment of the dealership. An incorrect modification can affect safety-critical systems and cause personal injury.

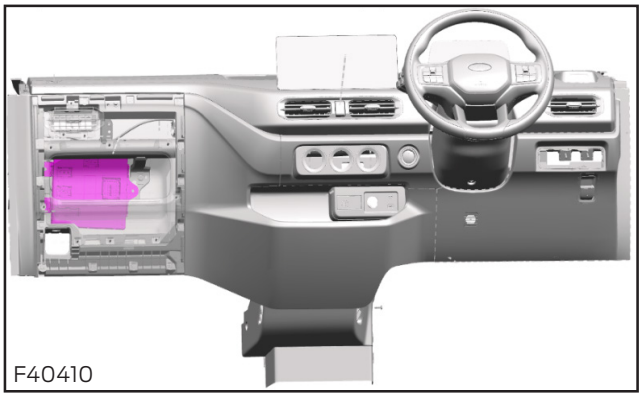
The CCU is the prime control module in the vehicle's electrical architecture. It is responsible for the management of most of the vehicle's lighting, locking and security systems.

CCU Location - Left Hand Drive



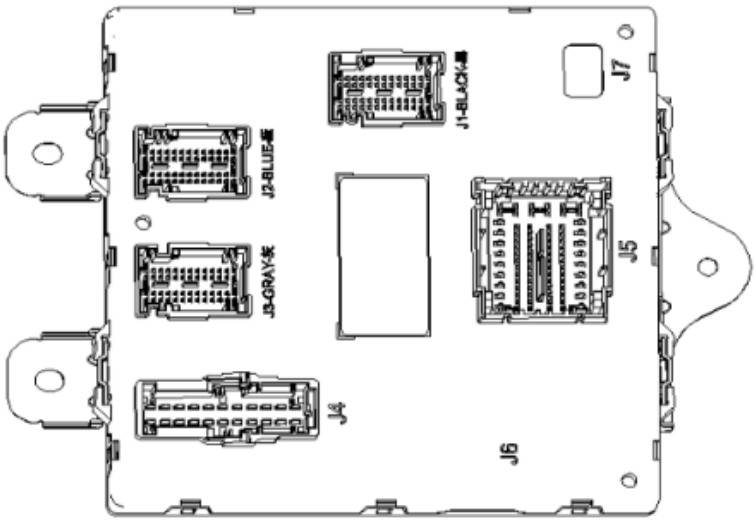
F40409

CCU Location - Right Hand Drive



F40410

CCU - as viewed in-car position



F40411

CCU Output Information

Function	Component	Load Type	Max. Load	Overload Condition
Dipped Beam	Low Side Drive External Relay	Halogen Bulb	0.3A	Output Shutdown
Main Beam	High Side Direct Drive	Solenoid Valve	1A	Output Shutdown
Daytime Running Light	High Side Direct Drive	LED	3.2A	Output Shutdown
Position Light (Number Plate)	High Side Direct Drive	LED (Front)+Halogen Bulb (Rear)	5A	Output Shutdown
Turn Indicators Left	High Side Direct Drive	LED (Front)+Halogen Bulb (Rear)	6A	Output Shutdown
Turn Indicators Right	High Side Direct Drive	LED (Front)+ Halogen Bulb (Rear)	6A	Output Shutdown
Reversing Light	High Side Direct Drive	Halogen Bulb	4A	
Rear Fog Light	High Side Direct Drive	Halogen Bulb	4A	Output Shutdown
Stop Light	High Side Direct Drive	Halogen Bulb	4A	Output Shutdown
Centre High Mounted Stop Light	High Side Direct Drive	LED	1.5A	Output Shutdown
Background Light	High Side Direct Drive	LED	2A	Output Shutdown
Battery Saver Supply	High Side Direct Drive	NA	3A	Output Shutdown
Front Cabin Lights Courtesy	Low Side Direct Drive (PWM)	LED	1.5A	Output Shutdown
Rear Cabin Lights Courtesy	Low Side Direct Drive (PWM)	LED	1A	Output Shutdown
Alarm Siren	High Side Direct Drive	LED	0.05A	Output Shutdown
Lock/Double Lock Outputs	H- Bridge Drive	Lock Motor	25A	Output Shutdown
Unlock Outputs	H- Bridge Drive	Lock Motor	25A	Output Shutdown

4.4 LV Charging System (12 V)

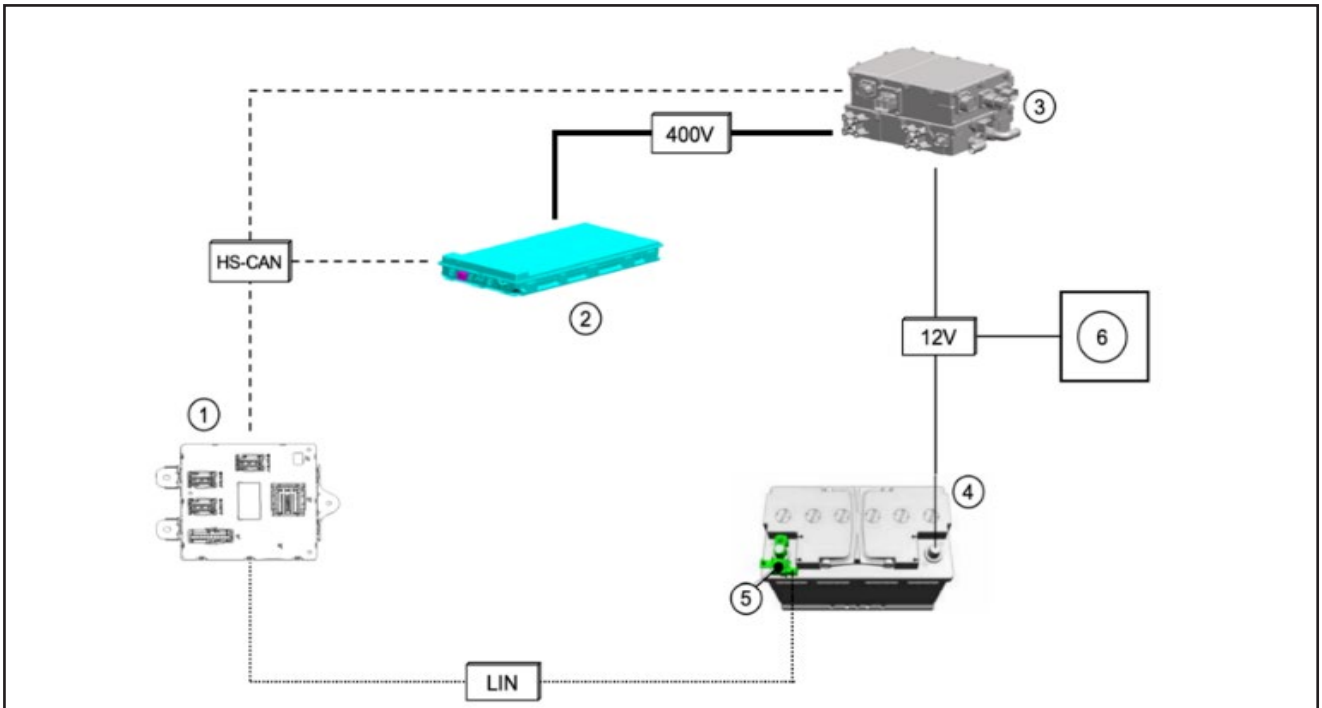
This section provides an overview of the low-voltage (12V) charging system, detailing its architecture, components, and operational modes for Battery Electric Vehicle (BEV) platform.

The battery capacity, technology and charge available from the charging system must be adequate to ensure vehicle remains operational in unfavourable climatic conditions, even after fitment of additional electrical equipment.

4.4.1 LV Charging System Layout

WARNING: Do not cut into the DCDC wires.

Low-Voltage Battery Charging System Layout



F40412

Item	Description
1	Central Control Unit (CCU)
2	High-Voltage Battery
3	3 in 1 High-Voltage Unit (DCDC & OBC & PDU)
4	12V Battery
5	Battery Monitoring System (BMS)
6	Electrical Consumers

4.5 Battery Systems

CAUTION: Some batteries will require specific charging profile. Therefore, you must use a suitable battery charger (e.g. DC-DC charger) for your selected battery. Consult your battery supplier.

NOTE: If there is an isolation relay, then check the settings to make sure the batteries connect to the charging circuit.

NOTE: Do not make any additional connections to the Power Distribution Box (PDB) terminals. Over-torquing can cause damage to the PDB.

4.5.1 Power and Connectivity Usage Recommendations

NOTE: Use Absorbent Glass Mat (AGM) batteries for deep cycle applications, that is, charge and discharge on a regular basis.

NOTE: When you consider battery discharge, the convertor must consider the current drawn when the added system is in operation, plus any continuous key-off loads, even when not in use. For example, a fitted inverter consumes power even with no load connected.

NOTE: Where possible, power active operation of electrical equipment reduces battery discharge; both Vehicle Start and Auxiliary Batteries are utilised in conjunction with the charging system.

NOTE: User training and appropriate battery maintenance on a regular basis help to make sure correct battery operation.

4.5.2 Guidelines When Converting Vehicles

Responsibilities and Considerations

CAUTION: Do not install voltage boosters or other devices to enhance alternator output. The installation of such devices invalidates the vehicle warranty. These devices can also damage the alternator, the Engine Management System or Power Control Module, and possibly affect vehicle legal compliance. Check the local legislation.

Operator requirements for additional and specialised electrical equipment vary. The convertor must therefore consider the points that follow when they design the installation:

- Maintain the legality and regulatory conformity of the base vehicle.
- Maintain the driveability and serviceability of the base vehicle.
- Consider the effect of regulations that govern the proposed conversion, including national legislation in the country of sale.
- Consider the method to integrate the circuit into the base vehicle.
- The materials and installation must meet the quality standards that are described in this section.

Normal Operating Voltage

The electrical system is charged by DCDC. The vehicle electronics run on a 12 V supply with a negative ground return. The factory-installed equipment is designed for normal operations to be fully operational in the range of 9 V to 16 V.

Voltage Check and Charging Procedure

CAUTION: Do not connect to any ground or +12 V potential points other than the point specified in the Owner's Manual. There is a dedicated charge point under the bonnet. If you connect to other points, the connections can cause high-current paths that damage peripherals and electronic modules, especially during a jump start.

Measure all voltages with an accuracy of ±5 % of the published values with calibrated meters. Measure when connected to the vehicle at ignition off and with no loads active, including interior or exterior lights in Off status.

Measure the voltage with the battery plus terminal for the positive connection and the battery ground or battery minus terminal for the negative connection.

Cold batteries do not readily accept a charge. Therefore, allow batteries to warm up to at least 5°C before you charge them. This can require four to eight hours at room temperature and depends on the initial temperature and battery size.

A battery that is completely discharged can be slow to accept a charge initially. In some cases, it does not accept a charge at the normal charger setting. When batteries are in this condition, you can start charging with the dead battery switch or boost charge on chargers that have this facility.

To determine whether a battery accepts a charge, follow the manufacturer's instructions for the charger for the use of the discharged battery or boost charge mode.

Surface Charge Dissipation

Before you do manual voltage checks, it is necessary to establish that the battery does not have any damage and the battery voltage is stable and free from the surface charge that occurs after DCDC converter charging.

To make sure surface charge is not present, measure the battery voltage after the vehicle stands with the ignition off and no loads active for a prolonged period of 24 hours. If this is not possible, you can make an estimate with the method that follows:

1. To dissipate any surface charge that is present in the battery, turn on the headlamps (main beam) for 5 seconds. Alternatively, turn on the parking lamps for 15 seconds if the headlamps do not turn on with the key in the Off position.
2. Turn off the lights and allow the key-off loads to reach their steady value. This typically takes 35 minutes from ignition off.

Sensitivity and Voltage Tolerance

The vehicle uses multiplexed vehicle electronics.

CAUTION: Use the appropriate Ford proprietary accessory systems. Inappropriate or incorrect connection of additional equipment can cause misoperation or damage to the vehicle and invalidates any warranty.

Stored and Delayed Vehicles

For additional information on vehicle storage, refer to 1.11 Vehicle Transportation Aids and Vehicle Storage.

Transport Mode

If the cluster displays Transport Mode, the vehicle may have reduced functionality. This mode is mainly to conserve battery life/warranty during pre-delivery.

NOTE: The only method to return the vehicle to Transport Mode is by using a Ford diagnostic service tool with the correct level of security clearance. The Ford dealer has the correct tools and level of security to do this if required.

NOTE: To change from Transport Mode to Normal Mode, keep the ignition on, press the brake pedal five times, and turn the hazard switch on and off twice in any combination within a 10-second period.

NOTE: Vehicles must remain in Transport Mode, where possible, during storage and before handover to the customer.

Power Disconnection

WARNING: Disconnect all the batteries, including the ground connection, before you do welding work or work on the airbags. Insulate the negative battery terminals.

NOTE: After you disconnect the power supply and before you do further work, you must wait for 15 minutes to make sure safety systems are fully deactivated.

After you disconnect the battery, you do not need to reprogramme the vehicle. The vehicle retains the normal power management settings and configurations.

If the vehicle is in the secured state and the battery is disconnected, manually opening any door during the disconnection period triggers the vehicle's anti-theft alarm function once the battery is reconnected.

If the vehicle was not in the secured state before battery disconnection, there is no action after the battery is reconnected.

Ground Connections

NOTE: If there is a battery guard or an isolation relay, then check the settings to make sure the batteries connect to the charging circuit.

Ground high electrical loads directly to the vehicle body and not the negative battery terminal. A connection to the negative battery terminal bypasses the BMS and affects the correct assessment of the battery state of charge. Refer to the BMS section in this manual.

Refer to section 4.6 Battery Protection.

If you add separate charging systems, you must also connect the ground side of the charger to the body.

Refer to 4.17 Electrical Connectors and Connections.

LV Battery Cable Fixing Torque

Fix the battery cables to the terminal post with a torque of 6.2Nm ± 1Nm for positive and 9Nm ± 1.4Nm for negative battery post connection with or without BMS. For additional information, see BMS later in this section.

LV Battery Safety

WARNING: Take necessary safety precautions when handling batteries, such as protective clothing and eye and hand protection.

WARNING: Make sure batteries are charged in a designated charging area that is correctly ventilated.

CAUTION: After the conversion, make sure that the drain tubes are not dislodged.

LV Battery Type and Capacity

The vehicle has AGM batteries as factory fit. Before installing additional electrical equipment check that the battery capacity, technology type, harness load capability and charging system output are suitable for the extra load.

LV Battery Covers

WARNING: Replace the battery positive terminal cover after any conversion to the battery.

WARNING: If the battery cover is missing or damaged, order and install a replacement part. Check the installation during the quality control process. See figure F40413 in the BMS section 4.5.3 Battery Monitoring Sensor (BMS).

LV Battery Drain Prevention

For information, refer to section 1.11 Vehicle Transportation Aids and Vehicle Storage.

LV Battery Rest Period

After you reconnect the battery, the BMS needs an inactive period of at least four hours to recalibrate to the correct battery state of charge. See the additional BMS information in section 4.5.3 Battery Monitoring Sensor (BMS).

Usage of Electrical Loads During Conversion

If you use electric loads during conversion, for example, multiple crank cycles or door ajar, then check the battery voltage more often than every seven days and recharge the battery if necessary.

Key Off Loads

Key off load should not discharge more than 35% in 40 days (Normal mode). In general, all loads should have some form of isolation. A supplemental battery can be required to power systems, for example, GPS vehicle tracking systems that pull high key-off loads continuously. This is to protect from discharging batteries at ignition off and from interference with the BMS correlation of battery state of charge. This supply must also have a dedicated protection fuse of the correct value.

Refer to 4.6 Battery Protection.

Auxiliary Electrical Systems

NOTE: When you add auxiliary electrical systems to the vehicle, it is mandatory that the additional circuit design includes the necessary fuses.

Refer to 4.16 Fuses and Relays.

The materials and installation must meet the quality standards that are described in this section. Design any additional equipment or components so that they have no adverse Electro Magnetic Compatibility (EMC) effect on the vehicle.

Cable Routing

The materials and installation must meet the quality standards that are described in this section. Design any additional equipment or components so that they have no adverse Electro Magnetic Compatibility (EMC) effect on the vehicle.

Fitting Equipment Containing Inductive Loads

CAUTION: When you fit inductive loads, such as electric motors, you must consider the inrush current.

CAUTION: You must observe the instructions that follow:

- **Drive all inductive loads through relays with contacts that are rated at least three times the maximum rated current of the motor.**
- **Individually fuse all inductive load supply circuits with the correct fuse rating for the motor.**
- **Rate all power wiring for at least three times the rating of the motor and install it as far away as possible from any existing vehicle wiring.**
- **Fully suppress all fitted inductive loads to European or applicable local legislation that relates to EMC to make sure electrical interference does not affect the vehicle systems.**
- **Add an EMC emissions statement to the CE approval.**

Airbags

NOTE: After you disconnect the power supply and before you do further work, you must wait for up to 15 minutes. Work on airbag systems may only be done by persons who have a relevant certificate of competence.

Pay attention to the points that follow:

- Disconnect all the batteries, including ground, and insulate the negative battery terminal or terminals.
- Disconnect the electrical connector at the airbag control module.

Welding and Cutting

Pay attention to the comfort and safety electronics in modern vehicles during body work.

WARNING: You must obey the safety instructions when you weld or cut vehicles with airbag systems.

CAUTION: Welding and alignment work during body shell rectification produce over-voltages. These over-voltages can damage electronic systems.

For additional information on welding, refer to section 5.1 Body.

Pay attention to the points that follow:

- Prior to any welding/cutting on electric vehicles:
  - disconnect the 12V auxiliary battery negative terminal
  - isolate the HV system via MSD removal
  - observe a 15-minute minimum HV capacitor discharge period
- If you do welding or cutting directly near a control module, then you must remove it beforehand.
- Never connect the negative cable of the welder near an airbag or a control module.
- Connect the negative cable of the welder close to the location of the weld

4.5.3 Battery Monitoring Sensor (BMS)

CAUTION: Do not permanently remove the jumper cable from the BMS.

NOTE: If the key-off load only drops to the expected lower value after 30 minutes, it is probably because a feature is still active and controlled by the battery saver timer. This can be because any door is ajar or an interior lamp is switched on. Peripherals that are plugged into the power sockets continue to drain power until the battery reaches a low level of charge.

The BMS continuously monitors the condition of the main battery. To do this, it is bolted directly to the negative terminal of the battery. Do not remove this. However, if removal is required, then refer to the Ford Workshop

Manual, Ford dealer, or customer services.

The BMS re-calibrates itself at regular intervals. This occurs during a rest period at key-off. The rest period must last for at least four hours. If the system cannot do a re-calibration, then it is unable to establish the correct state of charge of the battery.

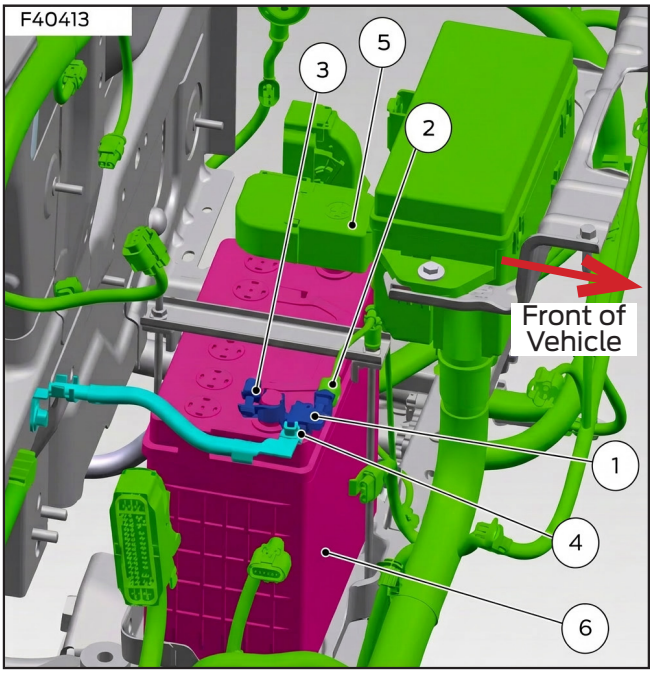
NOTE: Existing Ford systems have a key-off load of approximately 15 mA.

Third-party installations must activate only when the ignition is on or the engine is running.

If any battery discharges for a long period, then it requires a long period to recharge.

After you install a convertor system, it is recommended to measure the total key-off load to the battery with either a current shunt or with a clamp-on ammeter that is calibrated and sensitive to milliampere (mA). Do this test after 10 minutes of key-off with all doors shut so that the vehicle stays in sleep mode.

BMS Location



Item	Description
1	Battery Monitoring Sensor (BMS)
2	Plug-in connection- Local Interconnect Network (LIN) and Battery Positive +12V (B+) Feed
3	Connection to Negative Terminal of Main Battery Post- See 'Battery Cable Fixing Torque'
4	1x M6 nut. Do not loosen or remove
5	Battery Positive Terminal Cover
6	45Ah RJ45 H3 AGM 12V Battery

4.6 Battery Protection

This section details the operation of interior lights and 12V sockets, highlighting their timer-based and State of Charge (SOC)-controlled functionality, including automatic deactivation to preserve battery life. Furthermore, it introduces the intelligent 12V battery charging strategy specifically for electric vehicles in a shutdown state. This strategy makes sure the health of the 12V battery by leveraging the high-voltage system under specific trigger conditions and outlines the various scenarios for its activation and deactivation.

4.6.1 Interior Lights and 12V Sockets

12V sockets and interior lighting are both controlled by timers and SOC control. Both reset at vehicle wake, for example, door opening. These will switch off earlier if battery is low. 12V socket is recommended to be used in power-on mode only to avoid battery drain.

Interior lighting switches off after 15 minutes from key-off. There are some options where the interior lighting is extended to 25 minutes.

For further information refer to section 4.5.2 Guidelines When Converting Vehicles Key off loads.

4.6.2 Intelligent 12V Battery Charging Strategy for Electric Vehicles in Shutdown State

The vehicle has an intelligent strategy to charge the battery when the vehicle is off. This strategy maintains the 12V battery State of Charge (SOC) in healthy condition.

The Battery Monitoring System (BMS), the CCU and the high-voltage system operate together to do this function.

The Trigger Conditions for Intelligent Battery Charging Strategy

The Electronic Battery Sensor (EBS) triggers the 12V battery charging function.

The EBS signals the CCU through the LIN communication when the conditions that follow are true:

- The 12V battery SOC is less than 55%.
- The battery voltage is less than 12 V.
- The LIN communication does not wake the EBS within one hour after the EBS detects a key-off load of less than 500 mA.

NOTE: If the BMS detects a key-off load of more than 500 mA, the strategy does not operate.

The CCU checks if the conditions that follow are true after it receives a trigger signal from the EBS.

- The key is off.
- The front hood is closed.
- The 12 V battery SOC is less than 55%.
- The vehicle is not in factory mode.

If these conditions are true, the high-voltage control section in the CCU evaluates the conditions that follow to determine if the high-voltage power supply of the vehicle can activate:

- The vehicle speed is less than 3 km/h.
- The high-voltage battery SOC is more than 16%.
- There are no fault codes in the high-voltage system that affect the activation of the high-voltage power, for example, High-voltage Interlock Fault, MCU Fault, DCDC Fault, or BMS Fault.

If all conditions are true, the high-voltage system activates and the DCDC charges the 12 V battery.

Intelligent 12V Battery Charging Strategy Exit

Normal exit

The intelligent charging function exits normally when the 12 V battery charge reaches 90%.

Interruption Exit (Followed by De-energisation)

Under the circumstances that follow, this function terminates and de-energises the high-voltage system of the vehicle:

- The front hood is open.
- The operation time of the intelligent battery charging function exceeds one hour.

- The user locks or unlocks the vehicle with the key.
- The vehicle speed is more than 3 km/h.
- The high-voltage battery SOC is less than 16%.
- The system detects a high-voltage system fault.
- The communication with the EBS is lost for more than 10 seconds.

Interruption Exit Without De-energisation

Under the circumstances that follow, this function terminates, but the high-voltage system of the vehicle remains energised:

- The user engages the high-voltage system.
- The user connects the charging cable

4.7 Climate Control System

WARNING: The information in this section is for the convertor' s reference only. Any unauthorised modifications to the climate control system, including the refrigerant system, result in a malfunction of the system.

WARNING: Do not use propylene glycol-based coolant.

The Climate Control System uses components that are shared with other vehicle models. This means that some connector pins are not used in this vehicle.

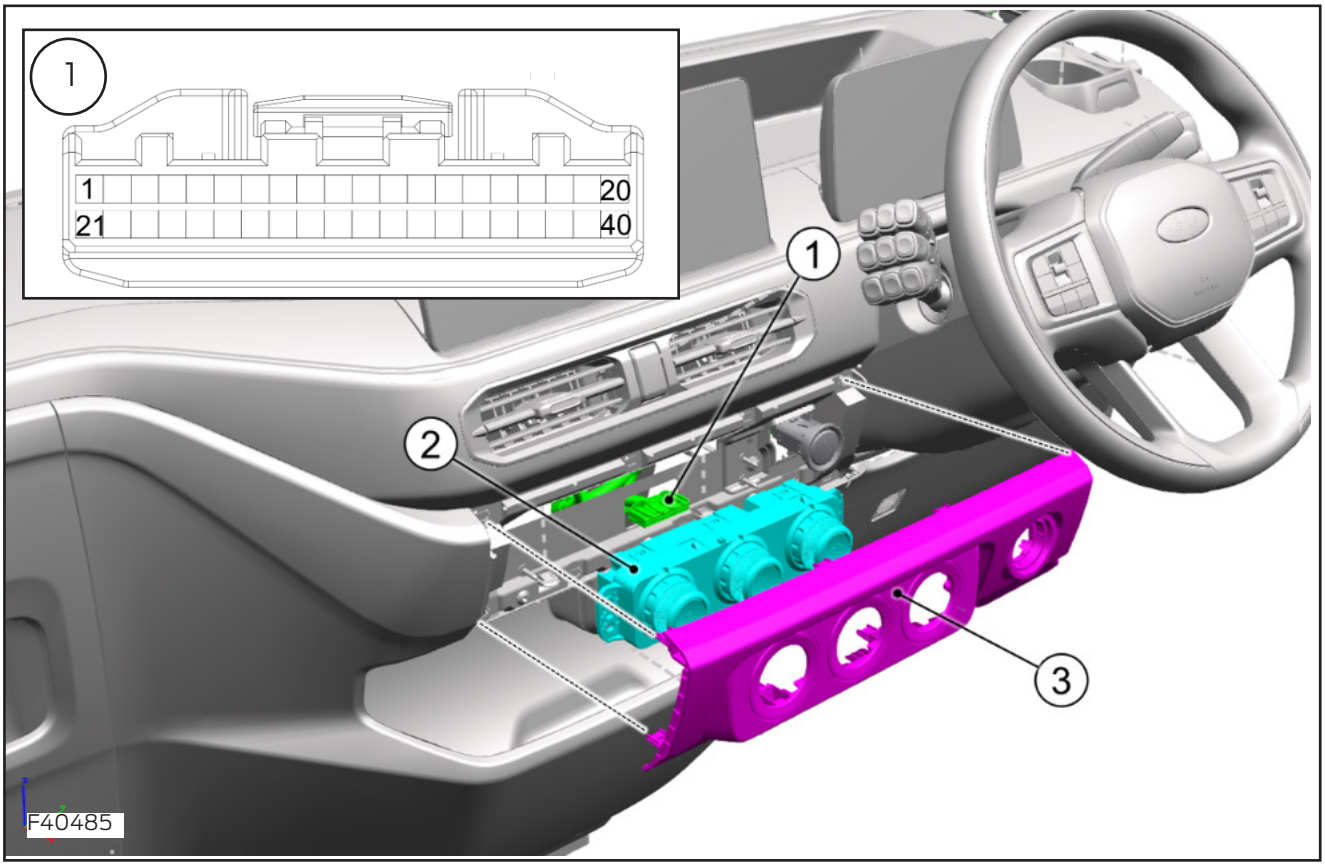
CAUTION: Do not connect external equipment to unused pins in the Climate Control System connectors. A connection to these pins can cause incorrect function or damage the system.

CAUTION: Do not install climate control hoses in the wheelhouse or the stone kick-up arch. If you need to install hoses in these areas, then you must install an applicable shield to prevent damage from stones.

- Do not route hoses near sharp edges. Use guards to protect against cutting or chafing.
- Refer to the Ford Workshop Manual for further information.

4.7.1 Front Climate Control System

Climate Control System Pin-Outs



Item	Description
1	Front Climate Control Panel Connector
2	Front Climate Control Panel
3	Trim Cover

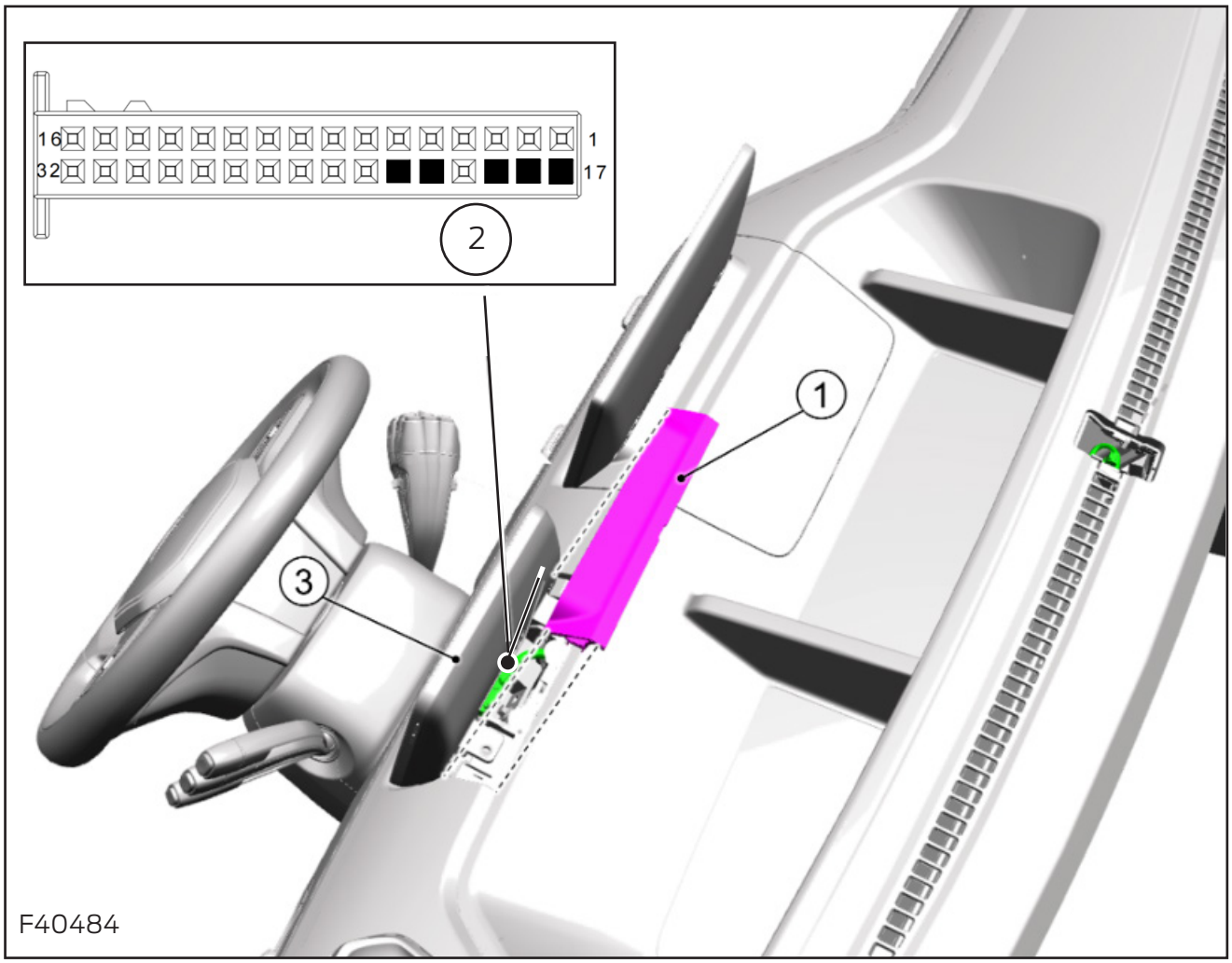
Connector Pin (Item 1)	Description
1	Back lighting Illumination Ground
6	Heating Indicator
7	Button Signal Output
8	Signal Ground
14	AC Indicator
18	Internal/ External Circulation Indicator
22	Back lighting Illumination Power
24	Button/ Knob Power
28	Temperature Setting Signal
34	Blower Speed Setting Signal
37	Mode Setting Signal
Any pins not listed in the table above are not to be used.	

4.8 Instrument Panel Cluster (IPC)

WARNING: Do not tamper with, cut into or connect to any of the CAN-Bus interface wiring or connectors.

Most of the functions are managed over the CAN-Bus interface.

Instrument Cluster



Item	Description
1	Trim Cover
2	Instrument Panel Cluster Connector
3	Instrument Panel Cluster

Connector Pin (Item 2)	Description	Wire Colour	
17	12V Power- KL30	Blue	-
18	Ignition	White	-
19	Ground	Black	-
21	CAN Bus High Speed- Low	Grey/Blue	Twisted Pair
22	CAN Bus High Speed- High	Grey/Orange	
Any pins not listed in the table above are not to be used.			

4.9 Horn

You must drive any other aftermarket horn, such as an air horn, by a separate relay that is energised by the horn circuit.

4.10 Information and Entertainment System

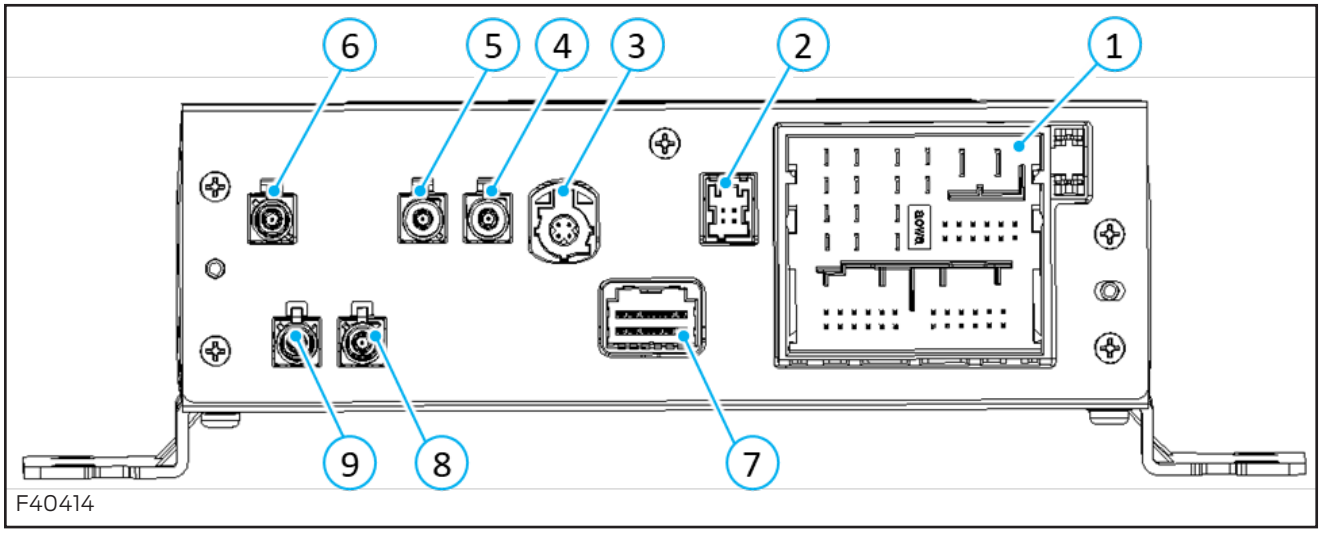
This section has information about the In-Vehicle Infotainment (IVI). It also gives details on the IVI module connector pinouts.

4.10.1 In-Vehicle Infotainment (IVI)

NOTE: The back of the IVI module has the connections that follow:

- Two co-axial cables connect to the FM, and DAB antennas in the left and right exterior mirrors.
- A black USB cable connects to the USB data port.
- A black co-axial cable for the global navigation satellite system (GNSS) antenna connects to the IVI module using a blue Fakra code C connector.
- A black LVDS cable connects to the IVI module using a blue connector. The IVI module and the 12.3-inch display communicate serially through this co-axial cable.
- The IVI module has a 12-pin connector. The IVI module supplies power to the 12.3-inch display through the wiring harness on this connector.

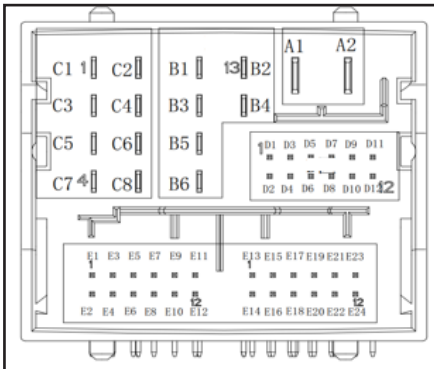
IVI Module's Connector Diagram Overview



F40414

Items	Description
1	52pin Main Connector
2	USB Data Connector
3	IVI LVDS Connector
4	DMS Camera Connector
5	RVC Camera Connector
6	GPS Antenna Connector
7	IVI Display Power Connector
8	AM & FM1 & DAB Antenna Connector
9	FM2/DAB Antenna Connector

In-Vehicle Infotainment Module 52 Pin Main Connector



F40415

Pin	Description	Type	Pin	Description	Type
A1	Ground	Input	D11	BCAN-L	Input/Output
A2	Battery Power	Output	D12	BCAN-H	Input/Output
B1	Battery Power	Output	E1	Not Used	-
B2	Not Used	-	E2	Not Used	-
B3	Not Used	-	E3	Not Used	-
B4	Ground	Input	E4	Not Used	-
B5	Ignition Power	Input	E5	Not Used	-
B6	Ground	Input	E6	Not Used	-
C1	Left Front Speaker -	Output	E7	Not Used	-
C2	Not Used	-	E8	Not Used	-
C3	Left Front Speaker +	Output	E9	Not Used	-
C4	Not Used	-	E10	Not Used	-
C5	Right Front Speaker -	Output	E11	Not Used	-
C6	Not Used	-	E12	Not Used	-
C7	Right Front Speaker +	Output	E13	Not Used	-
C8	Not Used	-	E14	LIN	Input/Output
D1	Not Used	-	E15	DMS Camera Ground	Output
D2	Not Used	-	E16	DMS Camera Power Supply	Output
D3	Ground	Input	E17	Ground	Output
D4	Not Used	-	E18	Not Used	-
D5	Not Used	-	E19	Not Used	-
D6	Ground	Input	E20	Not Used	-
D7	Not Used	-	E21	Not Used	-
D8	Not Used	-	E22	Microphone Shield	Output
D9	Not Used	-	E23	Left Microphone Signal	Input
D10	Not Used	-	E24	Left Microphone Power Supply	Output

4.11 Exterior Lighting

WARNING: Make sure that the modified vehicle complies with all relevant regulatory requirements.

CAUTION: Do not retrofit Bi-Xenon High Intensity Discharge (HID) or LED Daytime Running Light (DRL) headlamps to a vehicle that does not have them as original equipment. The vehicle wiring and control configurations are different. An attempt to install these headlamps can damage the electrical system.

CAUTION: Do not tamper with the base system or any feeds taken from the associated wiring or controller. The Central Control Module (CCU) and multiplex architecture control this system.

CAUTION: Do not use alcohol-based cleaning fluids on or near the tail lamps and headlamps. Contact with alcohol-based cleaners can cause chemical stress cracking in the lamp lens material. When fitting foils, decals, or wraps, convertors must take appropriate steps (such as masking) to make sure these fluids do not come into contact with the tail lamps and headlamps.

4.11.1 Reversing Lamps

A high-side driver in the CCU activates the reversing lamps.

CAUTION: You must use a relay to connect accessories that add load to the reversing lamp circuit, such as reversing sounders. If you connect these accessories directly to the reversing lamp circuit, then you can damage the CCU.

The load on the reversing lamps must not exceed a total of 4A (56W), 250mA for a relay.

4.11.2 Rear Fog Lamps

You must check national regulations about interconnection with other rear fog lamps before you design the wiring circuit. The maximum permissible load with the standard system is:

- Rear fog lamp - 2 x 21W (High side driver controlled).

4.11.3 Lighting Loads

The CCU exterior lighting outputs have shut-down protection in the event of an overload condition. If you do not address the overload condition, the output shuts down permanently to protect the driver hardware. A dealer visit or CCU replacement can be required if you do not remove the overload condition.

4.11.4 Hazard/Direction Indication Lamps

The standard system configuration each side is:

- 1 x Front left Indicator 15W and 1 x Rear left indicator 21W- max load 84W
- 1 x Front Right Indicator 15W and 1 x Rear Right indicator 21W- max load 84W

4.11.5 Electrically Operated Door Mirrors

WARNING: The base system is controlled by the CCU and a multiplex architecture. Do not modify this system or take any feeds from its wiring or controllers.

NOTE: This option cannot be retrofitted and is not compatible with aftermarket solutions.

4.11.6 Additional External Lamps

You must take all power for additional exterior lamps through a converter-installed fuse, switch, and relay, as this vehicle is not equipped with a factory-fit Auxiliary Fuse Panel for convertor.

For additional information, refer to the sections that follow:

- 4.16 Fuses and Relays
- 4.17 Electrical Connectors and Connections

Use LED lamps if you install additional markers.

Lighting Loads

CCU Outputs	Controlling Device	Max. Load	Vehicle
Number Plate	High Side Driver	60W	2 x 5W
Position Lamp Front - each side	High Side Driver		21W
Position Lamp Rear - each side	High Side Driver		21W
Direction Indicator front - each side	High Side Driver	84W- each side	15W
Direction Indicator Rear - each side	High Side Driver		21W

4.11.7 Connector Details for Exterior Lighting Harness Extension - Chassis Cab

Rear Combination Lamp

Disconnect the connector of the rear combination lamp harness. When you extend the harness, use matching connectors to interface with the rear combination lamp and the original vehicle harness.

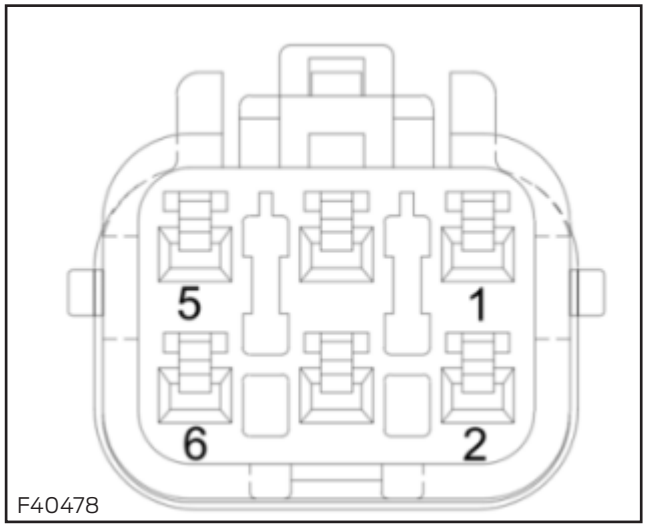
Seal unused cavities in the connector with plugs to make sure that the connector is waterproof.

Secure the connector to prevent abnormal noise

For additional information, refer to section 4.2 Wiring Installation and Routing Guides.

NOTE: The original rear combination lamp has mounting holes for park aid sensors. When you relocate the rear combination lamp, obey the specified installation requirements for park aid sensors. Refer to section 4.20 Park Aid Sensor Installation Guidance.

Rear Combination Lamp Connector (Wiring Side)

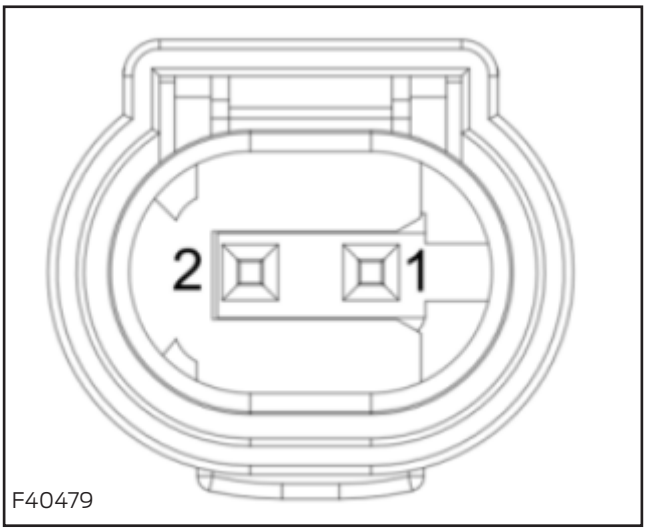


Pin	Description	CSA
1	Yellow	0.5
2	Brown/Yellow	0.5
3	Violet/Orange	0.5
4	Orange	0.5
5	Brown/Yellow	0.5
6	Black	0.5

Licence Plate Lamp

NOTE: Make sure that the licence plate lamp complies with applicable regulatory requirements.

Licence Plate Lamp Connector



Pin	Description	CSA
1	Brown/Yellow	0.5
2	Black	0.5

Rear Combination Lamp/Licence Plate Light Connector (Wiring Side) Information

Connector	External Supplier Connector Information (Wiring Side)			
	Supplier	Connector Model	Quantity	Mating Connector
Rear Light Cluster Connector	KET	MG610335	2	MG640337
Licence Plate Light Connector	TYCO	1-967644-1	2	2005342-5

4.12 Interior Lighting

This section has information about how to connect additional interior lamps in the cabin and cargo areas. It gives details on power supply limits, circuit identification, and the restrictions for fluorescent lighting.

4.12.1 Additional Internal Lamps

CAUTION: The maximum total internal lamp load must not be above 2.5A (35W) each.

You can get an electrical supply for additional cabin interior lighting by directly accessing the connector inside the dome lamp in the cabin.

You can get an electrical supply for additional load space interior lighting by directly accessing the connector inside the load space lamps.

For additional information on CCU, refer to section 4.3 Communications Network.

The battery saver system provides power for the interior lighting for a limited time.

Power Supply for the Interior Lights

The CCU gives power to the interior lights through three outputs, two for courtesy and one on demand:

- Cabin light courtesy function - CCU pin J3-51 with maximum load of 1.5A'
- Cargo light courtesy function - CCU pin J1-41 with maximum load of 1A.

Cabin light circuit is grounded at ground point 22(GD22). The rear cargo light circuit is grounded locally to the lamp. Refer to: 4.18 Grounding

The lamps installed on the cabin or cargo circuit depend on the vehicle type. To identify the lamps on the rear or cargo circuit, do the procedure that follows:

1. Set any lights that have a switch to the courtesy position.
2. Close all the doors and wait for the lights to switch off.
3. Open the door or liftgate at the rear of the vehicle.

Any interior lights that switch on are in the rear cargo or rear zone.

Some vehicle types can have no lamps on the rear circuit.

If you need fluorescent lighting, do not connect it to the existing interior cabin or cargo lighting. It is not compatible with the pulse width modulated (PWM) lighting circuit and can cause the fluorescent lighting to fail prematurely.

4.12.2 Additional Lighting for Rear of Vehicle Interior

Where higher wattage installations are required, these should be taken through a convertor-installed fuse with a suitable switch and/or relay as required along with an appropriate fuse for safety.

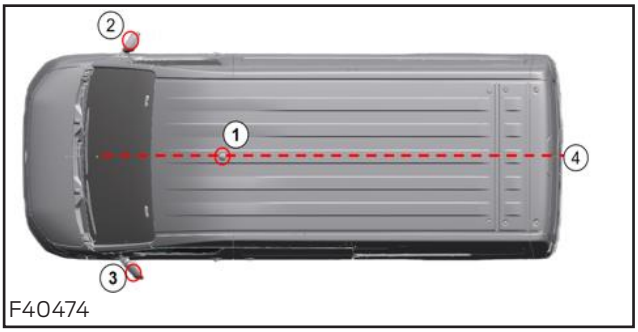
For additional information, refer to section 4.17 Electrical Connectors and Connections.

4.13 Emergency Call Systems

NOTE: Reception testing or loss of performance due to poor conversion or re-installation is not the responsibility of Ford.

NOTE: Do not relocate the microphone, the SOS switch, or the eCall speaker. The microphone and SOS switch are in the overhead console. The eCall speaker is below the steering wheel. Relocation can affect the eCall emergency call system hands-free audio performance.

Antenna Locations



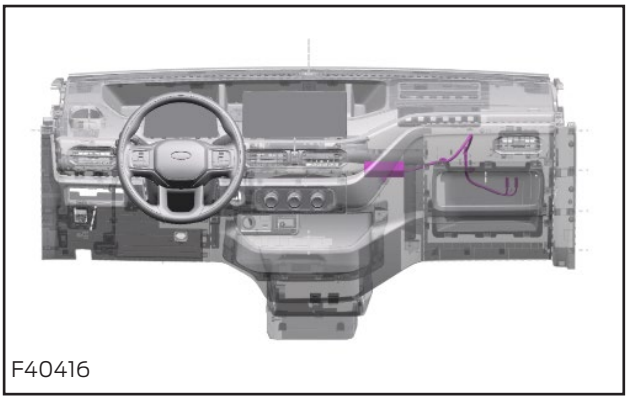
F40474

Item	Description
1	GNSS Antennas location
2	FM/ DAB Antenna location
3	FM/DAB Antenna location
4	Additional Antennas to be on centre line Y-0

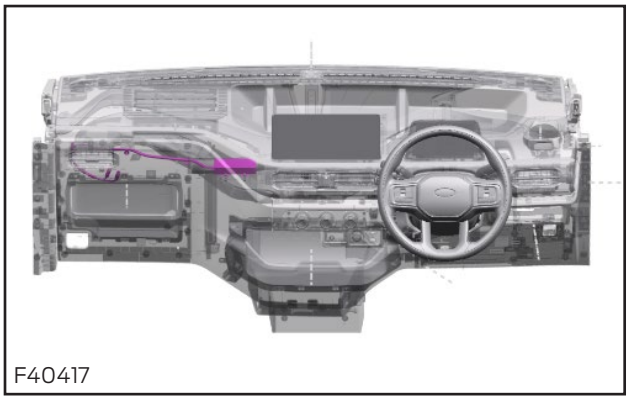
4.13.1 Relocation of GNSS/4G Antenna

WARNING: The 4G antenna is installed inside the dashboard. Do not move the 4G antenna because this affects the GSM signal quality of the eCall emergency system.

4G Antenna Location —LHD


F40416

4G Antenna Location —RHD


F40417

Conversions where the antenna does not need a relocation are:

- Air deflectors above the roof (convertor must make sure that the part is non-metallic).
- A cooling unit that is mounted at the front of the box structure. There must be a minimum clearance of 100 mm to the antenna. The maximum dimensions from the box to the front of the vehicle are 1300 mm width and 500 mm depth.
- Other non-metallic structures above the roof.
- Discontinuous metallic structures above the roof, for example, ladders.

Conversions where antenna does need a relocation are:

- A cabin above the roof with metallic components in it.
- Other continuous metallic structures above the antenna that are bigger and nearer to the antenna than a cooling unit, for example, deflectors.

If the conversion requires the antenna to be relocated, the recommendation is to use the existing vehicle antennas and seal the roof openings to be waterproof. You must park the disconnected fly-lead to avoid squeak and rattle issues. Alternatively, the convertor must seal the roof hole of the old antenna position to make it waterproof.

NOTE: The antenna has a seal that installs on the roof surface, but the convertor is responsible to make sure that an adequate waterproof seal is achieved.

If it is unavoidable and necessary to install an antenna, obey the instructions that follow:

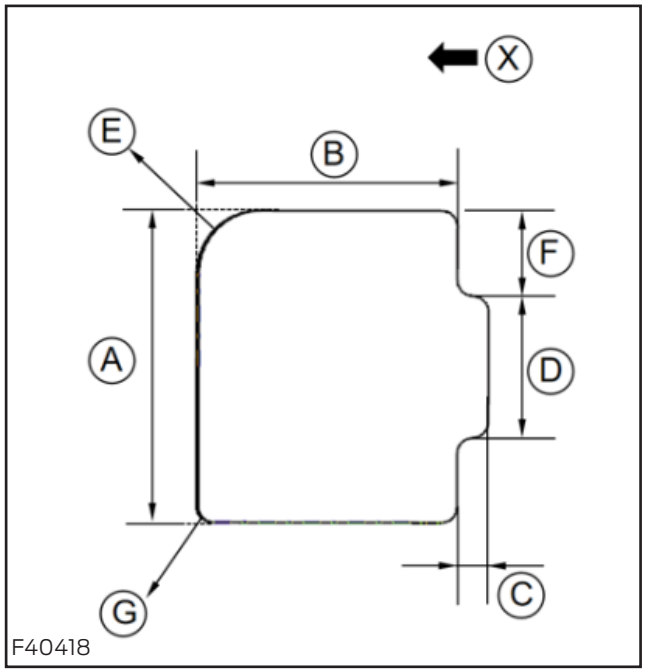
- Install the antenna on sheet metal, which is the ground surface or plane. A metal ground plane of 150 mm around the hole is mandatory. No interruptions are allowed. The antenna still functions if you install the ground plane on a plastic or fibreglass roof. The antenna includes two functions:
  - **GNSS** required for vehicle location, which is dependent on receiving satellite signals from overhead.
  - **Cellular** is required for communication, which depends on a clear line of sight from ground towers.
- HA repositioned antenna must take these requirements into account. Position it on the highest possible packaging location. Avoid depressions wherever possible.
- Provide a minimum clearance of 50 mm from all electronic devices and any wiring harness not related to the antenna system.
- When you install the antenna, put it on sheet metal at the highest possible metallic packaging location.
- The antenna base design and mounting require a specific hole shape to make sure of anti-rotation and orientation (F40418).
- The antenna must have a minimum clearance of 250mm from any other antenna located on the vehicle roof and from any metallic structures above the ground plane, if present.
- The antenna must be as close as possible to horizontal.
- The antenna attaches to the ground surface with a driven fastener from the underside of the plane. The fastener is a captured component on the antenna base.

A range of reception tests need to be conducted outside of a building by the convertor to make sure system performance.

GNSS (free space):

- Check if a DTC is set for a non-connected antenna.
- For vehicles with a navigation system, search for a route in the onboard navigation system to verify the GNSS connection in a reasonable time.

Antenna Anti-Rotation Mounting Hole

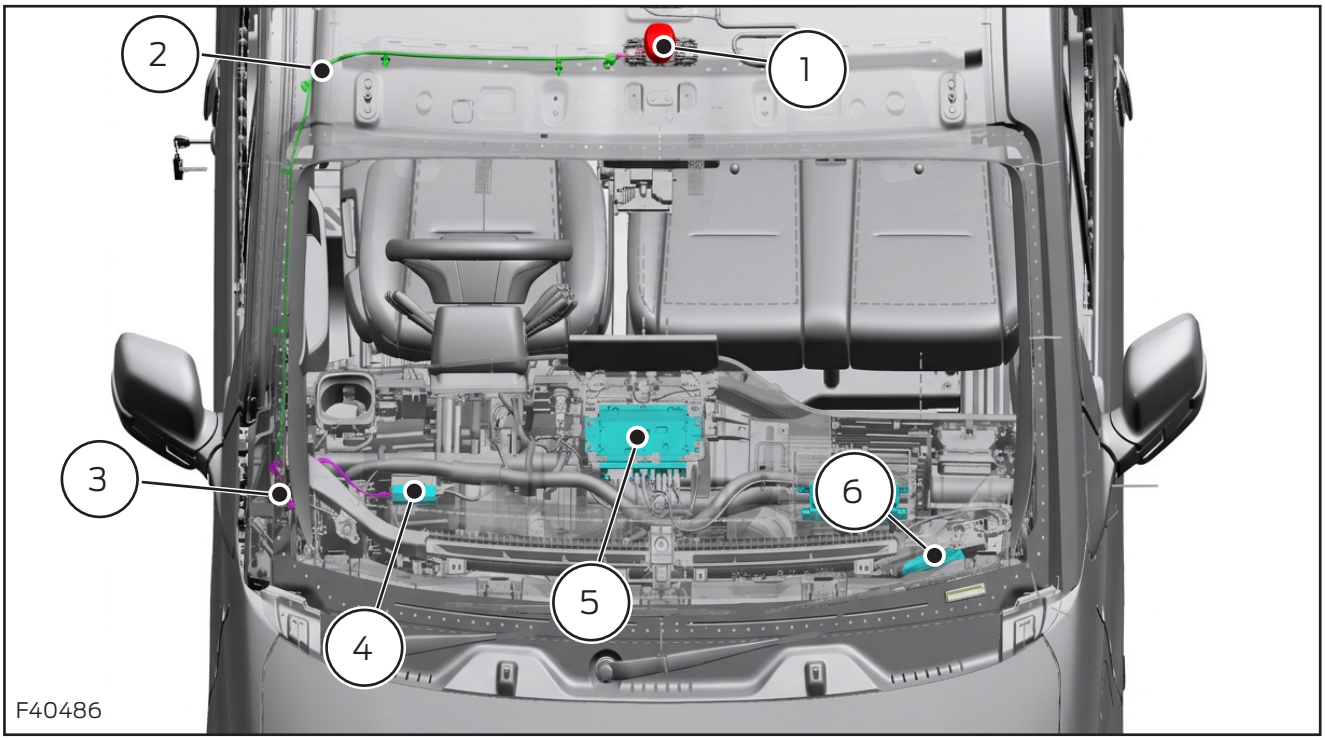


Item	Description
A	19.8 mm
B	16.8 mm
C	2 mm
D	9 mm
E	4 mm Radius x 1
F	5.4 mm
G	1 mm Common Radius x 7
X	Front of Vehicle Direction

Cable Extension (to be prepared by Convertor)

The overall cable run from the Connected component (IVI/Telematics Control Unit) to the antenna must not be longer than 8 m for GNSS connections. Extensions should utilise materials and direction from the table and diagram below:

GNSS Antenna Connections



Item	Description
1	GNSS Antenna
2	GNSS Signal Cable (Antenna to A-Pillar Connector)
3	GNSS Signal Cable (A-Pillar to Power Divider)
4	GNSS Power Divider
5	In Vehicle Infotainment (IVI) Module
6	Telematics Box (T-Box)

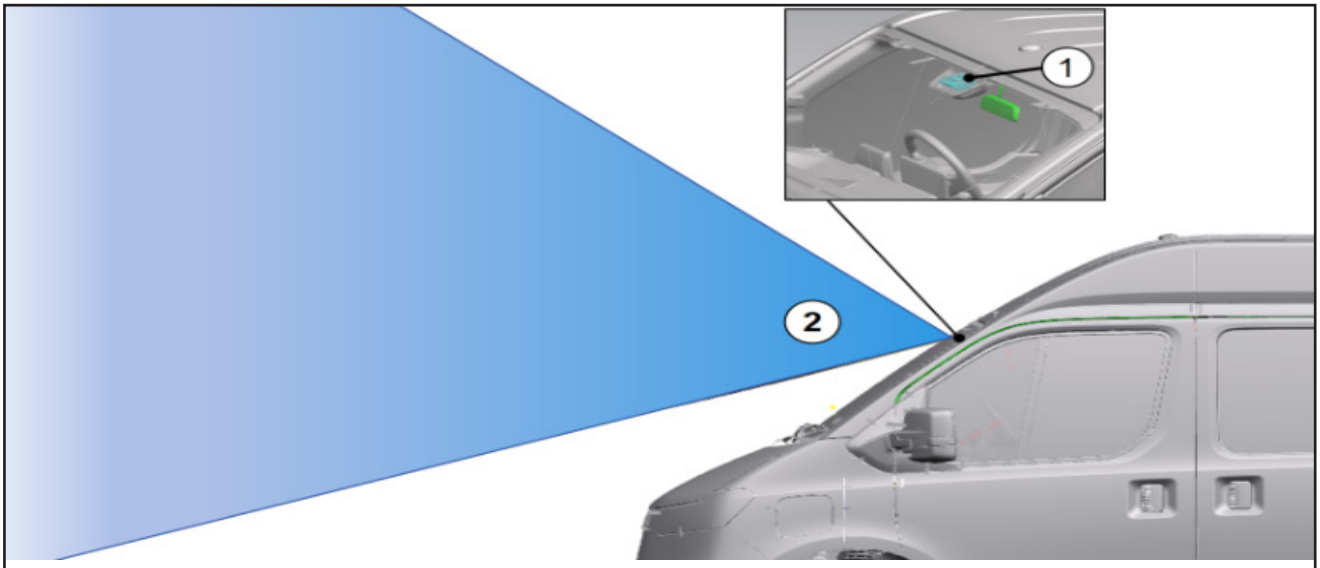
Cable Lengths from Module to GNSS Power Divider		
Drive	**IVI Module**	**Telematics Box**
LHD	815 mm	754 mm
RHD	733 mm	1617 mm
Cable Lengths from GPS Power Divider to A-Pillar Connection		
RHD	497 mm	
LHD	1046 mm	
Cable Lengths from A-Pillar Connection to GNSS Antenna		
Drive	**Low Roof**	**Medium Roof**
LHD/RHD	1333 mm	2136 mm

Supplier	Supplier Part No.	Male/ Female	Function	Single/ Dual	Colour	Key Code
Antenna Connection						
Amphenol	FK6121FW-115-TT30G-50	Female	GNSS	Single	Brown	F
A-Pillar Harness Connector						
Amphenol	FK1121BW-101-NT30G-50	Male	GNSS	Single	White	F

4.14 Front Windscreen Camera

NOTE: The Front Windscreen Camera features will not function correctly if any conversion or installation is in the field of view from the Front Windscreen Camera. These features include Adaptive Cruise Control (ACC), Automatic Emergency Braking (AEB) and Lane Keeping System (LKS).

NOTE: For converted vehicles that are fitted with a Front Windscreen Camera, where vehicle mass or geometry is significantly altered, you must do a new calibration for the camera sensor.



F40419

Item	Description
1	Front Windscreen Camera located behind the interior rear view mirror trim
2	View cone from camera, horizontal direction and downwards to the bonnet edge of the vehicle

4.15 Handles, Locks, Latches and Entry Systems

This section has information about modifying door systems, including the necessary wiring connections for door ajar switches and central locking configurations. It also gives details on how to use the third button on the key fob and the installation requirements for the Remote Keyless Entry and Tyre Pressure Monitoring System receiver.

4.15.1 Door Removal or Modification

WARNING: If you incorporate an additional third-party control system into the Ford Locking Unlocking System, you must use the Crash Event CAN Signal. This signal overrides the third-party control system to trigger a crash unlock feature in case of a relevant event.

NOTE: If any modified doors have ajar switches that are installed and operate in accordance with the information above, you can maintain the original alarm and interior lighting functions. If you need to remove the doors for derivatives that do not have doors, you must link certain circuits. This makes sure that door ajar warnings do not appear on the instrument cluster. The interior light also stays on if you do not do this.

It is possible to maintain a certain state by configuring the Central Control Unit (CCU) J3 in the way that follows:

Door ajar circuits must be ground when the door is closed, except for the bonnet ajar circuit:

- J3-43 Hood Ajar Switch in OEM Hood Latch Only
- J3-31 Front Left Ajar - Ground
- J3-44 Front Right Ajar - Ground
- J3-32 Right Rear Hinged Door Ajar Ground (if donor has rear door) or not connected if no rear door present on donor (i.e. chassis cab)
- J3-30 Sliding Door Ajar

The circuits that follow must be ground when the latch is locked and open circuit when unlocked, or always ground. If not ground when locked, the lock can fail to complete:

- J3-46 Front Left Door Latch feedback

Vehicles that are ordered with only the kerbside sliding door only support the kerbside sliding door ajar switch.

Refer to section 4.3.2 Central Control Unit (CCU).

4.15.2 Central Locking

NOTE: Each unlock circuit supports 1 production type latch. If more than 1 latch needs to be fitted, additional relays will need to be used (max 300mA coil current permitted) per unlock circuit.

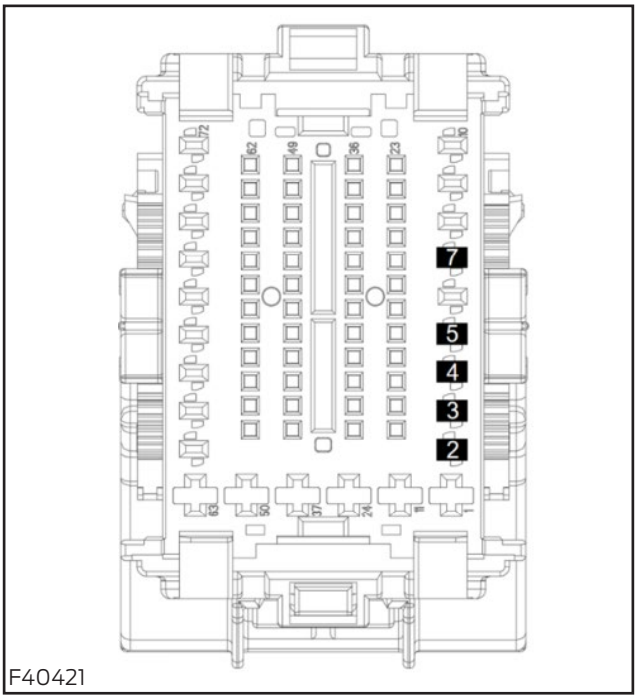
NOTE: All latch lock and unlock pulse durations are 110 ms.

Locking is controlled by the CCU. It is possible to add additional lock(s) via relays (max 300mA coil current permitted) per unlock circuit. All latch lock and unlock pulse durations are 110 ms.

The use of vehicles locking mechanism is strongly recommended as the CCU is designed to drive these latches for the correct amount of time.

Refer to sections 4.15.3 Third Button on Key Fob - Chassis Cab and 4.17 Electrical Connectors and Connections, for more locking interface options.

Pins to Control Door Locks



F40421

Item	Description	LHD/ RHD
J5-4	Passenger Door Unlock/Side Door Unlock	LHD/RHD
J5-2	Driver's Door Unlock	LHD/RHD
J5-5	Central Lock	LHD/RHD
J5-5	Front Doors/Side Door/Rear Cargo Door Double Lock	RHD
J5-7	Unlock Front Doors/Side Door/Rear Cargo Door Double Lock	RHD
J5-3	Unlock Cargo Rear Hinged Right Hand Side	LHD/RHD

4.15.3 Third Button on Key Fob - Chassis Cab

NOTE: There are no micro-switches, no current sensing, and no alarm system functionality that are associated with this pin or any lock set that it drives. J5-3 on the CCU is controlled by the third button on the key fob. This gives a 12V 110ms pulse when you press it. You can use the signal through an external relay for a variety of convertor applications, subject to the necessary load.

4.15.4 Radio Frequency Module/Tyre Pressure Monitoring System Receiver (RF/TPMS Receiver)

WARNING: For best performance, the RF/TPMS receiver must be a minimum distance of 25 mm away from any metal objects and 100 mm away from high switch loads.

NOTE: It is recommended that the RF/TPMS has a dedicated ground wire and ground stud. Do not splice with other modules.

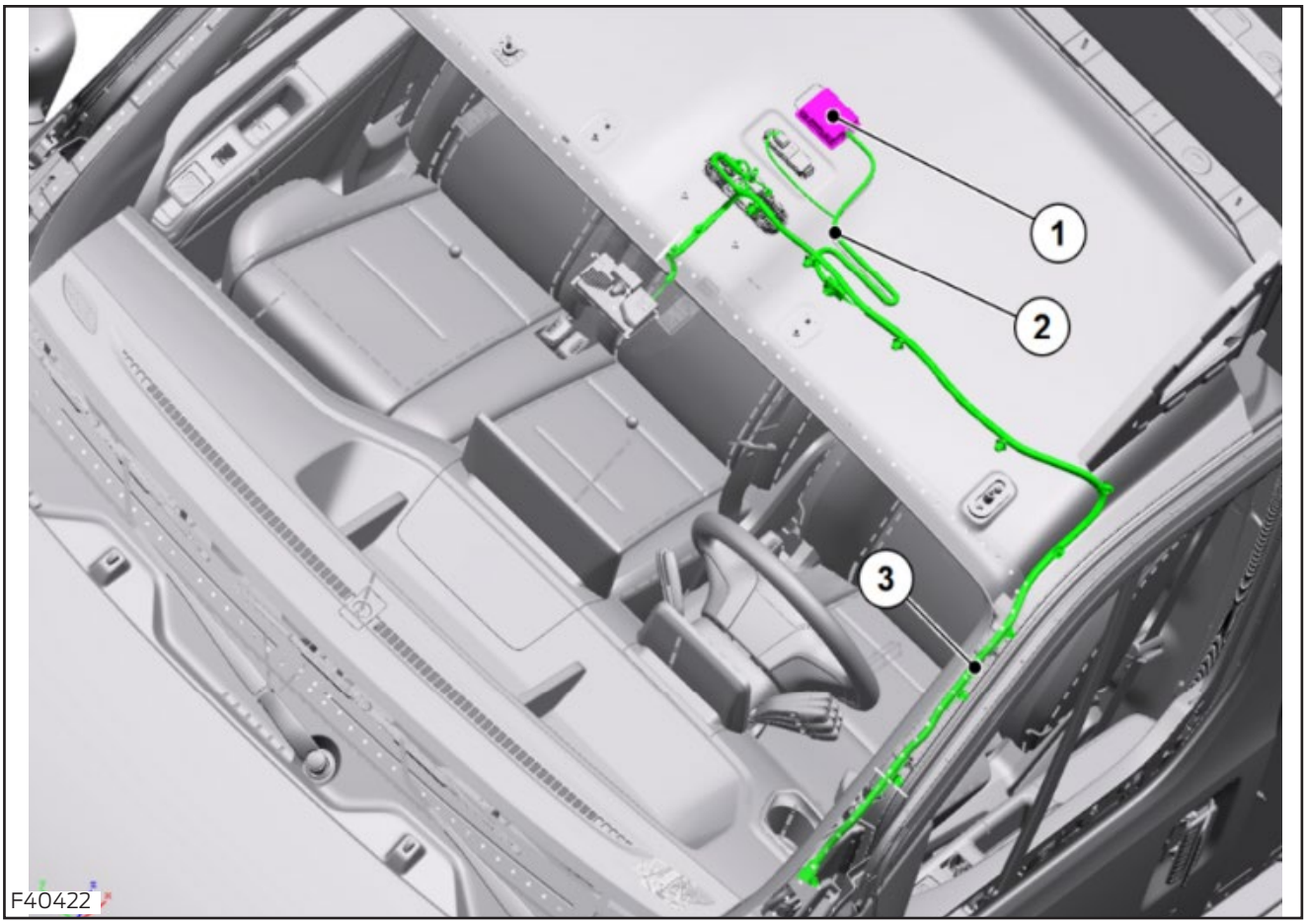
NOTE: If you remove the RF/TPMS receiver during an upfitting or conversion process, you must use the backup slot or pocket to start the vehicle. To locate the backup slot, refer to the vehicle Owner's Manual.

The RF/TPMS receiver is fed through a connection to the 14405 harness and then earthed at the ground point GD22.

For ground point locations, refer to section 4.18 Grounding.

For additional information, refer to section 2.4 Wheels and Tyres.

Radio Frequency Module/Tyre Pressure Monitoring System Receiver (RF/TPMS Receiver)



Item	Description
1	Receiver Remote RF
2	Front Cab Light Jumper
3	14405 Harness

4.16 Fuses and Relays

WARNING: Do not increase the capacity of the standard vehicle fuses.

NOTE: The pre-fuse box (PFB), smart relay box (SRB), and engine junction box (EJB) do not contain spare fuses. The convertor must install additional fuses if necessary. Refer to the Owner's Manual for additional information on fuses and relays.

NOTE: Only use Ford fuses. Other fuses may interfere with the validated fusing strategy.

4.16.1 Windscreen Wipers

The base wiper system should not be tampered with (controlled by CCU).

NOTE: Power to wiper motors is limited by the size of the wiring and associated relays. If any alternative wiper installation is made, it must have a specification equivalent to Ford components.

4.17 Electrical Connectors and Connections

WARNING: Do not modify the CAN bus because this can cause the failure of safety-critical components such as the Anti-lock Braking System (ABS).

WARNING: Do not use connectors that cut through the outer covering and into the core wire.

CAUTION: Only use Ford-approved connectors.

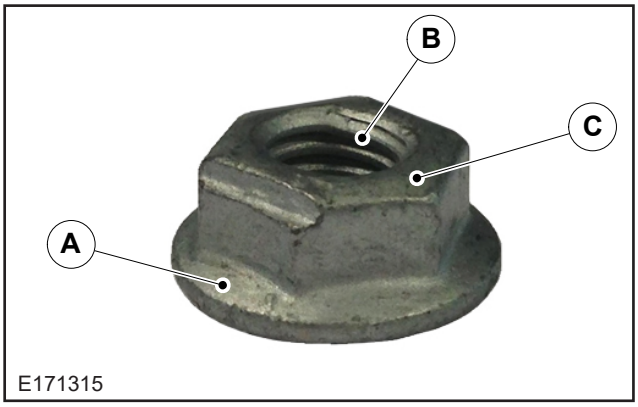
For wiring installation and routing guides, refer to 4.2 Wiring Installation and Routing Guides.

4.17.1 High Current Supply and Ground Connections

WARNING: You must use a self-locking crimp hexagonal nut for high-current terminal stud connections for the battery positive and negative or the chassis ground. Do not use locking washers, split washers, or nylon-lock type nuts.

WARNING: Use only one eyelet per stud for high-current applications. If more than one eyelet per stud is unavoidable, then connect the highest current eyelet feed closest to the supply terminal. Do not exceed two eyelets or crimp terminals per stud connection.

Self-Locking Crimp Hexagonal Nut



Item	Description
A	Large flange for maximum surface area current flow and large clamp force area.
B	Crimp/locking feature is obtained by deformed female thread only.
C	Finish must be a low resistance material which complies with the Restricted Substance Management Standards (RSMS).

For additional third party ground and +12V power cable connections to the Ford system, refer to 4.5 Battery Systems.

Any peripherals totalling more than 20A added to the power supply must be connected to an appropriate output depending on the vehicle configuration.

4.17.2 Vehicle Interface Connector

CAUTION: Signals 2 and 7 on the Vehicle Interface Connector are for sensing purposes only. Do not load them with high-current consumers.

CAUTION: The maximum current rating for signal 1 is 20A and signal 4 is 15A. Do not exceed these in any situation. This includes the total of the Ford system and third-party system requirement.

CAUTION: You must insulate the cable ends of unused wires in connectors to avoid shorting on any ground points.

The Vehicle Interface Connector provides a direct interface to signals. Refer to the figure F40475 for the location and the table for available signals.

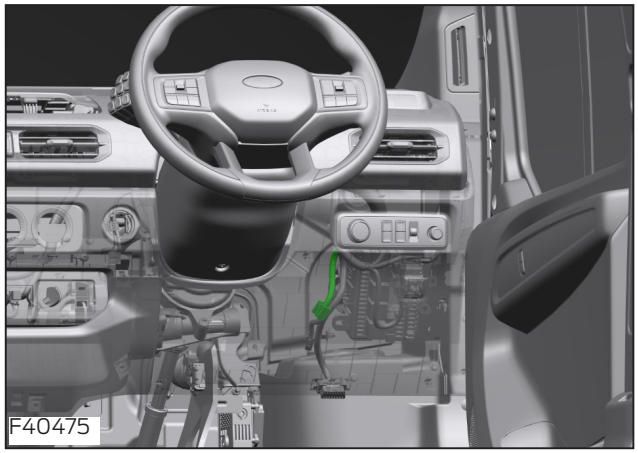
Vehicle Interface Connector mating part number can be found in the vehicle by the vehicle's standard OBDII Port. To access the vehicle signals through this connector, the convertor must follow the wiring installation and guidelines, and install terminals into the mating connector.

Refer to section 4.2 Wiring Installation and Routing Guides.

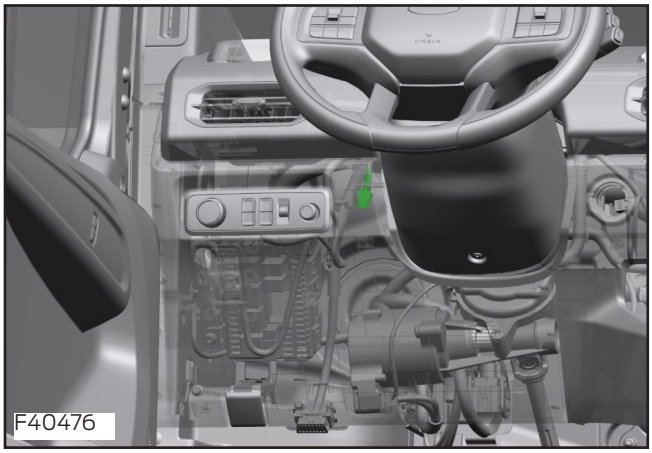
The terminal has the TE Part Number: 936242-1.

8 Way Vehicle Interface Connector

Vehicle Interface Connector RHD



Vehicle Interface Connector LHD



8 Way Vehicle Interface Connector Signals			
No	**Signal**	**Wire Gauge**	**Rating**
1	KL 30 Power	15 AWG	20A (16A Continuous)
2	Special Vehicle CAN H	20AWG	
3	Park Brake HW	14AWG	
4	KL 15 Ignition	17AWG	15A (12A Continuous)
5			
6			
7	Special Vehicle CAN L	20AWG	
8	Ground	14AWG	

Do not exceed Vehicle KOL of 100mA.

Ignition

Pin4: Ignition signal is protected by a 15A fuse. It is +12V active at ignition positions: Accessory (1) and Run (2) While it can drive equipment directly, use this feed to control a convertor-fitted relay, especially for high-current applications.

Special Vehicle CAN Signals

No.	Signal	Description
1	Vehicle speed	
2	LV battery voltage	
3	LV battery temperature	
4	Telltale-brake fluid level low	
5	Front AC compressor activation signal	On/Off
6	Rear AC compressor activation signal	On/Off
7	Odometer	
8	Remaining range	
9	Average current drain (kWh/100km)	Average power consumption displayed in the instrument
10	Driver seatbelt reminder	
11	Ambient temperature	
12	VIN number	

13	TPMS	TPMS_left front pressure	
14		TPMS_ Right front pressure	
15		TPMS_Right rear pressure	
16		TPMS_left rear pressure	
17		Left front pressure warning	
18		Right front pressure warning	
19		Right rear pressure warning	
20		left rear pressure warning	
21		Tire temperature	
22		Tire temperature warning	
23		TPMS lamp status	
24		Power Mode	On/ Off/ ACC/ Start
25	Light status	High beam status	
26		Low beam status	
27		Position lamp status	
28		Front fog lamp status	
29		Rear fog lamp status	
30		Turn indicator light status	
31		Hazard light status	
32		Brake light status	
33		Daytime running light status	
34		Ambient light status	
35	Door status	Front left door status	Open/Closed
36		Front left door lock status	Locked/ Unlocked
37		Front right door status	
38		Front right door lock status	
39		Rear left door status	
40		Rear left door lock status	
41		Engine hood status	
42		Trunk status	
43		Trunk lock status	
44		Trunk status	
45		Trunk lock status	
46		Cruise control status	Cruise control off/ Active/ Standby/ Error
47		Indicate- ABS/ ESP failure status	No failure/ failure
48		Indicate-airbag failure status	
49		Gear	P/D/N/R
50		Hand brake signal	Released/ Applied/ Releasing/ Applying
51		Brake signal	
52		Accelerator pedal ratio	
53		Brake pedal status	Not pressed/ Pressed
54	Crash event		
55	SOC		
56	AC_charge gun insert status		Disconnect/ Connect
57	DC_charge gun insert status		Disconnect/ Connect
58	Remain charge time		

59	Charge stop status	Normal stop to charge/ VCU stop to charge/OBC stop to charge/ BMS stop to charge/ Charger stop to charge
60	Charge More	DC/ AC- 16A/ AC- 32A/ AC- 64A
61	HV battery voltage	
62	DCDC output voltage/ current	
63	DCDC system status	
64	DCDC derating power status	
65	Tortoise drive lamp_warning	
66	HV_On/Off status	Init/OK/Warning/fault
67	OBC_work status	Standby/ Charging/ Charge Over/ Fault/ INV Standby/ V2L/ V2V/ Idle
68	BMS_charge status	Not ready/ Ready to charging/ Charging/ ChargeError/ ChargeOK/ Heating

4.18 Grounding

This section has information about general guidelines and warnings for electrical grounding, including the proper use of ground points and torque specifications.

4.18.1 Ground Points

WARNING: Use only one eyelet per stud for high-current applications. If you must use more than one eyelet per stud, then connect the highest current eyelet feed closest to the supply terminal. Do not use more than two eyelets or crimp terminals per stud connection.

WARNING: Do not use electrical ground paths for high-voltage components as additional ground points for 12-volt system applications. This includes low-voltage ground points for the high-voltage system.

CAUTION: Do not use the populated ground points that are shown. The use of alternative points can affect the integrity of the vehicle.

CAUTION: Make sure that you tighten all ground points to the correct torque.

NOTE: The Ground Point (GD) numbers are for reference only to show the location of the ground point.

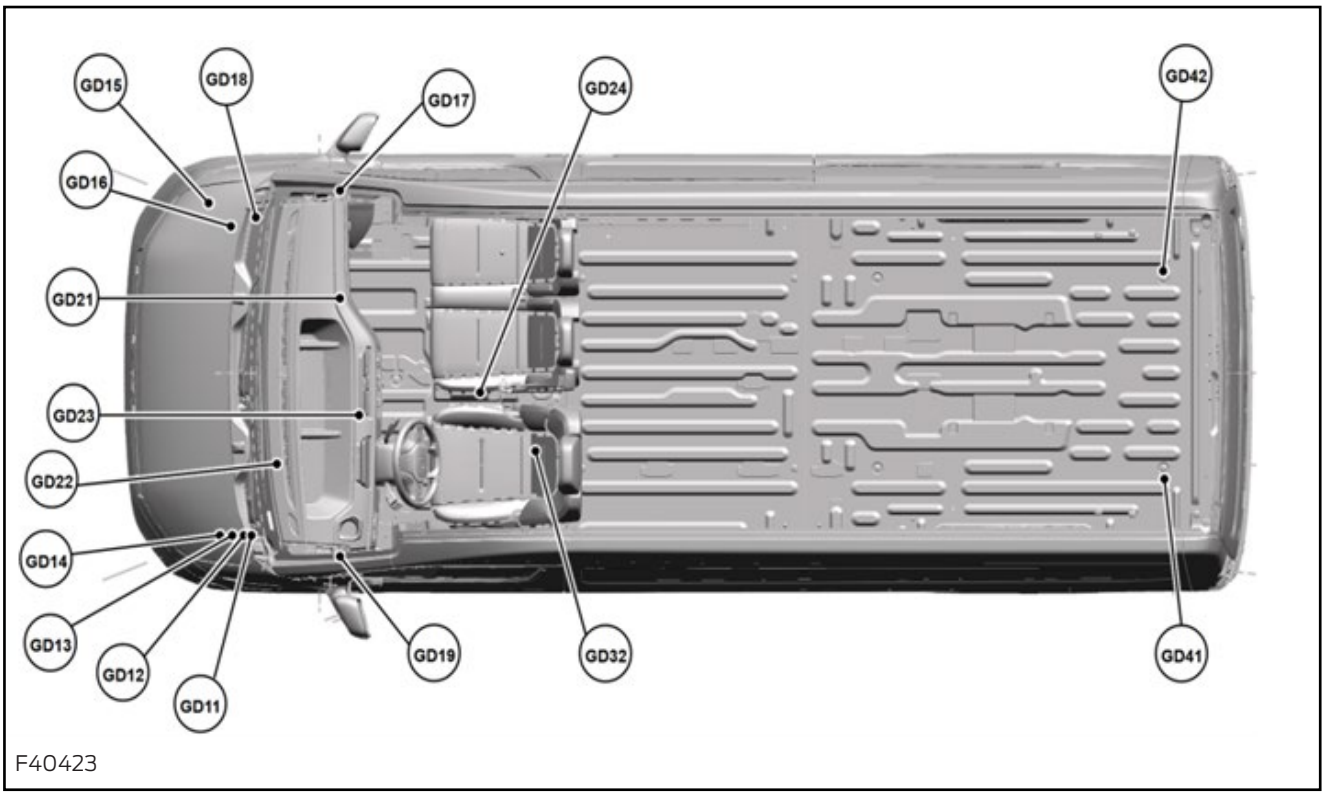
Route ground wires back to the Ford ground points that are supplied. For very high-current users, make the ground connection directly to the ground point that is close to the battery ground point. You can order an auxiliary ground stud eyelet.

For additional information, refer to section 4.6 Battery Protection

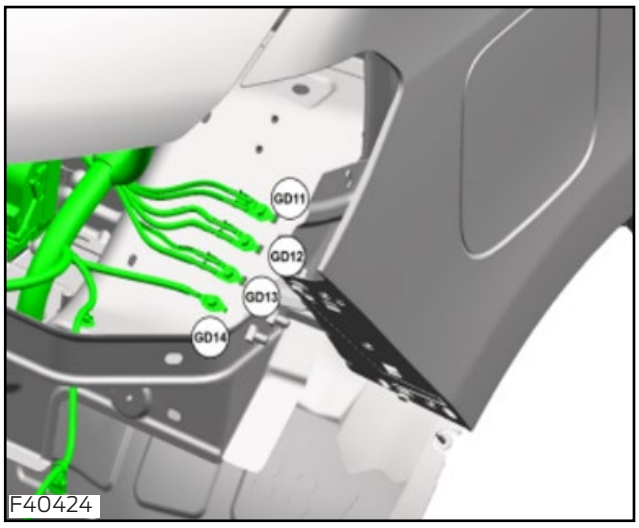
If you need a new grounding point, then avoid weather zones, especially for high-current grounds. Route ground connections back near to the location of the +12 V supply. This procedure helps to decrease the electromagnetic field that the inrush current generates and to improve electromagnetic compatibility.

For additional information, refer to section 4.2 Wiring Installation and Routing Guides.

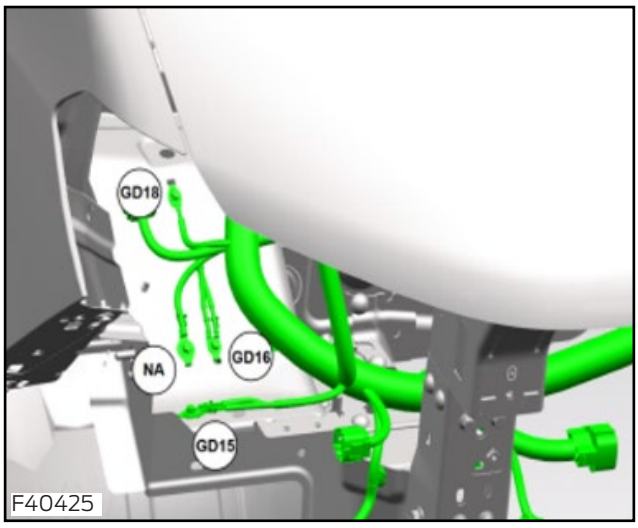
Van LHD Ground Points



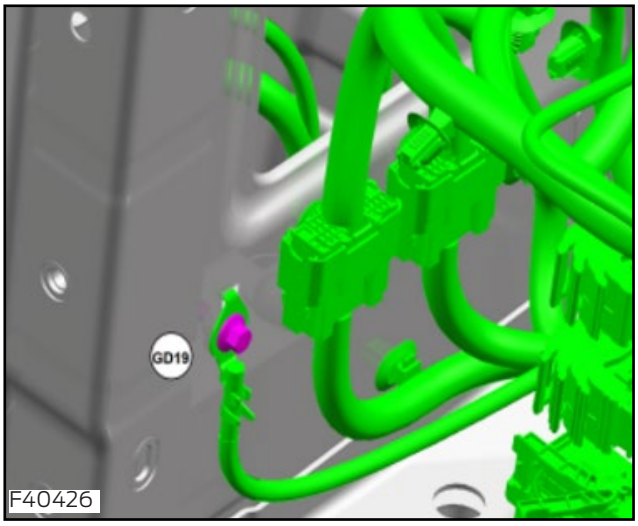
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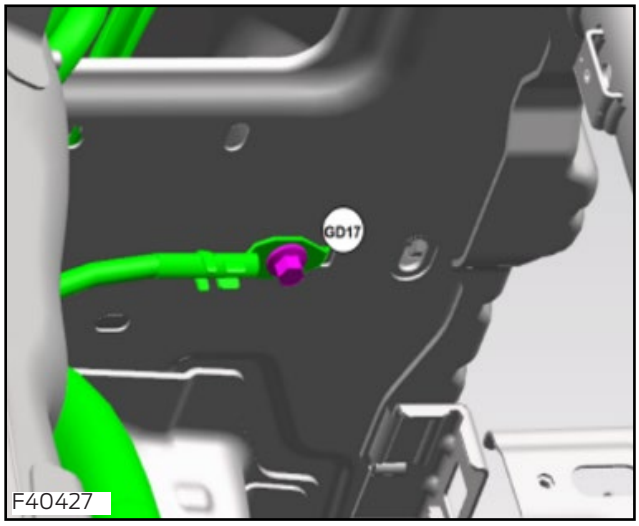
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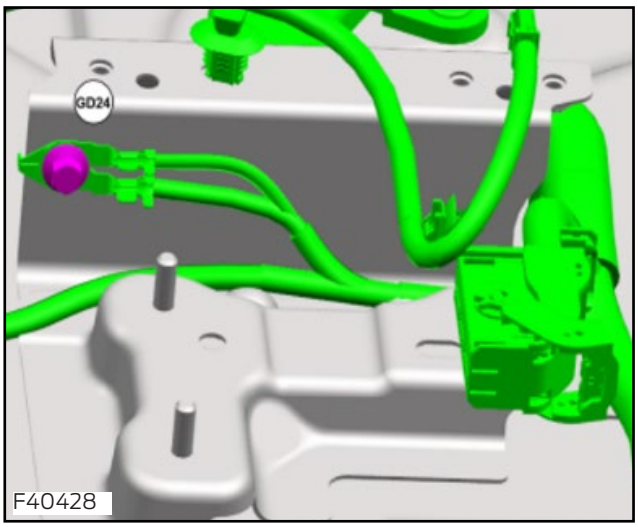
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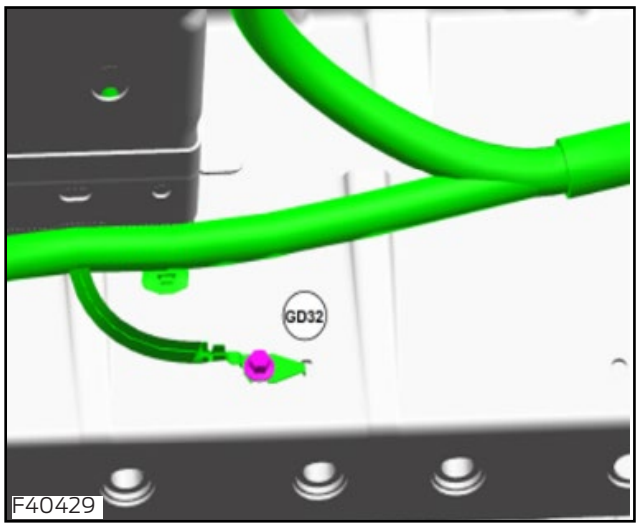
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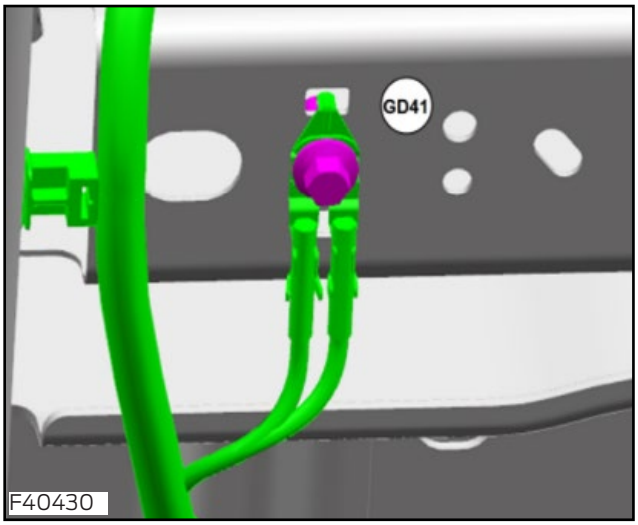
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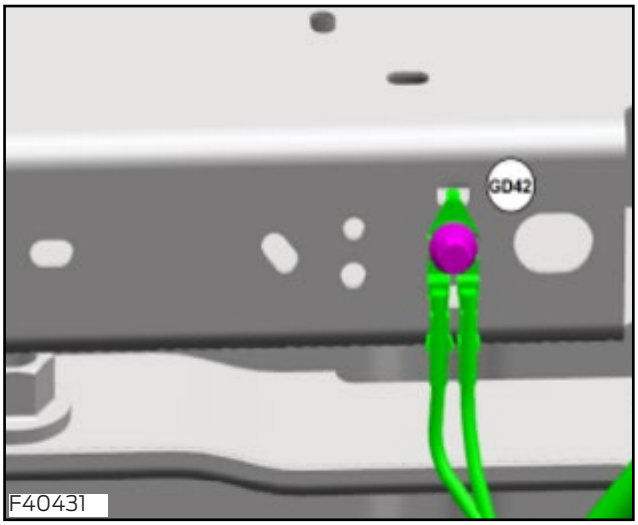


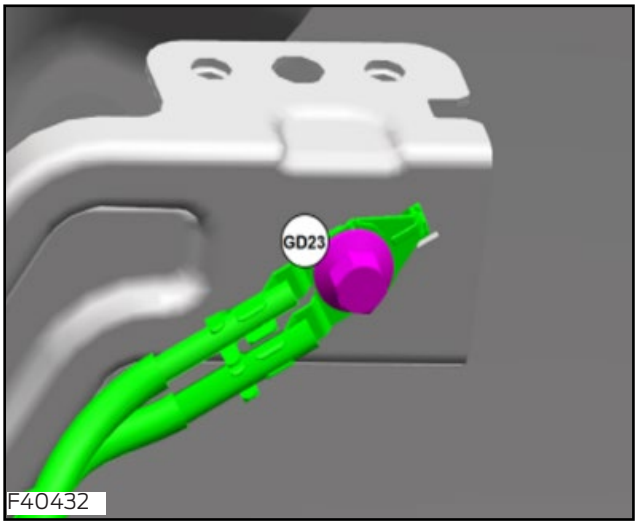
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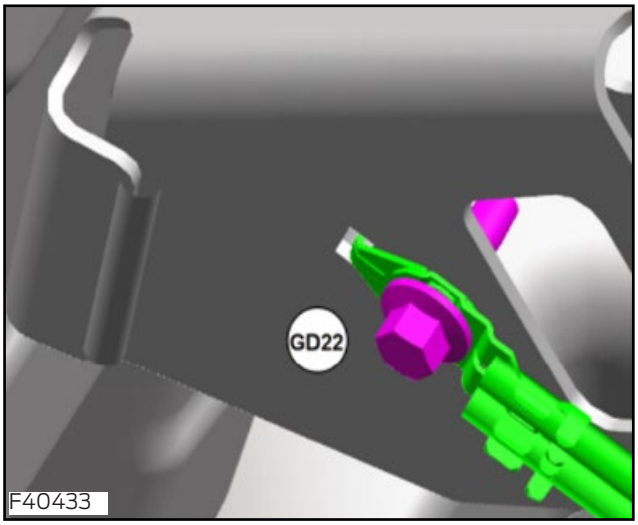


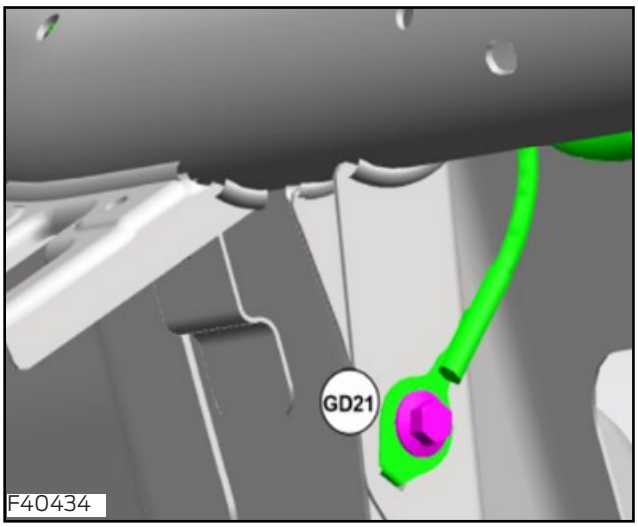
F40429


GD41
F40430


GD42
F40431

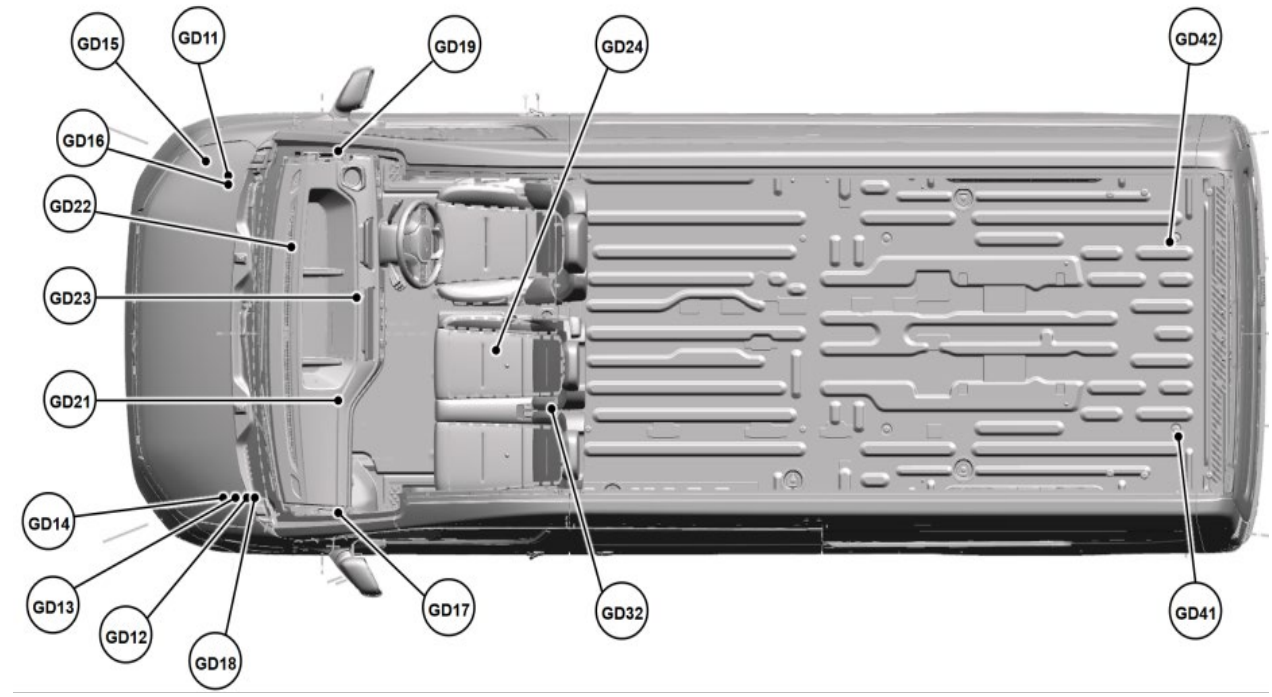

GD23
F40432


GD22
F40433

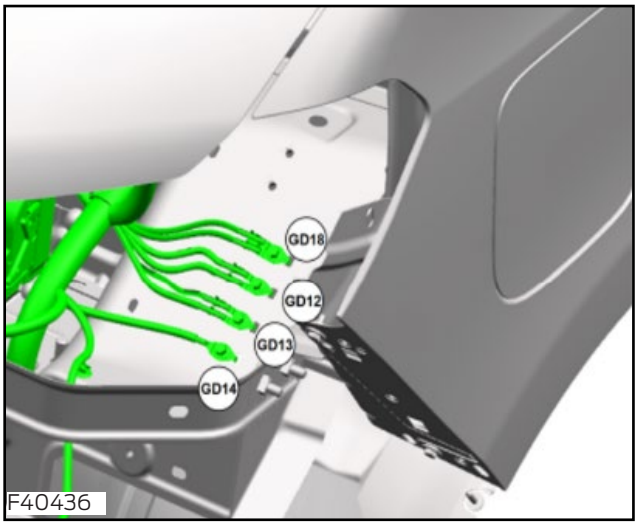

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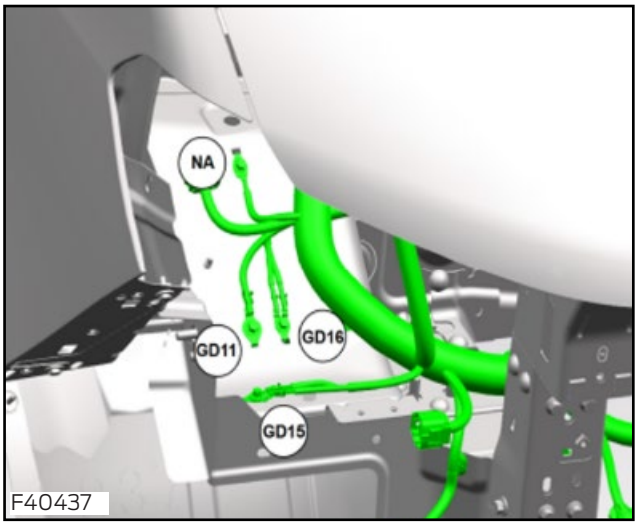
Point No.	Location	Type (Use of ground point)	Vehicle type	Harness
GD11	Front Wheel House LHS	IPB	VAN - LHD	14290
GD12	Front Wheel House LHS	RBU	VAN - LHD	14290
GD13	Front Wheel House LHS	Misc. Power Electric	VAN - LHD	14290
GD14	Front Wheel House LHS	Wiper/Washer Motor/HVAC shutdown value	VAN - LHD	14290
GD15	Front Wheel House RHS	FAN	VAN - LHD	14290
GD16	Front Wheel House RHS	Misc. Power Electric	VAN - LHD	14290
GD17	A-Pillar RHS	CCU	VAN - LHD	14290
GD18	Front Wheel House RHS	HVAC Blower Speed Controller	VAN - LHD	14290
GD19	A-Pillar LHS	EPS	VAN - LHD	14290
GD21	Cross Car Beam RHS	Special Vehicle Reserved Connector	VAN - LHD	14K024
GD22	Cross Car Beam LHS	Misc. Power Electric	VAN - LHD	14K024
GD23	Cross Car Beam LHS	USB/IVI/Power Outlet/ HAZARD Switch/Ignition Switch	VAN - LHD	14K024
GD24	Centre Channel	RCM	VAN - LHD	14B095
GD32	Frame Middle Left	BMS/PTC/OBC & DCDC/MCU	VAN - LHD	14M401
GD41	Frame Rear Left	License Plate Light/PAM/Rear Left Tail Lighter/Radar	VAN - LHD	18E255
GD42	Frame Rear Right	Rear Right Tail Lighter/Tailgate Lock/High Brake Light	VAN - LHD	18C394

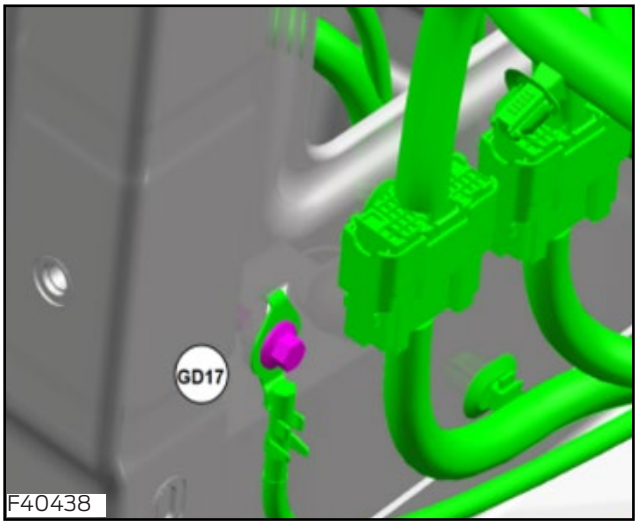
Van RHD Ground Points

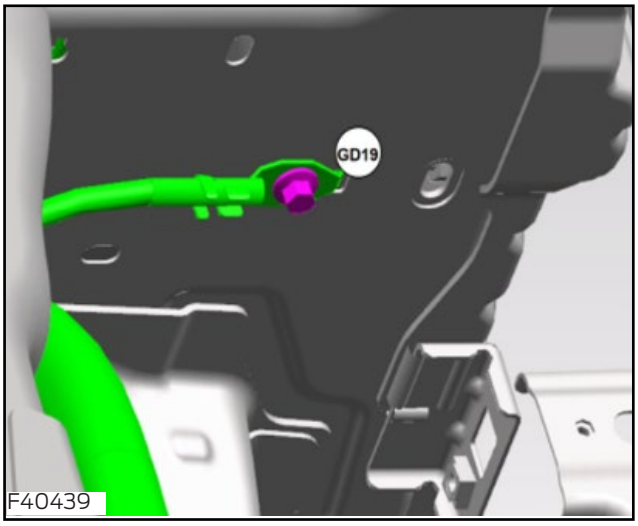


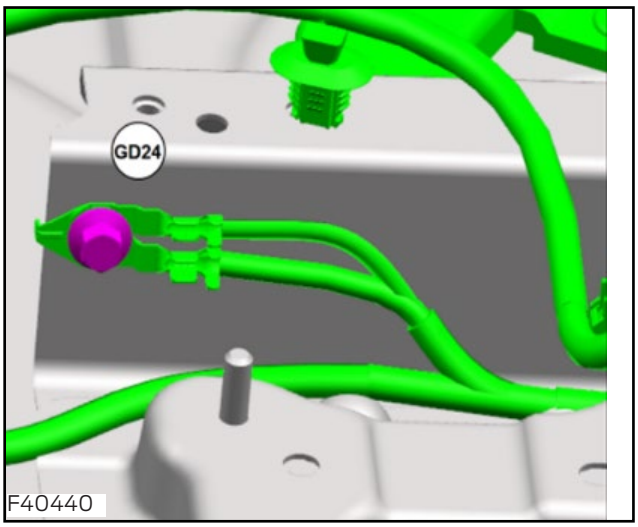
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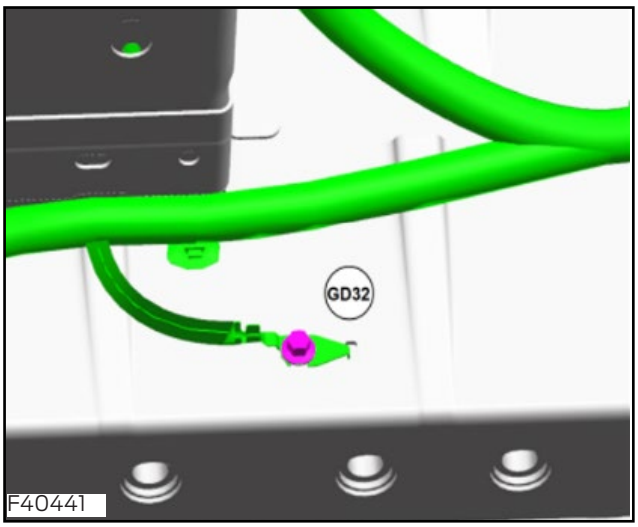

GD18
GD12
GD13
GD14
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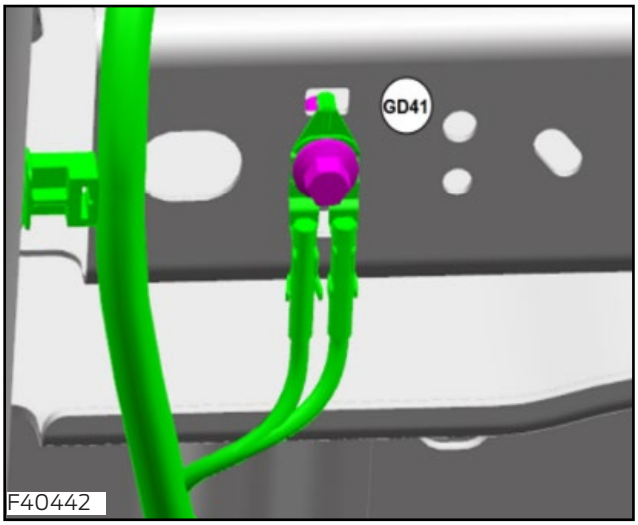

NA
GD11
GD16
GD15
F40437


GD17
F40438

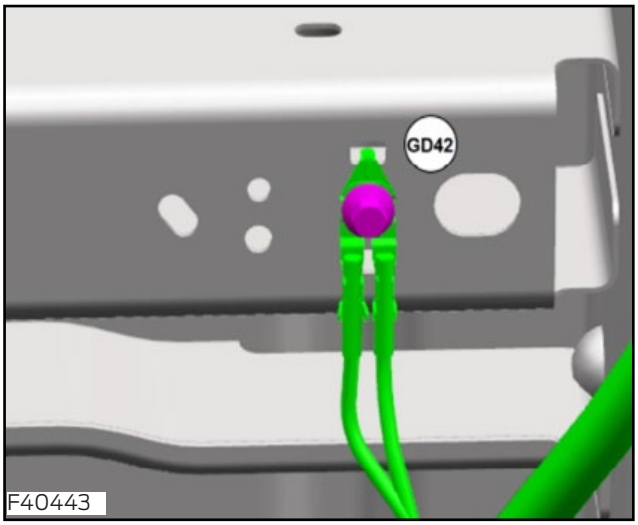

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GD24
F40440

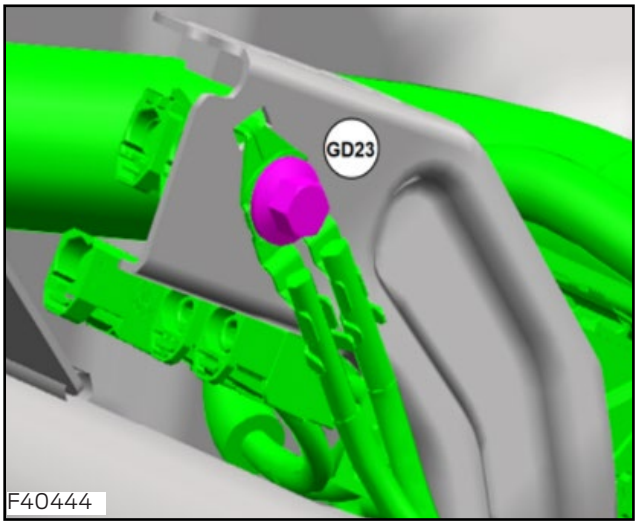

GD32
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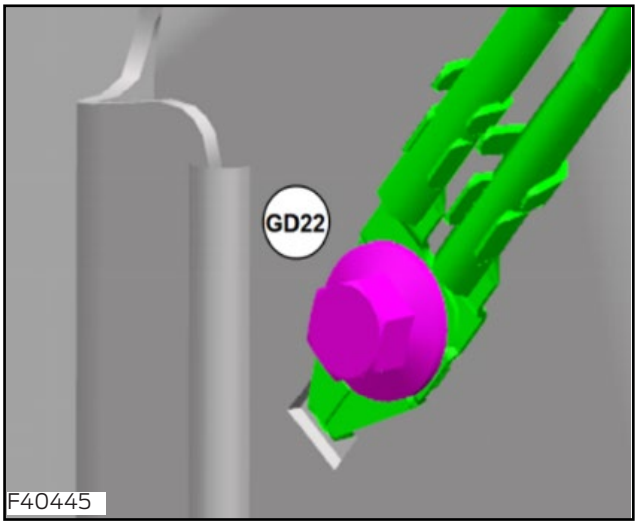
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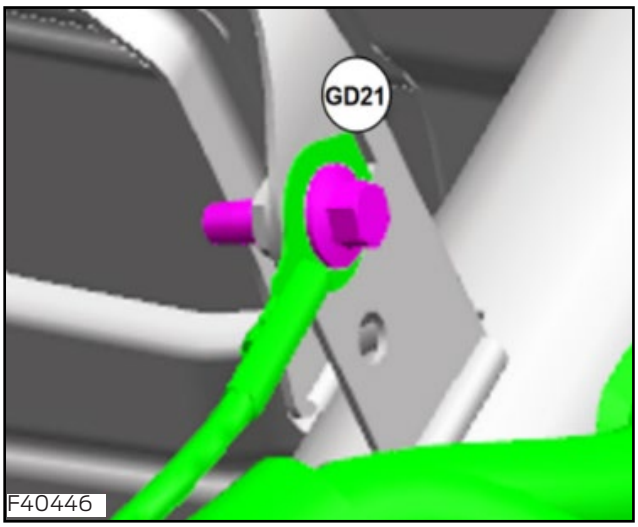
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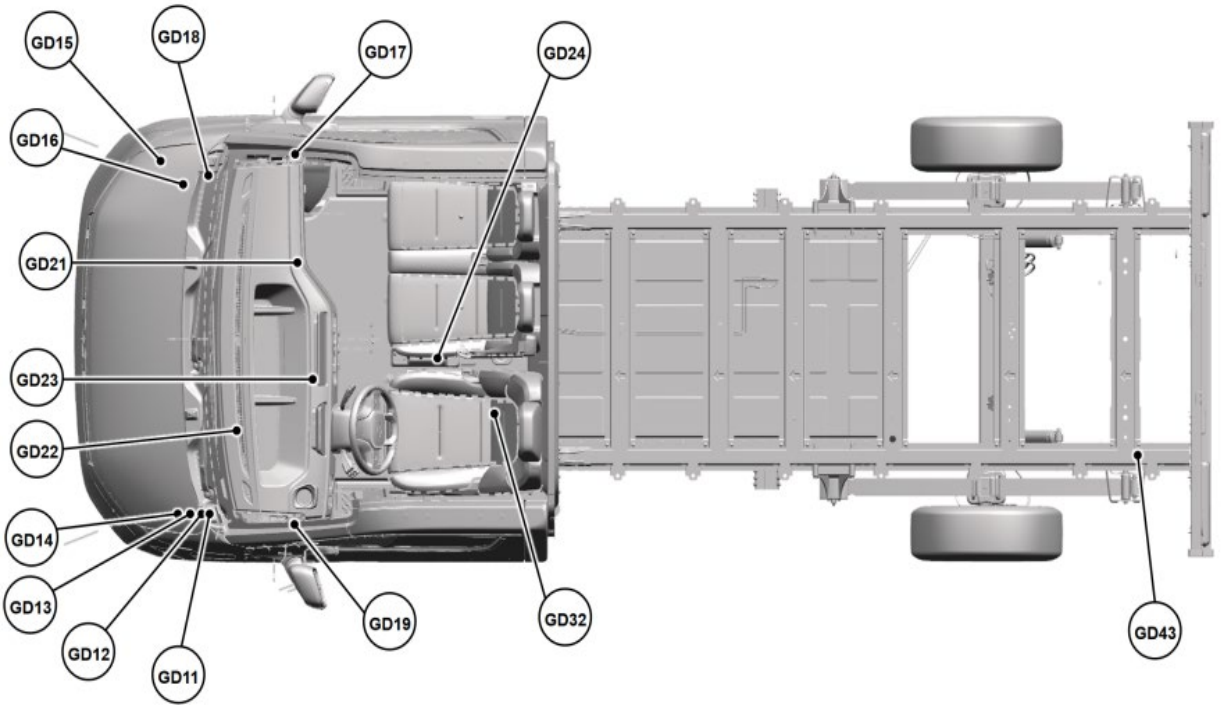
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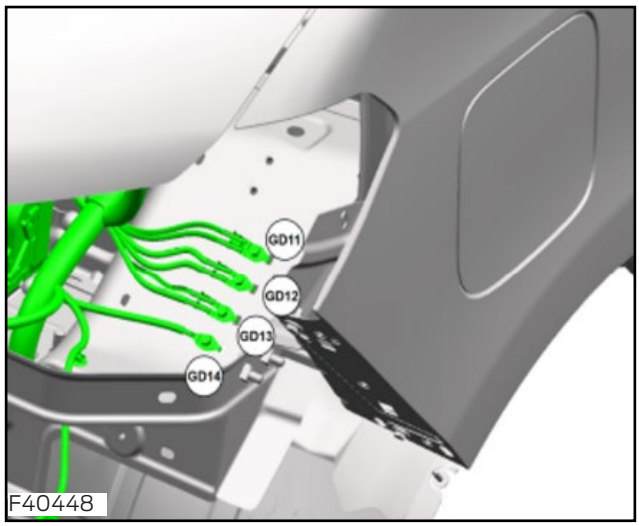
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Point No.	Location	Type (Use of ground point)	Vehicle type	Harness
GD11	Front Wheel House LHS	IPB	VAN - RHD	14290
GD12	Front Wheel House LHS	RBU	VAN - RHD	14290
GD13	Front Wheel House LHS	Misc. Power Electric	VAN - RHD	14290
GD14	Front Wheel House LHS	Wiper/Washer Motor/HVAC shutdown value	VAN - RHD	14290
GD15	Front Wheel House RHS	FAN	VAN - RHD	14290
GD16	Front Wheel House RHS	Misc. Power Electric	VAN - RHD	14290
GD17	A-Pillar RHS	CCU	VAN - RHD	14290
GD18	Front Wheel House RHS	HVAC Blower Speed Controller	VAN - RHD	14290
GD19	A-Pillar LHS	EPS	VAN - RHD	14290
GD21	Cross Car Beam RHS	Special Vehicle Reserved Connector	VAN - RHD	14K024
GD22	Cross Car Beam LHS	Misc. Power Electric	VAN - RHD	14K024
GD23	Cross Car Beam LHS	USB/IVI/Power Outlet/ HAZARD Switch/Ignition Switch	VAN - RHD	14K024
GD24	Centre Channel	RCM	VAN - RHD	14B095
GD32	Frame Middle Left	BMS/PTC/OBC & DCDC/MCU	VAN - RHD	14M401
GD41	Frame Rear Left	License Plate Light/PAM/Rear Left Tail Lighter/Radar	VAN - RHD	18E255
GD42	Frame Rear Right	Rear Right Tail Lighter/Tailgate Lock/High Brake Light	VAN - RHD	18C394

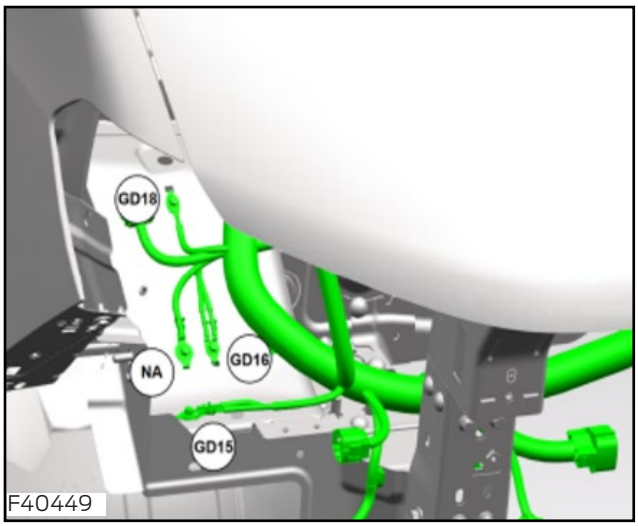
Chassis Cab LHD Ground Points



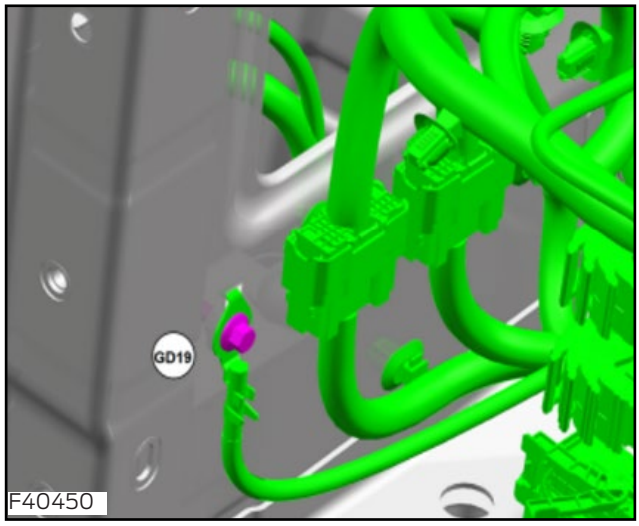
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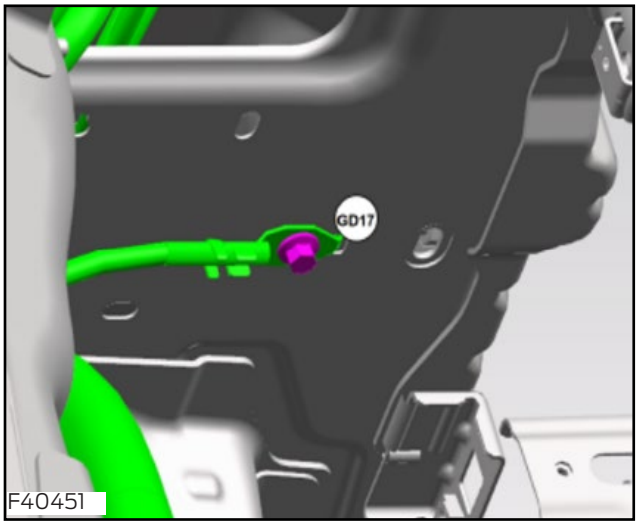
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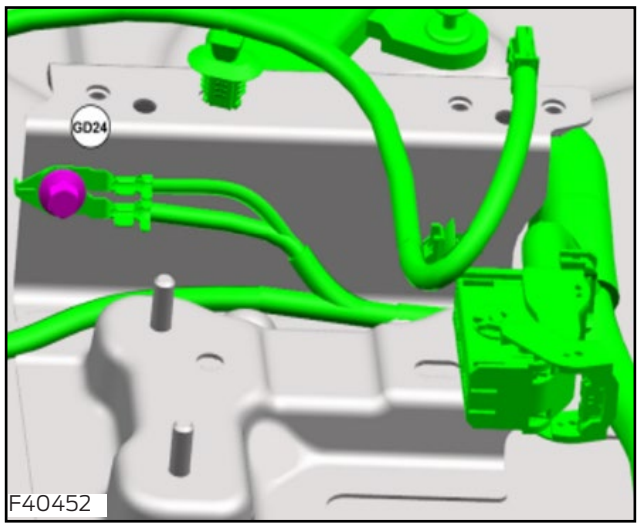
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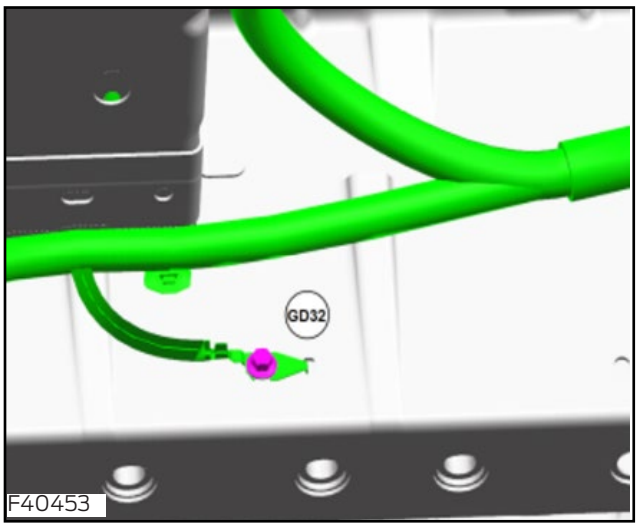
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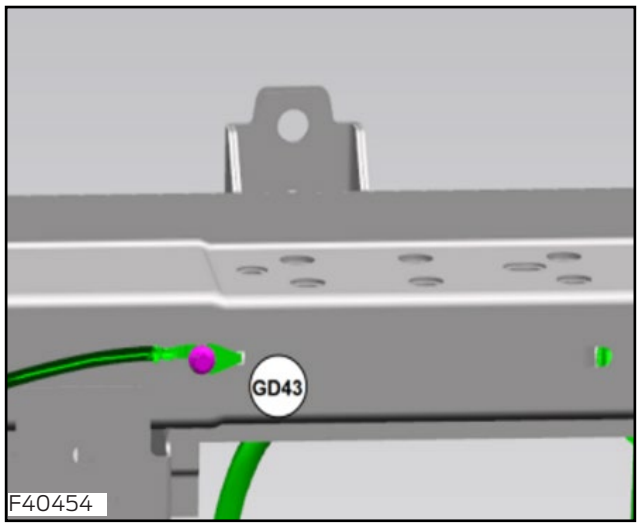
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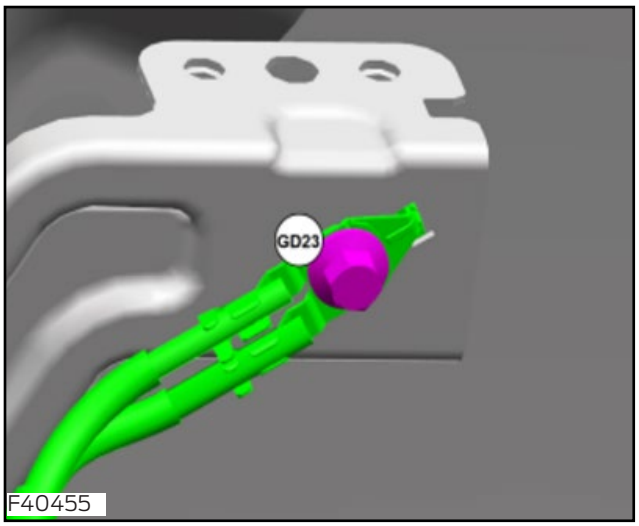


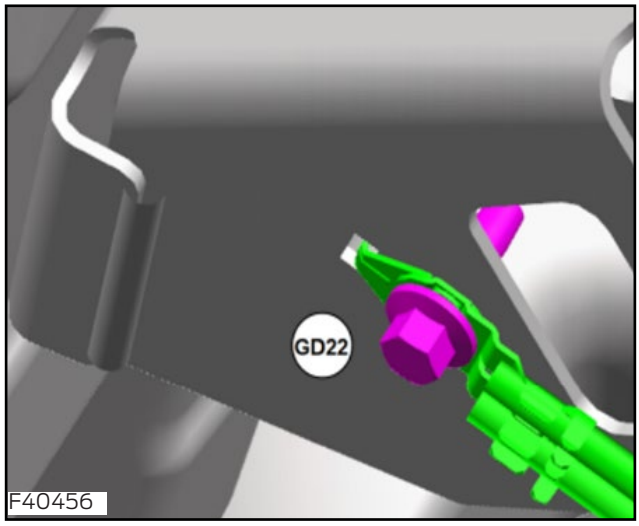
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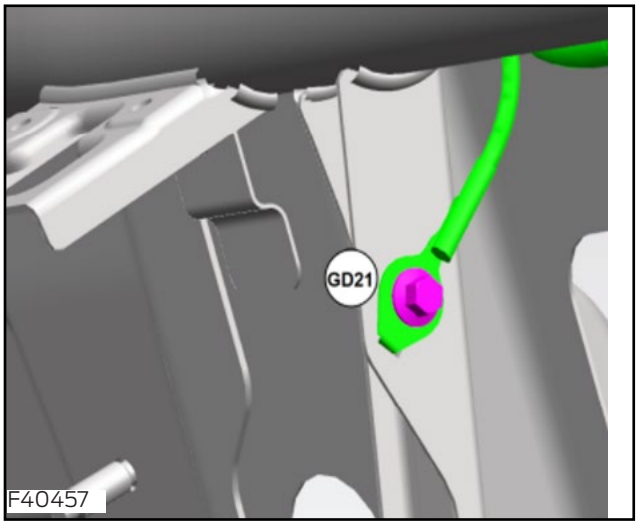


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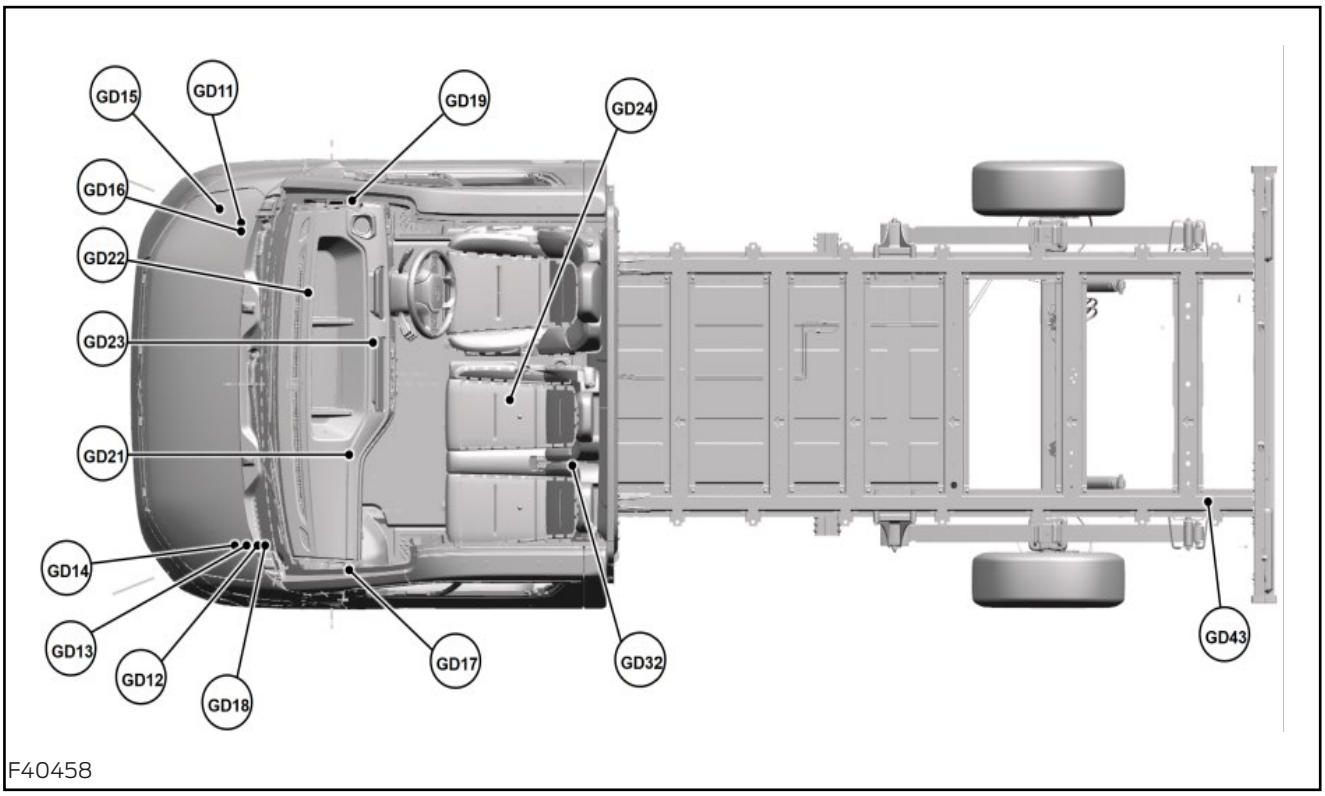




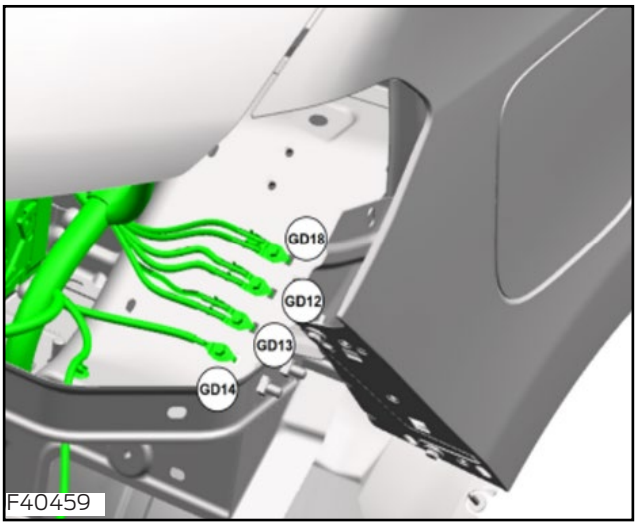


Point No.	Location	Type (Use of ground point)	Vehicle Type	Harness
GD11	Front Wheel House LHS	IPB	CC - LHD	14290
GD12	Front Wheel House LHS	RBU	CC - LHD	14290
GD13	Front Wheel House LHS	Misc. Power Electric	CC - LHD	14290
GD14	Front Wheel House LHS	Wiper/Washer Motor/HVAC shutdown value	CC - LHD	14290
GD15	Front Wheel House RHS	FAN	CC - LHD	14290
GD16	Front Wheel House RHS	Misc. Power Electric	CC - LHD	14290
GD17	A-Pillar RHS	CCU	CC - LHD	14290
GD18	Front Wheel House RHS	HVAC Blower Speed Controller	CC - LHD	14290
GD19	A-Pillar LHS	EPS	CC - LHD	14290
GD21	Cross Car Beam RHS	Special Vehicle Reserved Connector	CC - LHD	14K024
GD22	Cross Car Beam LHS	Misc. Power Electric	CC - LHD	14K024
GD23	Cross Car Beam LHS	USB/IVI/Power Outlet/HAZARD Switch/Ignition Switch	CC - LHD	14K024
GD24	Centre Channel	RCM	CC - LHD	14B095
GD32	Frame Middle Left	BMS/PTC/OBC & DCDC/MCU	CC - LHD	14M401
GD43	Frame Rear Right	PAM/Radar/Tail Lighter/License Plate	CC - LHD	14M401

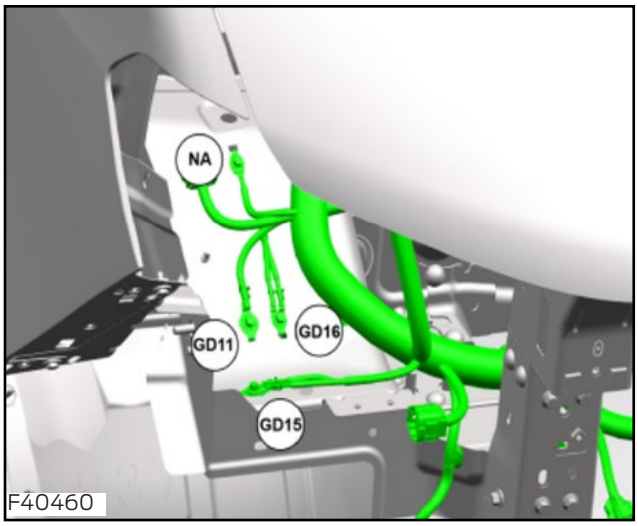
Chassis Cab RHD Ground Points



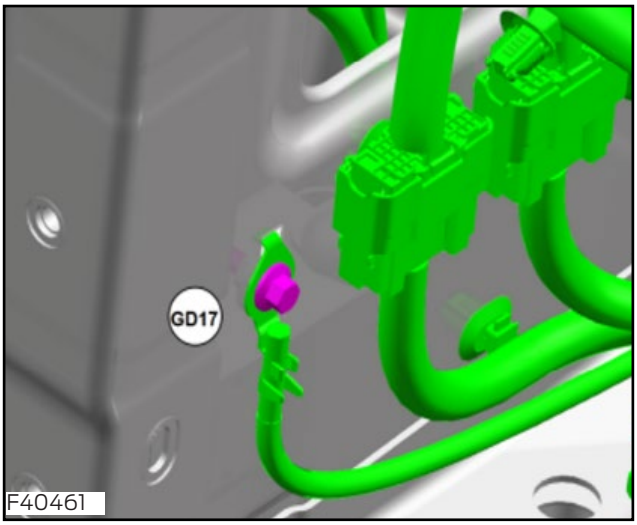
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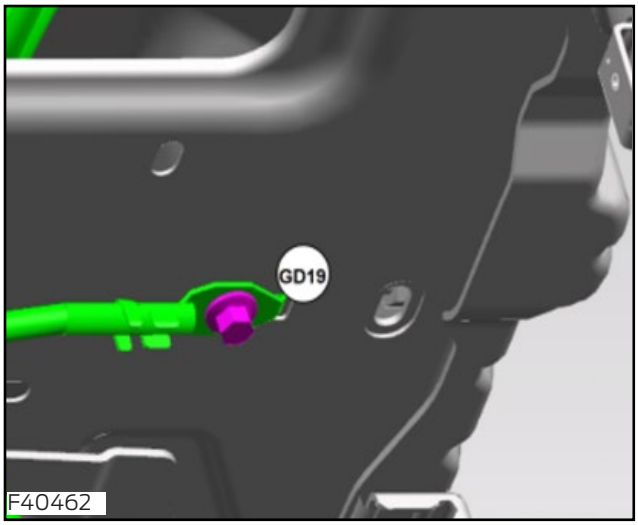
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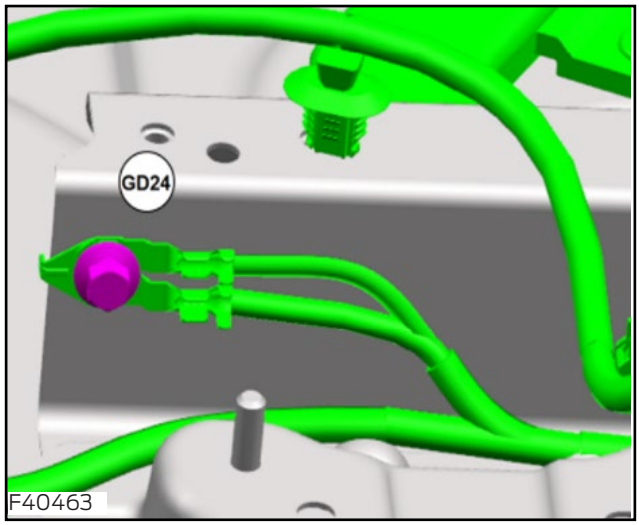
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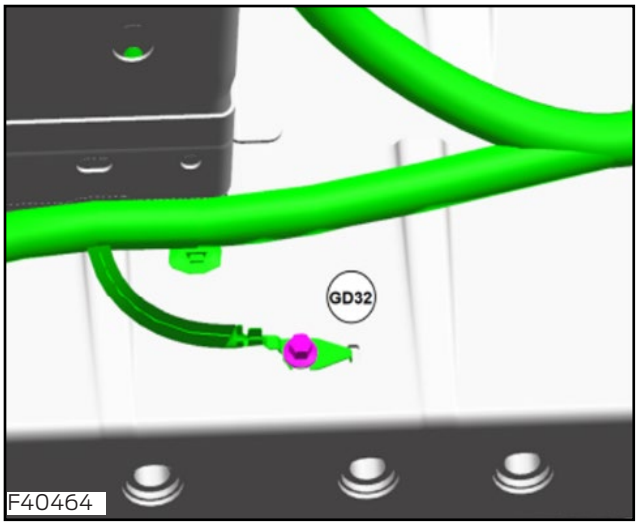


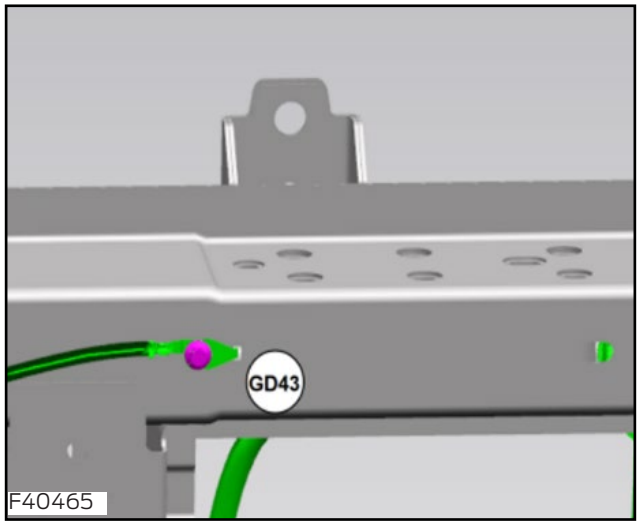
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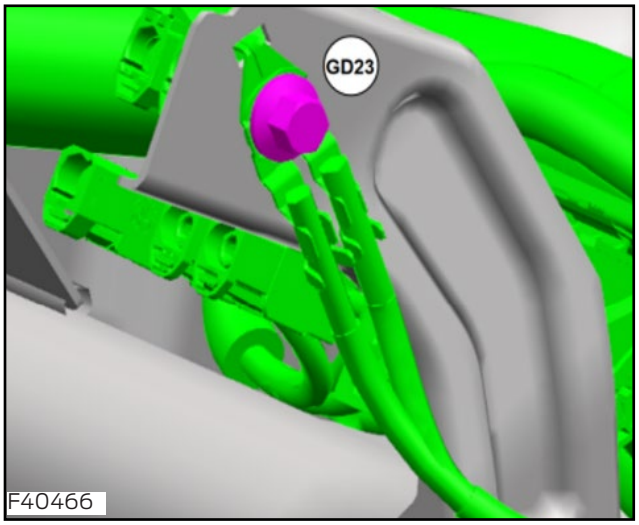


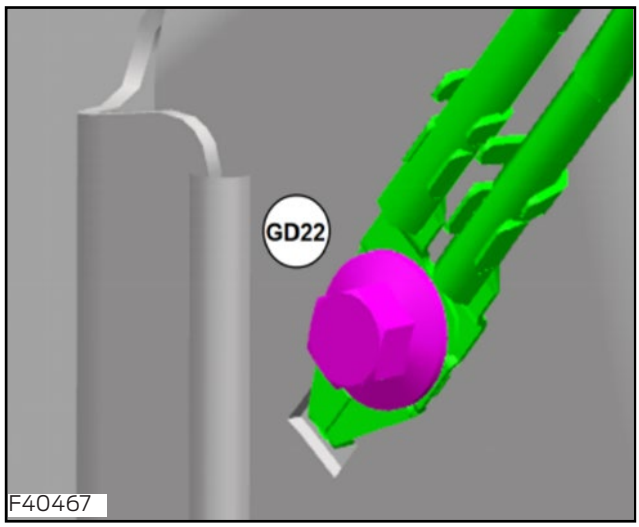
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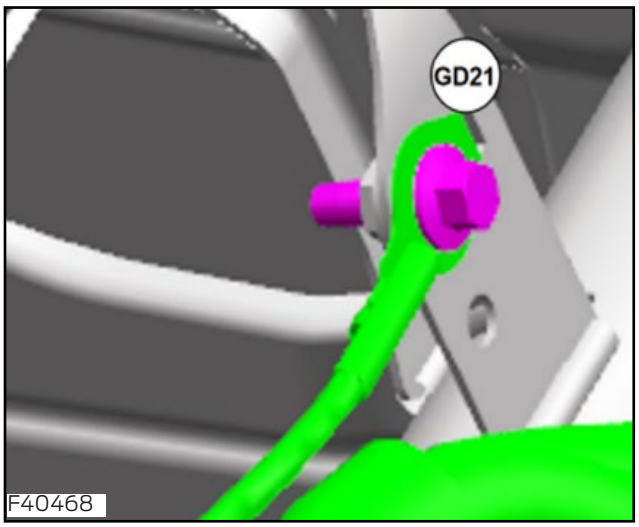












Point No.	Location	Type (Use of ground point)	Vehicle Type	Harness
GD11	Front Wheel House LHS	IPB	CC - RHD	14290
GD12	Front Wheel House LHS	RBU	CC - RHD	14290
GD13	Front Wheel House LHS	Misc. Power Electric	CC - RHD	14290
GD14	Front Wheel House LHS	Wiper/Washer Motor/HVAC shutdown value	CC - RHD	14290
GD15	Front Wheel House RHS	FAN	CC - RHD	14290
GD16	Front Wheel House RHS	Misc. Power Electric	CC - RHD	14290
GD17	A-Pillar RHS	CCU	CC -RHD	14290

GD18	Front Wheel House RHS	HVAC Blower Speed Controller	CC - RHD	14290
GD19	A-Pillar LHS	EPS	CC - RHD	14290
GD21	Cross Car Beam RHS	Special Vehicle Reserved Connector	CC - RHD	14K024
GD22	Cross Car Beam LHS	Misc. Power Electric	CC - RHD	14K024
GD23	Cross Car Beam LHS	USB/IVI/Power Outlet/HAZARD Switch/Ignition Switch	CC - RHD	14K024
GD24	Centre Channel	RCM	CC - RHD	14B095
GD32	Frame Middle Left	BMS/PTC/OBC & DCDC/MCU	CC - RHD	14M401
GD43	Frame Rear Right	PAM/Radar/Tail Lighter/License Plate	CC - RHD	14M401

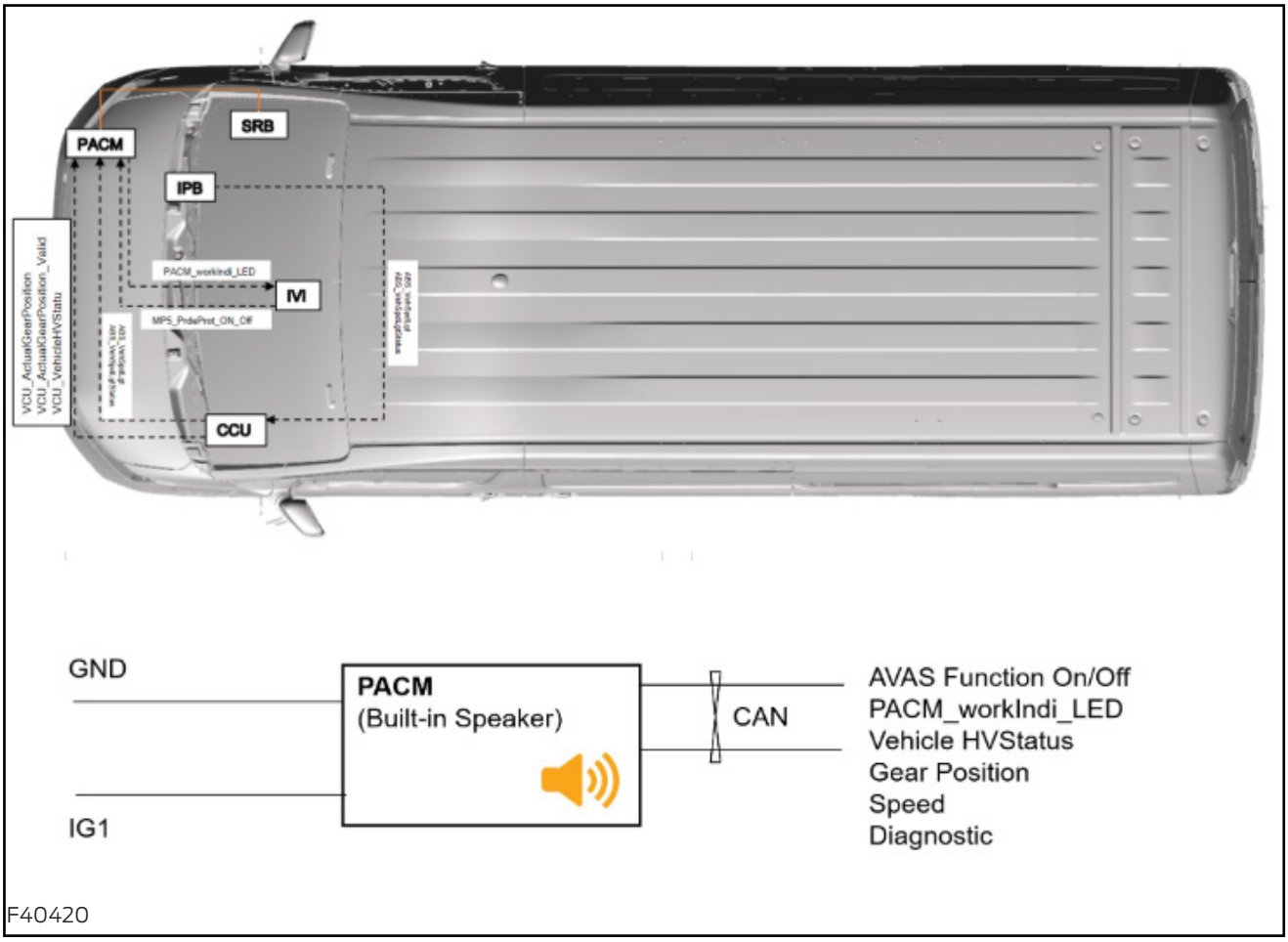
4.19 Acoustic Vehicle Alerting System (AVAS)

WARNING: Do not move or modify the components of the AVAS system, it is legal requirement.

WARNING: Do not remove, change the position of, or obscure the AVAS speaker.

Converted vehicles that are based on a Chassis Cab must not be above the geometrical limits of a van.

AVAS System



F40420

4.20 Park Aid Sensor Installation Guidance

CAUTION: Van variants are Type Approved to Regulation 158 with a Rear Park Aid System. Modifying the Park Aid sensor positions in those variants may require Type Approval to Regulation 158. If the vehicle was originally equipped with a rear view camera, Type Approval can be achieved using the camera system. For further information, refer to 4.20.5 Park Aid Sensor Relocation Guideline in this section.

CAUTION: You must follow the instructions in this section to guarantee performance of the systems. Any deviations from the instructions may cause failure or reduced functionality of the systems for which Ford is not responsible. The Vehicle Convertor must do applicable tests to make sure that the system is durable and functions correctly after installation.

4.20.1 General Requirements for Park Aid Sensor Installation

The Rear sensor holder (RB21-15K870-AAW, RB21-15K871-AAW, RB21-15K873-AAW), Front sensor holder (SB21-15A861-AAJA6, SB21-15A862-AAJA6, SB21-15A863-AAJA6, SB21-15A864-AAJA6) and park aid sensor (SB21-15K859-ABJA6, PP6-15K859-AAJA6) need to be used.

The sensor holder is designed for typical bumper assembly (material modulus of elasticity range from PP to ASA). If the surrounding material is harder, you may need to use another sensor or holder.

The sensor holder is designed for a material thickness: 3+/-0.1 mm.

The minimum distance of PWM wires to sensors must be 200 mm to avoid magnetic or electric fields.

4.20.2 Sensor Positions and Tolerances

Install the sensor holder on flat surfaces. If you place the sensor into a pocket or next to a sharp edge, the performance of the system may be affected.

The proposed parking sensor holder itself is angled at 7.8 (R2/R5) -9.4° (R3/R4), 2° (F2/F3/F4/F5) facing upwards. You cannot change/rotate the sensor connector direction as this causes the sensor to face down.

Angles show the sensor axis relative to the vehicle horizontal (XY) plane. See figure F40469 for outer and inner sensor positions.

Distance height from sensor to ground = Z

- Z - min worst case 357mm (R2/R3/R4/R5), 465mm (F3/F4), 460mm (F2/F5). The worst case corresponds to fully laden state.
- Z – max can go up to 418 mm from the ground. Higher is possible but will compromise lower object detection. The maximum height corresponds to unladen state.
- Variance of Z - for inner and outer assumed. if variance required, it should be minimized (~20 mm) to avoid incorrect distance between the sensors.

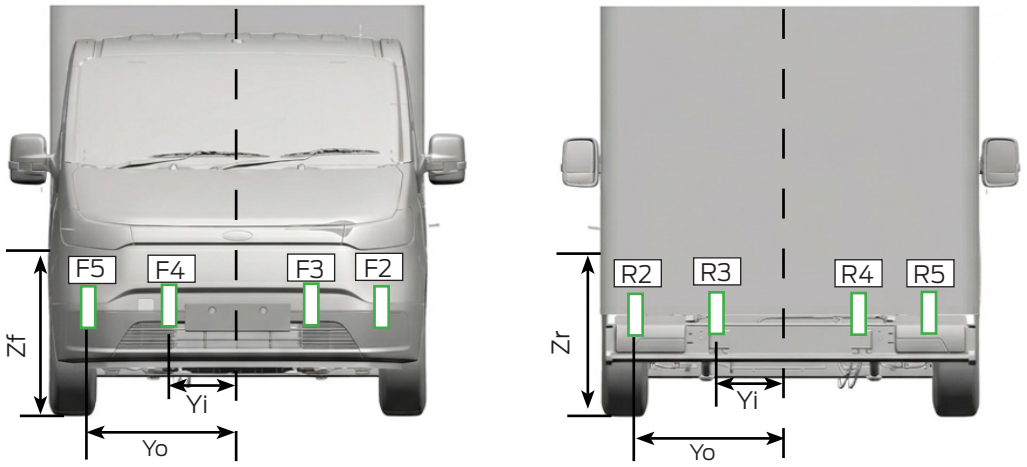
Distance width between vehicle middle point and sensor = Y

- Y Rear - Inner 250 mm (Yi), outer 670 mm +/-10 mm (Yo)
- Y Front - Inner 355 mm (Yi), outer 740 mm +/-10 mm (Yo)
- Y - mirrored installation for left/right

Distance between sensor and rear axle = X

- X= 1080 mm (F2/F5), 1106 mm (F3/F4), same distance for all sensors. Overhang can vary to the defined X value (1 m, more is possible - with small limitations in turning scenarios).

Park Aid Sensor Positions and Tolerances



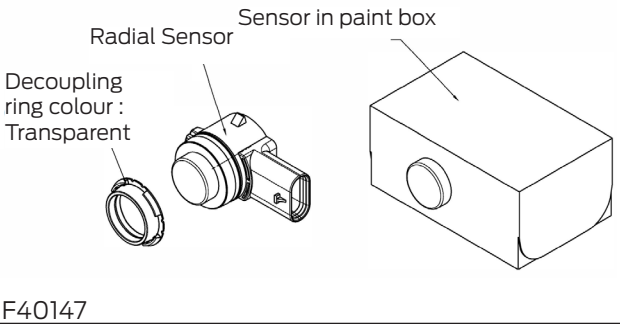
F40469

Item	Description
F2 / F5	Front Outer Sensor
F3 / F4	Front Inner Sensor
R2 / R5	Rear Outer Sensor
R3 / R4	Rear Inner Sensor
Yo	740 mm (front) , 670 mm (rear)
Yi	355 mm (front), 255 mm (rear)
Zf	460-500 mm (outer), 465-502 mm (inner)
Zr	357-418 mm

4.20.3 Sensor and Sensor Holder Painting Requirements

Before you paint, remove the decoupling ring (the ring does not allow any paint on it). You can use a paint box to make sure that you paint only the correct area of the sensor. An example is shown in Figure F40147.

Sensor Paint Box



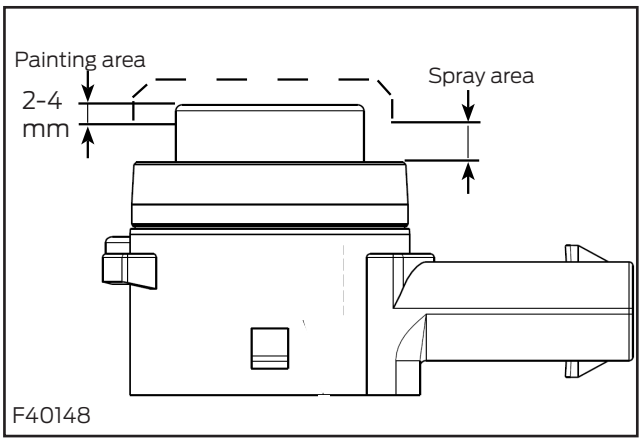
F40147

The painting area of the sensor is the front, transition radius, and shell surface of the membrane. The shell surface is painted from the front surface to the sides. In spray area, only spray is permissible. A continuous coating layer between membrane and cover is not permissible.

Painting area without spray area is 2-4 mm.

For the spray painting (state-of-the-art), you must meet the coating in Figure F40148.

Sensor Paint and Spray Area



The minimum layer thickness of the coating is the sum of the minimum acrylic layer thickness and the minimum thickness of the applicable coating. The coating thickness depends on the colour and the necessary coverage. This minimum thickness is necessary for colour matching and quality.

The maximum layer thickness of the coating must not exceed 110 µm. This measurement includes the acrylic powder layer. You can measure the layer thickness with an Eddy Current Tester (ECT). This maximum thickness is necessary to make sure that the transducer functions correctly.

Make sure that the layer thickness of the complete coating area does not exceed the maximum layer thickness. The coating area includes the front, the transition radius, and the shell surface. If you achieve the correct coverage, colour match, and quality with a thinner layer, you can use that thickness.

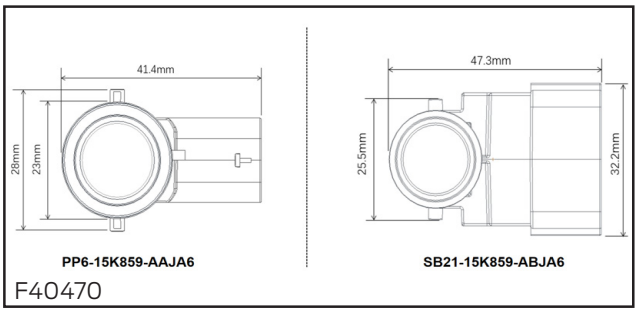
Do not apply coating or coating veils outside the defined area, for example, on the plug periphery or the plug contacts. The coating and coating veils must not form a strap between the membrane and any bordering components.

CAUTION: Do not use immersion treatment or power-washing without sealing the complete plug first.

Parameters

Acrylic Powder Layer Thickness	30 µm - 5 µm to 45 µm +5 µm
Ideal Storage Conditions	Ambient temperature (18°C-28°C) without being exposed to UV rays

Sensor Surface Dimensions



Sensor Holder

CAUTION: Maintain the overall minimum and maximum holder dimensions, even with the paint layers added to the sensor interface. Incorrect dimensions can cause sensor malfunction.

4.20.4 Park Aid System Check After Retrofitting

1. Place an object 20 - 30 cm away from each sensor. Shift to reverse gear and verify that a red indication on display is visible and a continuous tone is requested.
2. Place an object 35 - 50 cm away from each sensor. Shift to reverse gear and verify that a yellow/orange indication on display is visible and a chime is requested.
3. Place an object 70 - 140 cm away the inner sensors only. Shift to reverse gear and verify that a green indication on display is visible and a chime is requested.

4.20.5 Park Aid Sensor Relocation Guideline

A Park Aid sensor relocation may impact the compliance with Regulation 158. If you need to relocate the Park Aid sensor and a rear view camera exists in the vehicle, we recommend that you use the rear view camera to comply with Regulation 158.

If you need to relocate the Park Aid sensor and no rear view camera is available for Type Approval, follow the guidelines below to be able to Type Approve the vehicle with Park Aid sensors.

In relation to the vehicle's original Park Aid sensor positions, sensor relocation should not exceed the limits that follow:

Maintain a symmetrical sensor position setup to the vehicle's centre.

X-Position: You can move all sensors in the X-direction if the change is equal for all sensors. Additionally, a deviation of maximum 20 mm X-direction change between different sensors is tolerable.

Y-Position: You can move sensors +/- 10 mm.

Z-Position: Do not move sensors downwards. You can move sensors up to 200 mm upwards if the position change is equal for all sensors. A deviation of maximum 20 mm Z-direction change between different sensors is tolerable to maintain a symmetrical sensor position.

NOTE: Be careful when mounting sensors lower down. If they are too close to the ground, the road surface can trigger false warnings.

NOTE: Make sure that the combined change in distance between the sensors in the X, Y, and Z directions does not exceed 50 mm.

Alpha-angle: No change possible to the horizontal direction of each sensor.

Beta-angle: No change possible to the vertical direction of each sensor.

CAUTION: We do not recommend installation of the sensors into rigid material (especially metal). If you cannot avoid this, pay special attention (for example consider plastic fixtures, damping improvements).

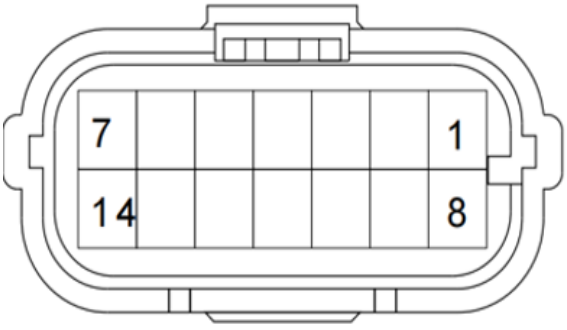
NOTE: Every sensor relocation can cause a deterioration of the base Park Aid system performance.

4.20.6 Connector Guidelines for Park Aid Sensor Wiring Extension

NOTE: When extending the park aid sensor wiring, disconnect at the connector.

NOTE: Unused cavities in the connector must be sealed with plugs to ensure waterproofing.

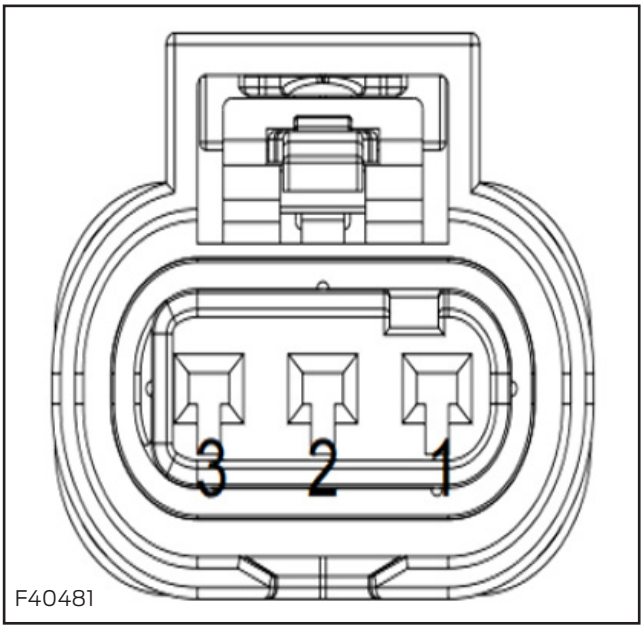
Master Park Aid Sensor Connector (Wiring Side)



F40480

Pin	Colour	CSA	Plug No Supplier No
1	Violet/Brown	0.5	
2	Violet/Orange	0.5	
3	Violet/Green	0.5	
4	Green/Orange	0.5	
5	-	-	FY989-1874
6	-	-	FY989-1874
7	-	-	FY989-1874
8	Green	0.5	
9	White	0.5	
10	Violet/White	0.5	
11	Grey/Orange	0.35	
12	Grey/Blue	0.35	
13	Black	0.5	
14	Violet	0.5	

Slave Sensor Connector (Wiring Side)



Pin	Colour	CSA
1	Violet	0.5
2	Green	0.5
3	Black	0.5

Rear Parking Aid Sensor Connector (Wiring Side) Information

Connector	External Supplier Connector Information (Wiring Side)			
	Supplier	Connector Model	Quantity	Mating Connector
Park Aid Module Sensor - Master Sensor Connector	KET	MG645724-5	1	MG655671
Park Aid Module Sensor -Slave Sensor Connector	TE	1-2355507-1	3	1-2434392-1

4.21 Cameras

This section has information about the installation and mounting guidance for the rear view camera system.

4.21.1 Cameras - General Information

CAUTION: The convertor must make sure that the vehicle complies with Regulation 158. Changes to the camera location may impact the Stage 1 Type Approval.

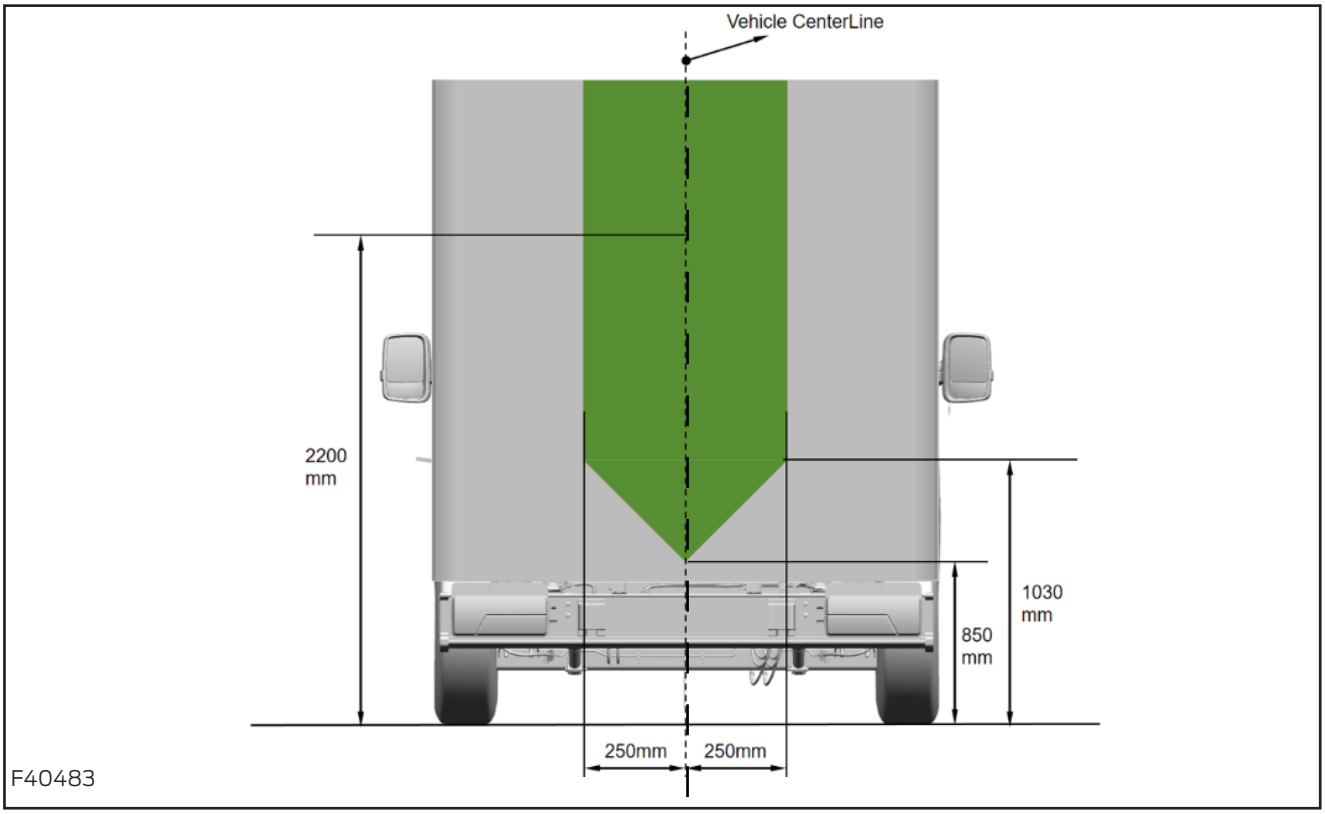
This information is provided for directional purposes only.

The camera included in the kit is capable of complying with Regulation 158 (Reversing Safety Regulations) when it is mounted in the green areas as defined in Figure F40483 on Stage 2 chassis cab conversions.

Mount the camera at a height not exceeding 2200 mm so that you can obtain the best field of vision.

The rear view camera of the Chassis Cab is stored in the glove compartment on the passenger side.

Rear View Camera Mounting Location



4.22 Driver State Monitoring Camera (DSMC)

WARNING: The Driver State Monitoring Camera is a legal requirement that is specified in the General Safety Regulation Batch C. This regulation is effective from 7 July 2026 for all new registrations in the EU and associated markets.

WARNING: The Driver State Monitoring Camera sends signals to the Driver Alert System that are necessary to comply with the General Safety Regulation Batch C requirements.

WARNING: Do not disconnect or remove the Driver State Monitoring Camera. This action makes the vehicle illegal.

WARNING: Do not change the location, housing, or any components of the Driver State Monitoring Camera.

WARNING: Do not put electromagnetic field emitters near the Driver State Monitoring Camera without approval from the Ford Electromagnetic Compatibility team.

CAUTION: Do not interfere with the field of view of the Driver State Monitoring Camera or with the field of illumination of its infra-red light LEDs. A disturbance to the field of view affects the functionality and performance of the camera. A disturbance to the field of illumination creates reflections and shadowed areas that affect the functionality and performance of the camera.

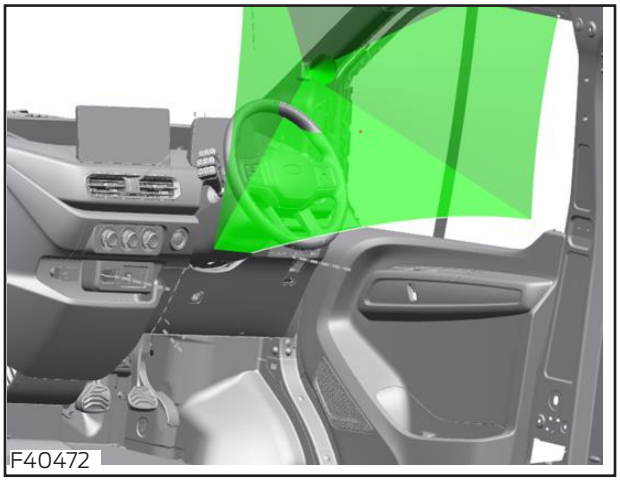
CAUTION: Do not remove or change the infra-red filter lens in front of the camera. If the lens is damaged or scratched, then replace it only with an original part.

CAUTION: Do not alter or change the camera bracket or cover of the Driver State Monitoring Camera because this action affects its functionality.

Front View


F40471

Isometric View


F40472

5.1 Body

This section has information about structural modifications, including essential safety precautions for welding and drilling on standard and electric vehicles. It details the mounting procedures and fixing strategies for Chassis Cab.

5.1.1 Body Structures - General Information

WARNING: Before you drill, see figure F50103 in this section of the manual for Boron Steel parts.

WARNING: Before you drill the floor, check sections 5.1.4 Precautionary Drilling/Welding.

WARNING: Extreme heat, such as from paint drying ovens, damages the high-voltage battery. Remove the high-voltage battery before you use paint drying ovens for more than 45 minutes or with temperatures above 60°C. If you do not follow this instruction, you can damage the high-voltage battery. A damaged battery can cause a fire or an explosion that results in serious personal injury or death. Refer to the Ford Workshop Manual.

WARNING: Do not remove, move, alter, or modify the components that follow, which Ford installs:

- **High-voltage battery, battery connectors, battery cradle (carrying structure), outriggers, energy absorption members, brackets, and attachment hardware.**
- **Front-end structure, which includes the aluminium extrusion assembly "Megabrace", attachment brackets, and attachment hardware.**

Refer to: 3.2.5 High Voltage Battery.

WARNING: Seal all fixings through the floor, sides, or roof with plugs, grommets, or tape to prevent harmful liquids, gases, and heat from entering the cabin. Use sealing components that withstand a temperature of at least 95 °C. Make sure that the sealing components maintain their seal at this temperature for a minimum of 30 minutes.

CAUTION: Uneven load distribution can cause unacceptable handling and braking characteristics.

When carrying out vehicle conversions, the following points should be considered:

- Maintain the structural integrity of the vehicle.
- Do not drill into closed frame body members.
- Design body alterations or additional structures to disperse the load evenly.
- Repaint metal edges after you cut or drill them. All metal edges must comply with exterior and interior protection requirements.
- Seal the body correctly after you cut or drill it to prevent the entry of fumes, water, salt, and dust. Use Ford-approved sealing and finishing materials and underbody corrosion protection.

Refer to section 5.11 Corrosion Prevention.

- Make sure that fixings in the B-pillar area do not interfere with the seat belts or seat belt reels.
- Make sure that swarf or debris from work in the B-pillar does not contaminate the seat belts.

For information about unique floor fixings, refer to the sections that follow:

- 5.3.1 Load Compartment Tie Downs (Load Lashing Points)
- 5.12 Frame and Body Mounting

For more information on precautionary drilling, refer to the sections that follow:

- 4.2 Wiring Installation and Routing Guides
- 5.5 Body Closures

5.1.2 Welding

WARNING: Before you weld, refer to figure F50103 for Boron Steel parts, in this section of the manual.

Before you weld on a vehicle body, follow all safety measures to protect people, modules, and electrical

components.

Electronic Components

WARNING: Obey the safety instructions for airbag systems when you weld on vehicles.

CAUTION: Welding and body shell alignment generate overvoltages that damage electronic systems.

NOTE: After you disconnect the power supply, you must wait 15 minutes before you do more work. Only personnel who have a relevant certificate of competence can work on airbag systems.

Protect the comfort and safety electronics during bodywork repairs.

Follow the points below:

- Disconnect the battery negative clamp and cover the battery terminal.
- Disconnect the electrical connector at the airbag control module.
- If you must weld directly near a control module, remove the module first.
- Never connect the negative cable of the welder near an airbag or a control module.
- Connect the negative cable of the welder close to the location of the weld.

Before Welding

Paint the interior surfaces of new bodywork components that are not accessible after installation. Treat the welding flanges with a special welding primer. The joint areas are not always accessible from the inside after installation. Therefore, prepare these areas to prevent soot production from burning paint during welding.

NOTE: To make sure you do not destroy the factory corrosion protection, keep the work area as small as possible.

NOTE: Do not touch cleaned, bare metal with your bare hands. The moisture from your hands corrodes the metal.

Follow this procedure:

1. Remove the primer, paint, or zinc layer in the welding area with a wire brush. This action prevents soot formation from the paint.
2. Clean the welding area thoroughly with a metal cleaning agent and rub it dry.
3. Coat all sides of the welding flange with welding primer and allow it to dry.

NOTE: Apply only a thin layer of welding primer to the spot-welding area. This action minimises spatter when you weld.

Note the points that follow when you weld:

- Zinc starts to melt at about 420 °C.
- Zinc vaporises at a temperature of about 900 °C.
- The amount of heating determines the damage to the zinc coating, and therefore to the corrosion protection.
- Resistance spot welding is particularly suitable for welding zinc coated panels, because no widespread warming occurs.
- Electrolytically zinc-plated panels do not require special preparation. You do not need to remove the zinc coating.
-

After Welding

Body panels often reach very high temperatures during work. This heat destroys the corrosion protection. It is vital to rework the affected areas.

- Grind the welded seams flat and clean thoroughly with silicone remover.
- Dry with a lint-free cloth.
- If the join area is accessible from the inside, the transition area to the paint must be abraded for all types of join, so that good adhesion of primer is achieved later.
- If the join area is not accessible from the inside and the cleaning and sanding work cannot be done, make sure that there is as little contamination as possible in the area of the repair. This allows the cavity wax applied later to penetrate the join area without hindrance.

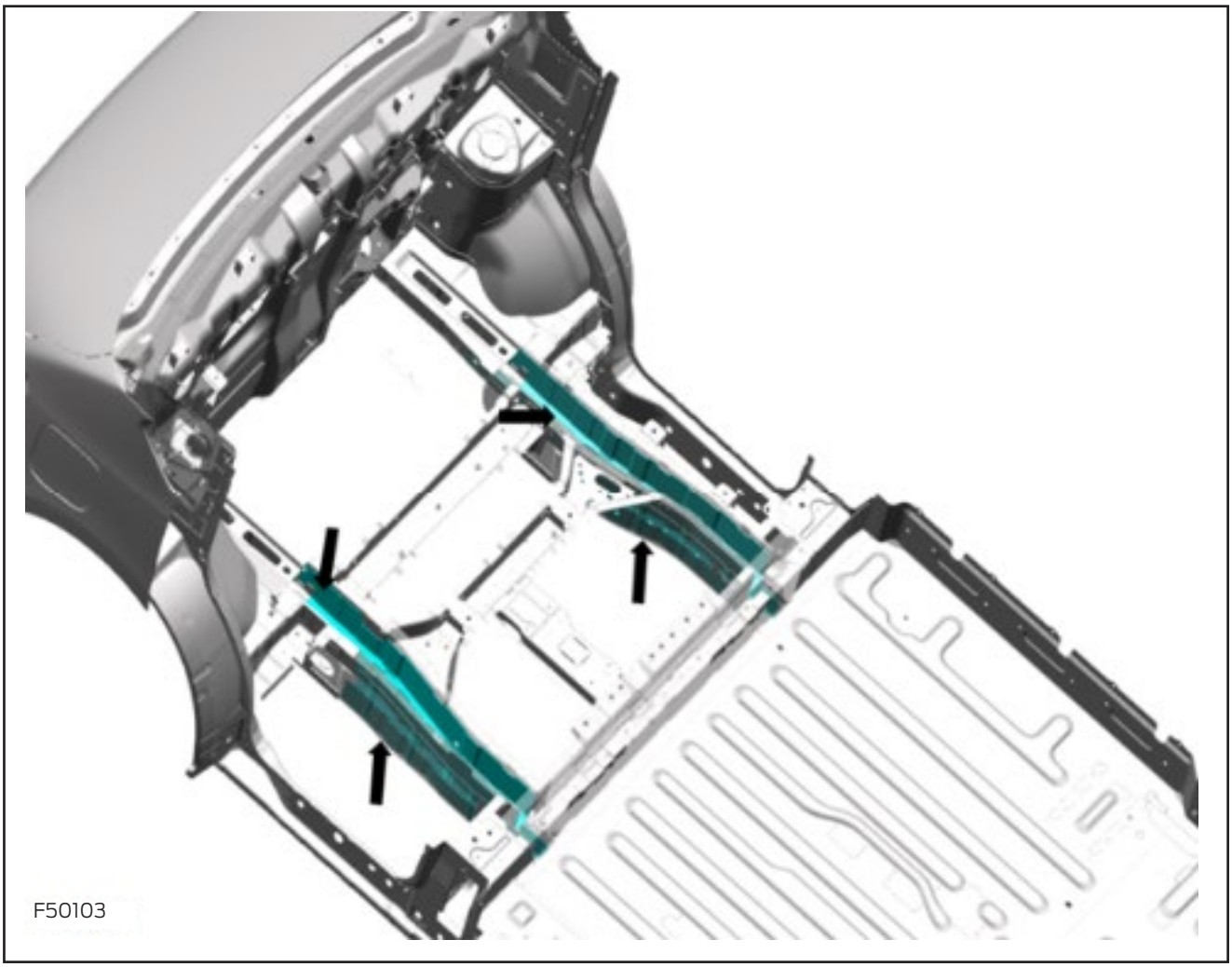
NOTE: Only apply a small amount of panel cleaner to the cleaning cloth when cleaning the area. Make sure that no cleaner reaches the connecting flange, so that the welding primer is not washed away.

Priming after welding

Apply primer to the welded flanges after you clean them. Check that the factory corrosion protection is present in the flange area. You must re-prime any damage.

5.1.3 Boron Steel Parts

Boron Steel Parts - Precautionary Drill or Weld Zones



5.1.4 Precautionary Drilling/Welding

WARNING: Ford does not recommend drilling, welding or any other operation in order to prevent damage to components located beneath the floor, including HV/LV system components, HV/LV cables, coolant/AC/brake lines. Refer to separate guidance for Vans in section 5.1.5 Precautionary Floor Drilling: Vans

WARNING: Do not weld to the high-voltage battery, casing or cradle.

WARNING: Do not ground welding equipment to the battery, battery casing, or battery cradle.

Ford provides 3D CAD data to help you locate vehicle components. You can ask for 3D CAD data by contacting FPSVHelp@ford.com.

5.1.5 Precautionary Floor Drilling: Vans

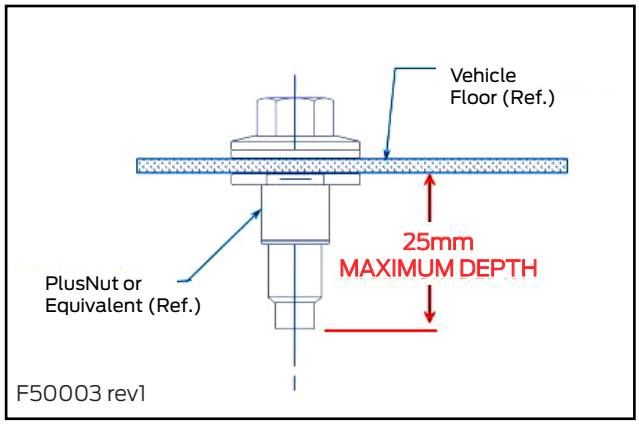
Ford does not recommend drilling. You can do limited drilling and fixing in the cargo floor area. You must follow the guidelines below.

WARNING: Do not touch the high-voltage grounding points in the vehicle.

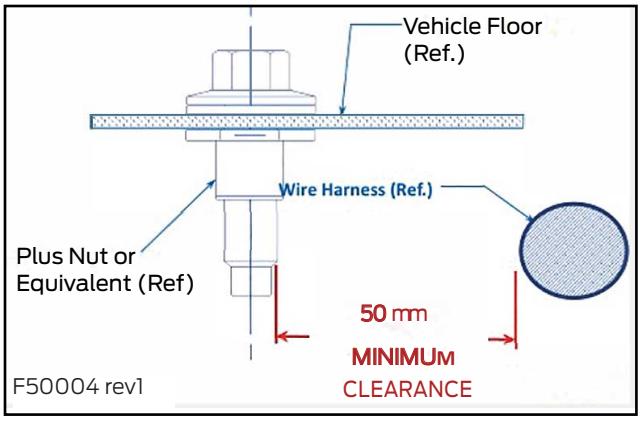
CAUTION: Take precautions when you drill or do any other operation behind the B-pillar to

prevent damage to components under the van floor.

- When you add holes or fasteners to the vehicle floor, you must consider all components below the floor.
- Use drill-depth stops. The drill stop depth must not exceed 25 mm.
- Fasteners, such as a PlusNut® or an equivalent, that extend below the vehicle floor must not exceed a depth of 25 mm. See figure F50003 rev1.
- Fasteners or alternative fastening methods that extend below the floor must have a minimum clearance of 50 mm to any surrounding high-voltage or low-voltage wiring, coolant line routing, or hydraulic brake line routing. This clearance prevents damage or chafing. See figure F50004 rev1.



F50003 rev1



F50004 rev1

NOTE: Repaint metal edges after you cut or drill them. All metal edges must comply with exterior and interior protection requirements.

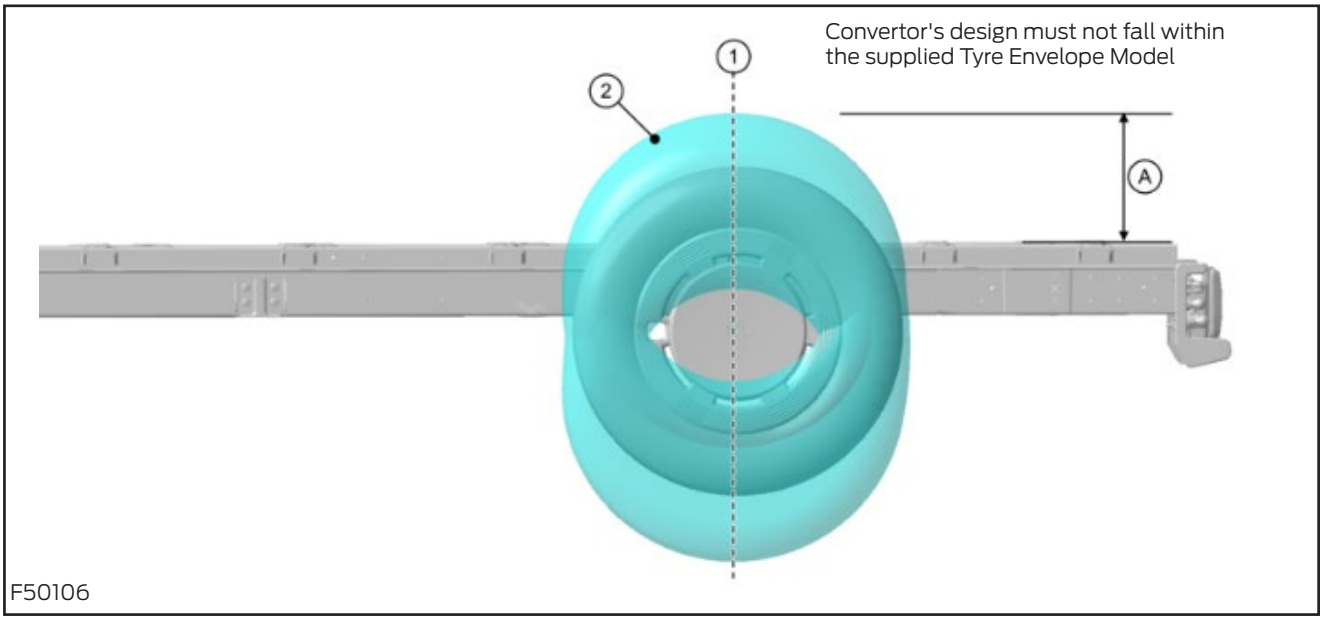
For additional information, refer to the following sections:

- 5.1.1 Body Structures - General Information
- 5.11 Corrosion Prevention

5.1.6 Integrated Bodies and Conversions

Figure F50106 shows recommended dimensions for wheelhouses. If you need further information on wheelhouses, then contact FPSVHelp@ford.com for access to tyre envelope models through CoLab.

Wheelhouse Dimensions Chassis Cab



F50106

1	Centre line of wheel
2	Tyre clearance envelope model
A	252 mm

5.1.7 Chassis Cab

WARNING: You must seal all fixings through the floor, sides, and roof.

CAUTION: Uneven load distribution can cause unacceptable handling and braking characteristics.

When you do vehicle conversions or modifications, consider the following points:

- Make sure that you use all of the reinforced holes that are in the chassis frame top surface for full-length bodies or subframes. See figure F50107.
- Make sure that you maintain the vehicle's structural integrity.
- Do not drill into closed frame body members.
- Design the body alterations or additional structure to disperse the load evenly.
- Repaint metal edges after you cut or drill. All metal edges must obey exterior and interior protection requirements. See section 5.11 Corrosion Prevention.

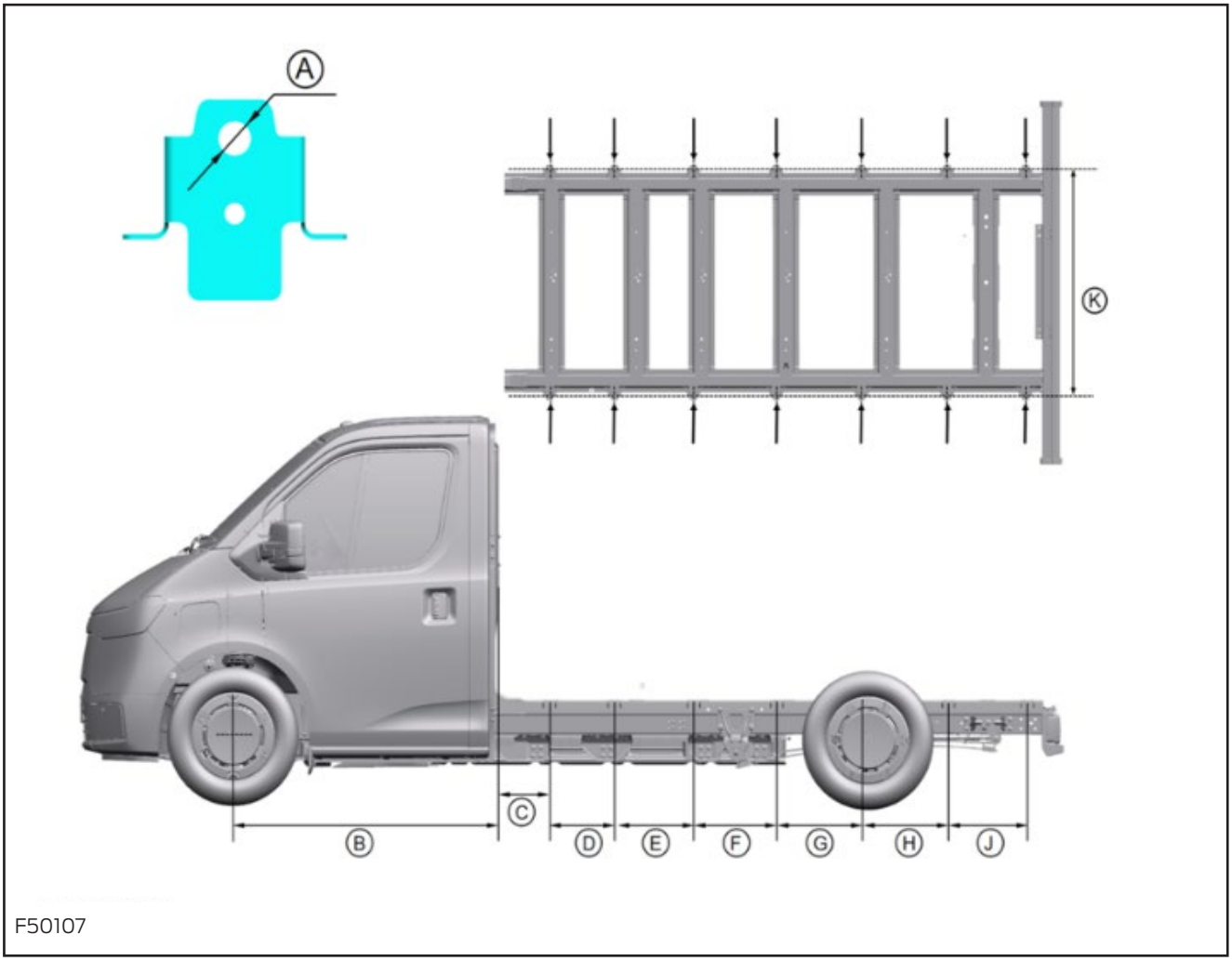
NOTE: You must maintain the reinforcement plate in the cab back panel to the chassis member area. Do not drill or cut into this area. See figure F50108.

The following points apply for any conversion structure that you attach to or mount onto the base vehicle cab structure:

- Make sure that the assembly process does not preload the conversion structure or the existing vehicle structure.
- Ford recommends adhesive jointing, but you must supplement it with mechanical fasteners to prevent initial peel and long-term failure.
- Spread bolt loads to minimise local stress.

When you mount a Second Unit Body, you must use all of the attachment holes that are shown in figure F50107, unless it is specified that you can omit them.

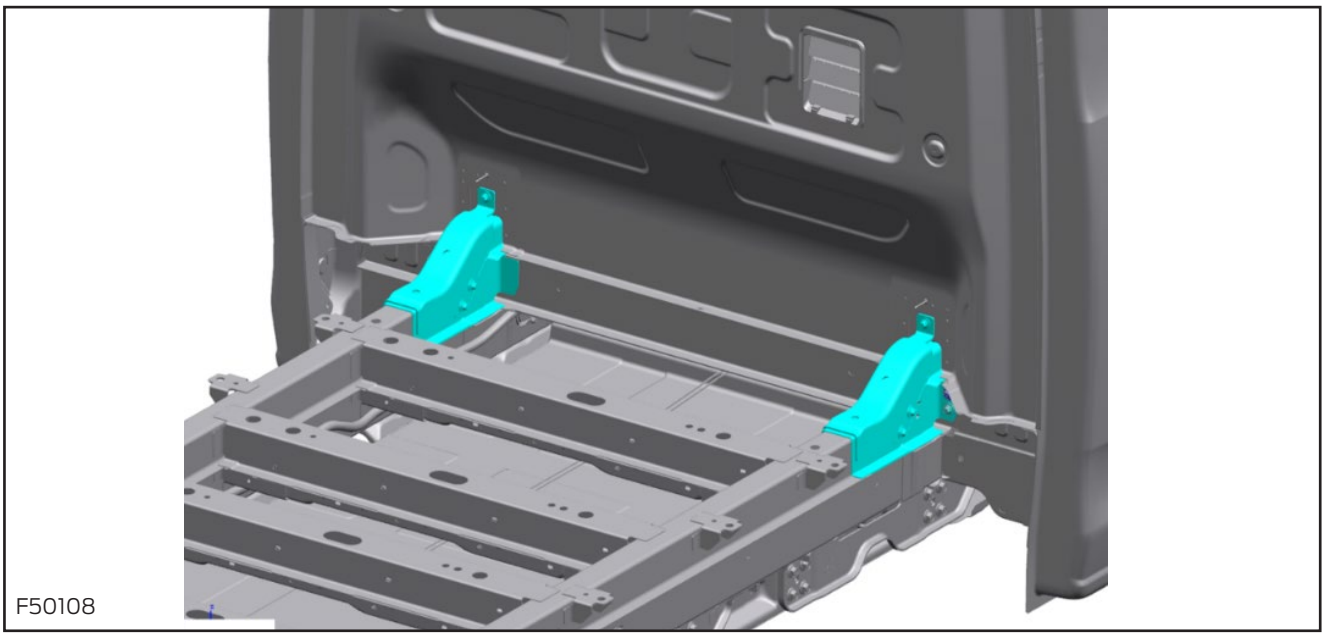
Body Attachment Holes - Chassis Frame Fixings



F50107

Body Attachment Holes - Chassis Frame L2 Wheel Base			
A	Ø 16 mm	F	440 mm
B	1409 mm	G	455 mm
C	267 mm	H	455 mm
D	345 mm	J	418 mm
E	420 mm	K	1148 mm

Reinforcement Plate on Chassis Cab Vehicles



5.1.8 Front End Integrity for Cooling, Crash, Aerodynamics and Lighting

NOTE: You can access the WLTP calculator at https://www.fordserviceinfo.com/. You will need to register or login to use it.

For WLTP information, refer to the following sections:

- 1.12 Package and Ergonomics
- 1.7 Vehicle Duty Cycle Guidelines

Cooling: Do not obstruct the continuous airflow through the front end and engine compartment when you add equipment.

Lighting: Do not alter the lighting system.

Crash: Do not cut, drill, or weld any parts that are relevant to the load path in a crash. Do not add material in the crash zone. This action can affect the crash sensor calibration. For location of the sensors, refer to 5.8.3 Front Sensor.

5.2 Racking Systems

This section has information about the installation and structural requirements for internal racking systems. It details the recommended fixing locations and sealing procedures to maintain vehicle integrity. Finally, it outlines specific guidelines for constructing and attaching external glass carrying racks.

5.2.1 Racking Systems - General Information

- Frames should be rigid, self-supporting and bolted through the floor, use reinforcements on the underfloor.
- It is not recommended to drill through the floor in combination with plastic load floor liners.
- You can also use load compartment tie-downs for additional fixing locations. Refer to section 5.3.1 Load Compartment Tie Downs
- Make sure proper sealing after you cut or drill the body to prevent the entry of fumes, water, salt, and dust. Use Ford-approved sealing and finishing materials and underbody corrosion protection.
- To minimise stress in the upper area of the body side, use additional cross-brace roof bows.
- If you plan to install linings on the inside of the load area, you must design all racking through-bolts to be accessible through the lining to the body structure with a spreader plate.
- Do not attach any load-bearing fixings only to the lining.
- For increased crash performance, design the racking system with diagonal reinforcements.
- Equip the vehicle with the Ford standard option bulkhead to give the best protection to the driver and front passengers.
- Consider installing a rack on each side to balance the vehicle load.

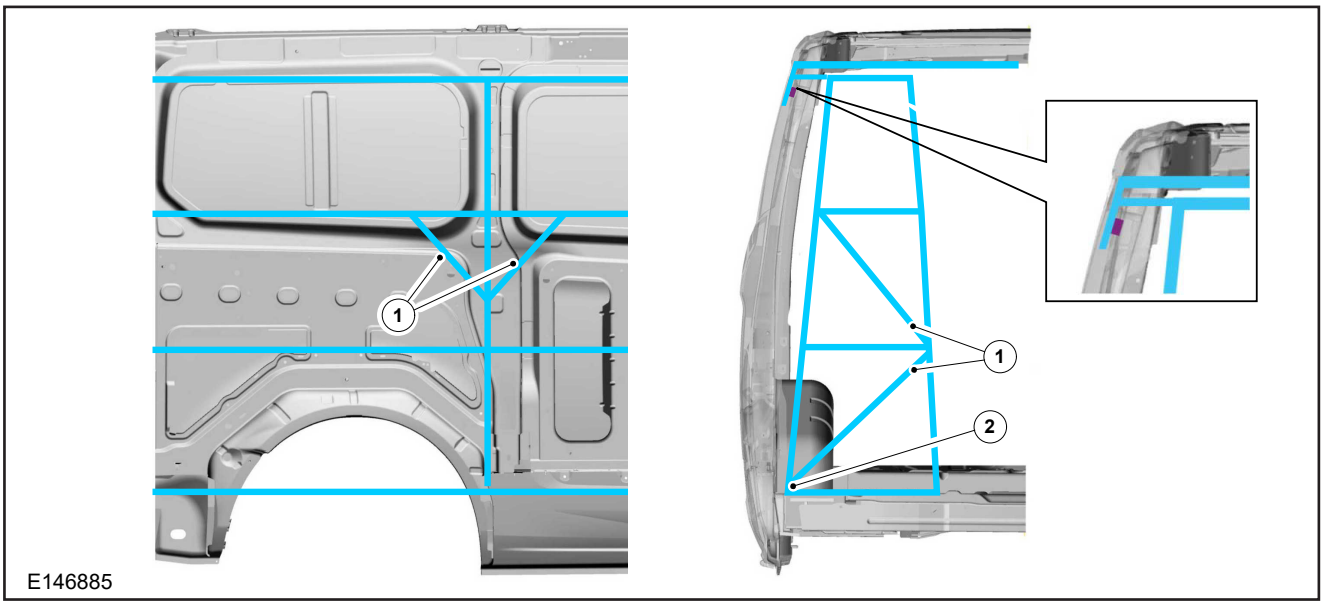
For additional information, refer to the following sections:

- 5.3 Loadspace
- 5.11 Corrosion Prevention

For additional information on Precautionary Drilling, refer to the following sections:

- 4.2 Wiring Installation and Routing Guides
- 5.1 Body
- 5.5 Body Closures

Design Proposal for non Ford Production Option Racking System (LHS Shown)



Racking - Floor Fixings to Load Compartment Tie Down

5.3 Loadspace

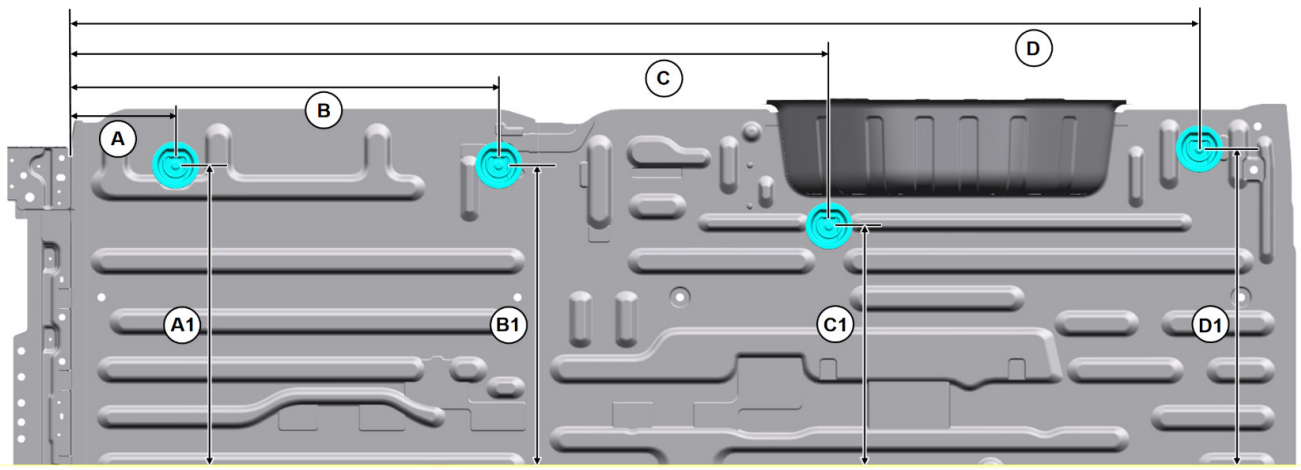
This section has information about the load compartment tie-down points known as 'D' rings. It explains that the availability and location of these points depend on the specific base vehicle configuration.

5.3.1 Load Compartment Tie Downs

All vehicles are fitted with load compartment tie downs, these are all ‘D’ rings as shown in F50109. Not all vehicles will have all locations shown. The locations depend on the base vehicle.

For additional information, see the Owner's Manual. For additional fixing locations, refer to 5.2 Racking Systems.

Dimensions for Load Tie Downs



F50109

Dimension (mm)	L1	L2
Dimension from B-Pillar		
A	250	
B	1022	
C	1611	1811
D	2396	2696
From centre line of the vehicle		
A1	720	
B1	720	
C1	575	
D1	759	
L1 = 3060 mm Wheelbase, L2 = 3360 mm Wheelbase		

5.4 Interior Partitions

This section has information about the legal requirements and installation procedures for driver and passenger protection bulkheads.

5.4.1 Partitions (Bulkhead) - Driver and Front Passenger(s) Protection on Van

WARNING: In the case of bulkhead removal, the Vehicle Convertor MUST make sure that the B-pillar including the seat belt and retractor, are covered. This is to make sure that the safe operation of the seatbelt is not impaired.

CAUTION: Bulkheads serve an important function and are legally required in some territories.

CAUTION: If a vehicle is equipped with a Thatcham Alarm System, removing any type of bulkhead will cause the Thatcham Alarm System to stop functioning.

CAUTION: The addition of any bulkhead type to a vehicle equipped with a Thatcham Alarm System requires Combined Sensing Module (CSM) hardware and related wiring updates accordingly.

It is the vehicle convertor's responsibility to make sure local current legislation governing bulkheads and protective window grilles is met. It is also the convertor's responsibility to make sure legal load constraint requirements if using a non Ford standard bulkhead.

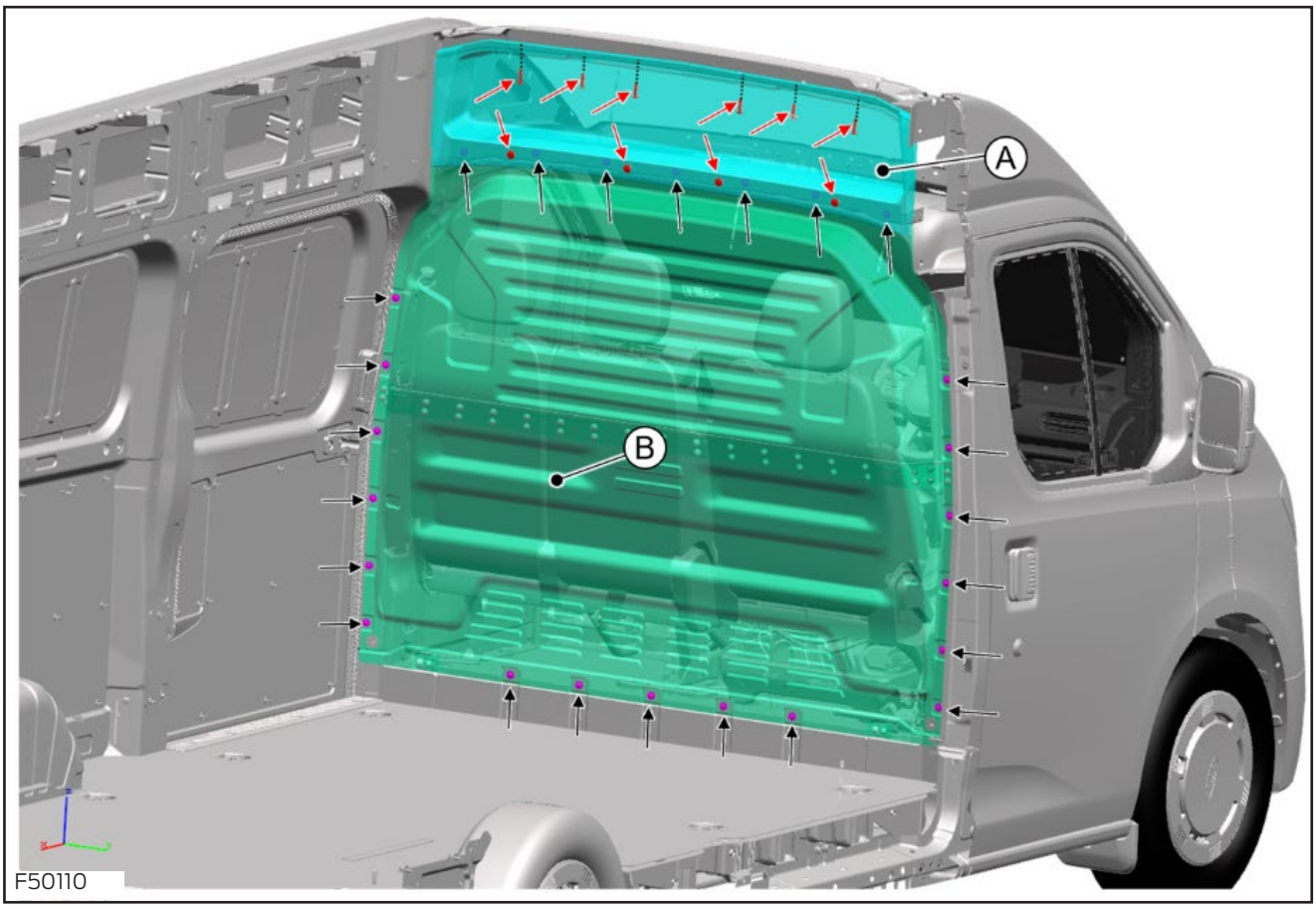
Standard Ford bulkheads do have a clearance between bulkhead and body structure to allow natural body flexing and an air circulation from the cab to the rear load space for ventilation control.

Air circulation and body flexing must also be given consideration when engineering an alternative bulkhead. It is not recommended to restrict driver's or passenger's seat adjustment travel.

The following figure F50110 show the standard bulkhead fixing locations on B-pillar. These are standard weld nuts for M6. The standard range of Ford bulkheads can be retro-fitted at these points.

In some territories it is a legal requirement for bulkhead fixings to be tamper proof. For further information check with your local Ford dealer.

H1/H2 Roof Height - Bulkhead Fixing Locations



Item	Description	Fixing Location
A	Upper Plastic Bulkhead (High Roof - H2)	Indicated by Red Arrow
B	Lower Steel Bulkhead (Low Roof - H1)	Indicated by Black Arrow

5.5 Body Closures

This section has details regarding the security, anti-theft, and locking system, with an emphasis on modification guidelines and no-drill zones for various doors.

5.5.1 Security, Anti-Theft and Locking System

CAUTION: To avoid security complications with the locking system, discuss the conversion with your local Ford dealer before you modify the vehicle.

NOTE: Do not alter the locking system or damage the security shielding around the lock and latch.

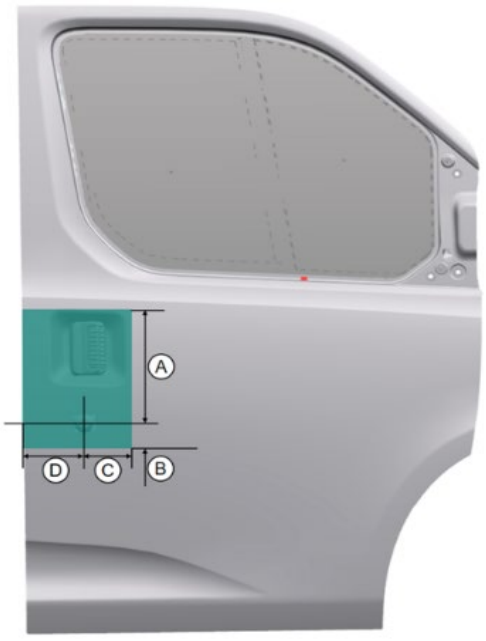
When removing and reapplying door seals, take care to fit correctly, using the same seals, as this is critical to door closing efforts. Any modification to the sealing flanges or surfaces will require consultation with your local Ford dealer. This may also include air extraction/venting adjustments to assist door close efforts if significant changes to closures are required.

The Central Control Unit is designed to work specifically with the Ford Transit lock and latch mechanisms and therefore drives latches to lock and unlock for specific time periods. Additional power locking functionality should be based around the use of additional Ford Transit latch mechanisms. Additional latches can be driven via relays connected in parallel with existing latches.

Refer to 4.15 Handles, Locks, Latched and Entry Systems.

The following figures outline the areas in which it is not advisable to drill.

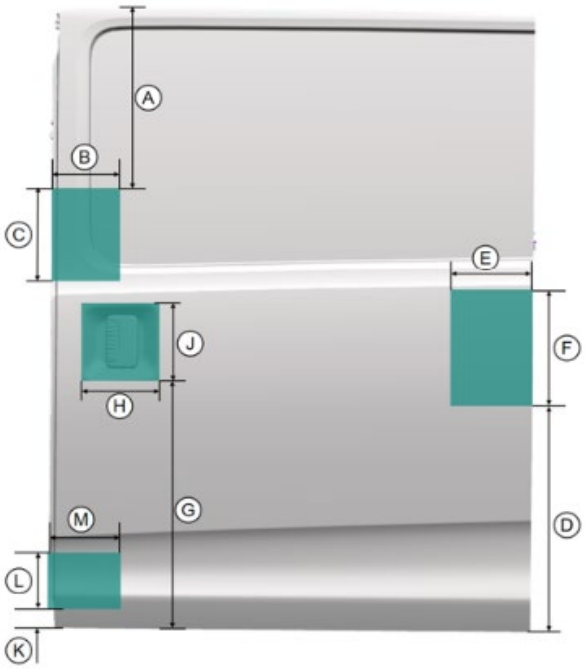
No Drill Zone - Driver and Passenger Doors



F50111

Item	Description
A	245 mm
B	65 mm
C	105 mm
D	145 mm

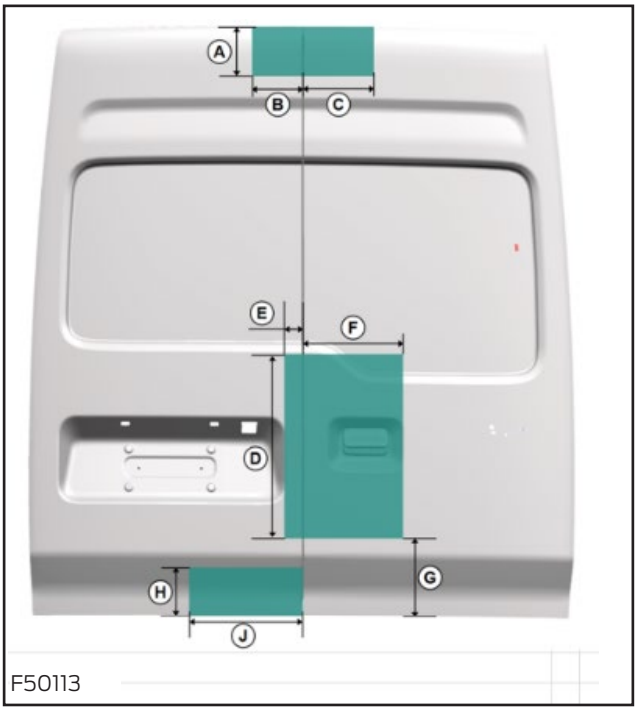
No Drill Zone - Side Sliding Doors



F50112

Item	Description
A	485 mm
B	180 mm
C	210 mm
D	555 mm
E	230 mm
F	300 mm
G	615 mm
H	170 mm
J	200 mm
K	55 mm
L	105 mm
M	185 mm

No Drill Zone - Rear Cargo Doors



F50113

Item	Description
A	215 mm
B	160 mm
C	200 mm
D	480 mm
E	50 mm
F	300 mm
G	240 mm
H	110 mm
J	230 mm

5.6 Interior Trim

This section has information about interior trim, including guidelines for load compartment lining and plywood cladding.

5.6.1 Load Compartment Interior Lining

Do not damage the lock, hinge, latch or check arm system (electrical cables, release system) when applying interior lining.

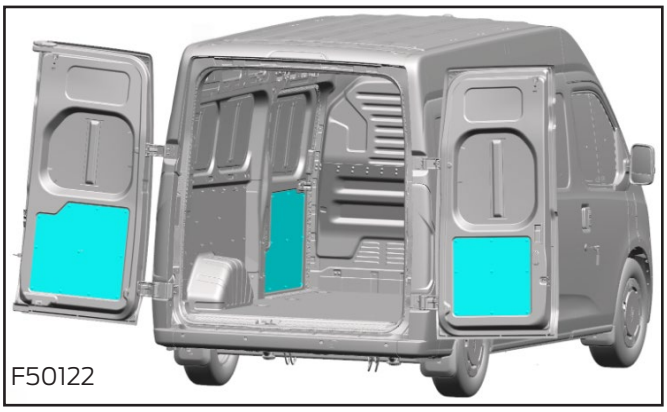
WARNING: Plan the fixing points for other equipment, such as racking, to make sure that you can install through-bolts. Attaching equipment to the lining material is inadequate for the safe operation of the vehicle.

CAUTION: Varnish or paint the wooden interior cargo area panels if you expose them to high humidity conditions.

CAUTION: Do not damage the weather shield when you remove or install the interior door trim. The weather shield is the water shield that covers the inner door access hole.

Because of the additional weight of the linings on doors may require additional reinforcements to the door and pillar at the hinge and then check the mechanism.

5.6.2 Plywood Lining/Cladding



F50122

CAUTION: Do not drill into the vehicle before checking the Precautionary/No Drilling information and electrical wire routing.

For additional information, refer to the following sections:

- 4.2 Wiring Installation and Routing Guides
- 5.5 Body Closures
- 5.1 Body

Make sure the following points are observed:

- Panels should be precision cut by machine, not by hand jigsaw, to reduce rough edges and splinters.
- Panels should be pre-drilled.
- Do not drill through floor panels, use existing load lashing points when securing the panels.
- It is recommended that when fitting a plywood floor that it is joint free.
- Use aluminium floor trims.
- Plywood should be water resistant (WBP, water and boil-proof).
- It is recommended to use 9 mm thickness for floors and 6 mm thickness for side and door lining.

5.7 Seats

NOTE: When reassembling the seat and the seat belt, use specified bolts and make sure to apply the specified torque. For torque specifications, please consult the Ford Workshop Manual, or local Ford dealer. If they are unable to help you then please contact FPSVHelp@ford.com.

NOTE: If the passenger seat is not fitted (passenger seat delete option) or removed, the convertor must provide a new storage location for the warning triangle and reflective vest originally stored under the passenger seat.

5.7.1 Van

WARNING: Do not install seats in the rear cargo area of a van.

5.7.2 Heated Seats

WARNING: Do not use the electrical feed for the original heated Ford seat for other purposes, such as other electrical equipment.

5.8 Airbag Supplemental Restraint System (SRS)

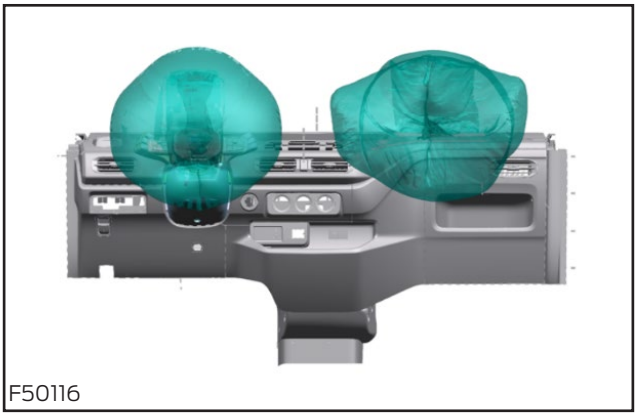
This section has information about the Airbag Supplemental Restraint System (SRS), including details on airbag deployment zones, the Restraints Control Module (RCM), and the location and considerations for front sensors

5.8.1 Airbag Deployment Zones

WARNING: Do not install accessories in the deployment zone of the driver and passenger airbags because they can impair airbag deployment.

WARNING: Do not place stickers or decals over the airbag covers because this can impair airbag deployment.

Front Airbag Deployment Zones



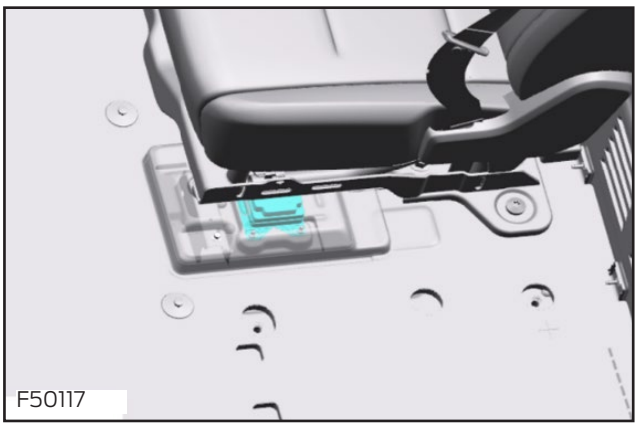
F50116

5.8.2 Restraints Control Module (RCM)

The RCM is located between the front seats, underneath the centre floor console, see F50117.

WARNING: The RCM is between the driver and front passenger seats. You must keep the RCM protective cover in its installed position to protect the RCM from damage.

RCM Location



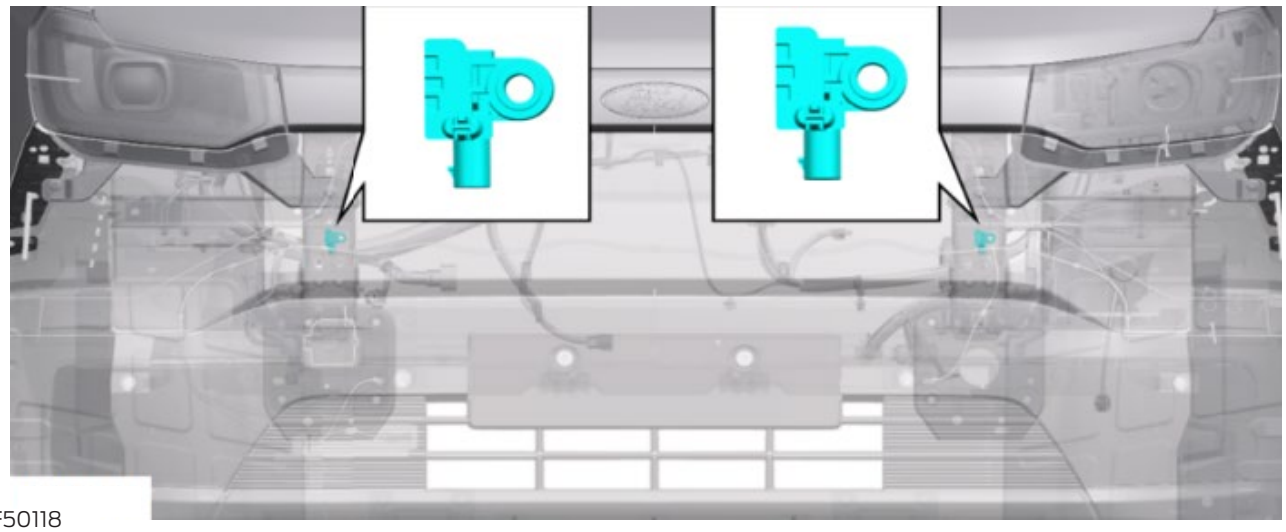
F50117

5.8.3 Front Sensor

WARNING: The front airbag sensor is behind the front grille. You must disconnect the battery cables before you drill or grind in this area. See figure F50118 for the location of the front airbag sensor.

If you disconnect the battery, see section 4.5 Battery Systems for reconnecting battery.

Front Sensor



F50118

5.9 Seatbelt Systems

This section has information about seatbelt systems, specific no-drill zones around the B-pillar and retractor assemblies, and details on the Seat Belt Reminder system, its deactivation, and the wireless Beltminder system.

5.9.1 Seatbelts

WARNING: Obey the removal and installation procedures for the seatbelt system to make sure of the correct function of the restraints system.

WARNING: Do not modify the seat belt buckles while they are installed on the seats. If you need to modify or remove the seat belt buckles, the OEM seat supplier must do this work.

Do not remove and install the seatbelt, the buckle, or any component of the seatbelt system. If it is necessary to remove and install the system during the conversion, obey the removal and installation guidelines of the seatbelt system in the Workshop Manual.

When you remove the seatbelt system, install a seat belt webbing forked retainer to the webbing 200 mm below the webbing button stop. This prevents all the webbing from running back into the retractor and locking the retractor.

When you install the system again, install the retractor to the body first. Gently pull the webbing out of the retractor to install the D-loop. Remove the forked retainer.

If the retractor locks, allow a small amount of webbing to reel back into the retractor to release the webbing lock. Do not pull on the webbing with significant force or manually interfere with the locking mechanism to release the retractor.

5.9.2 B-Pillar Precautionary Drilling

WARNING: Do not drill in the right or left side of the retractor assembly area.

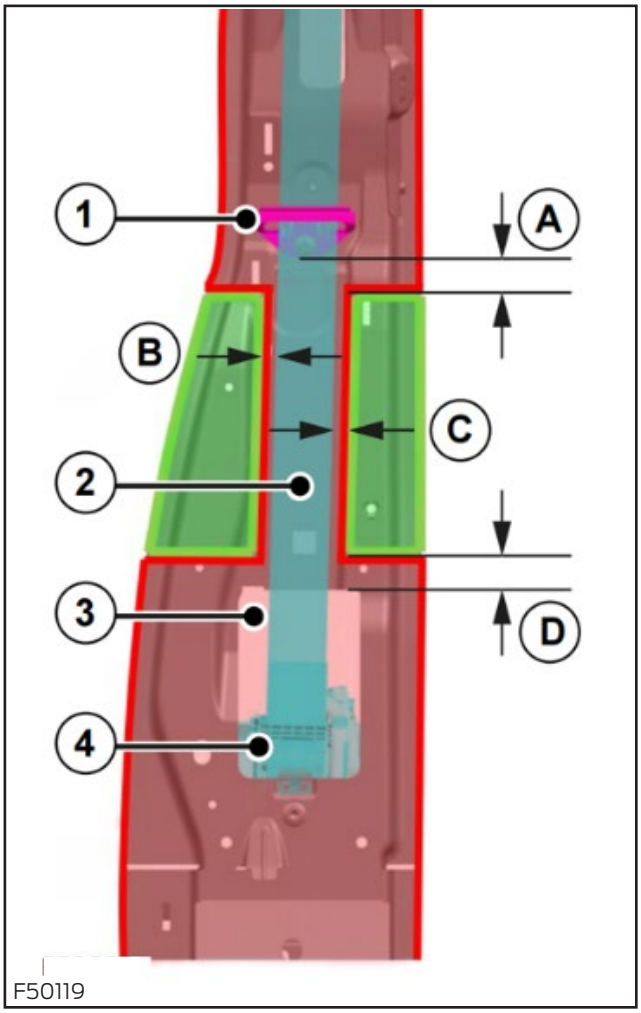
WARNING: Drilling is only permitted in the green area that is shown in figure F50119.

WARNING: If you drill holes near or above the retractor and the anchor pretensioner, then cover the mechanisms to prevent swarf or debris from falling into the assembly and causing malfunctions.

WARNING:

- **Do not install additional hardware that cuts, pinches, or interferes with the seatbelt webbing along its complete path from the retractor to the D-ring area.**
- **Do not install sharp brackets near the webbing. Make sure that all edges have a minimum radius of 0.5 mm.**
- **Do not install parts that change the belt routing to the occupant.**

Front Seat Belt/B-Pillar Drill Zone Definition



Item	Description
1	Webbing Guide
2	Seatbelt Webbing
3	Retractor Hole
4	Retractor
A	30 mm Below Webbing Guide
B	15 mm Left of Webbing
C	15 mm Right of Webbing
D	30 mm above Retractor Hole

5.9.3 Seat Belt Reminder

Seat Belt Reminder is a legal requirement for all new vehicles. For front seats including dual passenger seats, a sensor is in the seatbelt buckle to sense the seatbelt wearing status of the occupant, in addition to occupant detection mats in the seats.

NOTE: If you permanently remove factory-installed wired seats, you need to reconfigure the Instrument Panel Cluster with the Ford Diagnostic and Repair System (GFDRS).

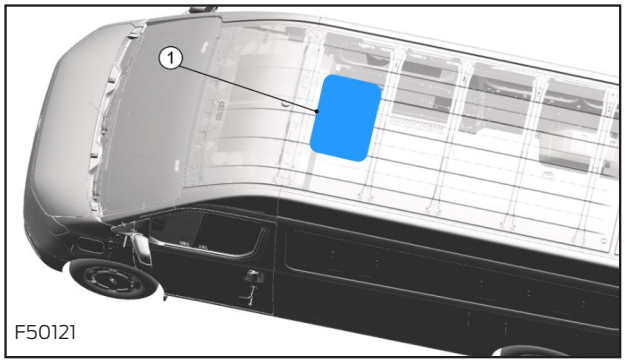
NOTE: When a customer or convertor replaces the seat trim, the functionality of the Seat Belt Reminder will need to be successfully tested during trim development. You need to verify the function of the final seat assembly at the End-Of-Line.

5.10 Roof

This section has information about roof ventilation, including guidelines on load support and recommended design principles for installing roof racks and load carriers.

5.10.1 Roof Ventilation

WARNING: Avoid all antenna positions when retrofitting a sunroof or any roof mounted units.



F50121

Item	Description
1	Roof Panel Aperture

General - Apertures must not cut through roof bows. See figure F50121. Ventilators must prevent direct entry of water and dust. A shut-off system should be available to prevent fume ingress. Interior and exterior projection.

If you cut or remove a roof bow, you must replace it with an applicable structure that gives the equivalent structural integrity and functionality as the original structure. You must maintain any legal requirements.

Ventilation Units - The roof panel can support up to 1 kg on an unsupported area of the roof. You must distribute loads up to a maximum of 25 kg over the full length of the roof rails between the roof bows.

Air Conditioning Units - You must internally support units that weigh more than 25 kg on cross brace members that distribute the load out to the roof rails.

5.10.2 Roof Racks

The Vehicle does not come with pre-drilled nut holes for fixing a roof rack directly on the roof. Instead, it is necessary to drill holes into the roof based on the pre-positioned holes on the brackets located on both sides of the roof crossbeams. See figure F50120.

CAUTION: You must seal all roof rack fixing points to prevent water from entering the vehicle.

CAUTION: The holes drilled into the vehicle's roof during the installation of the roof rack must be carefully protected against corrosion. Refer to 5.11 Corrosion Prevention.

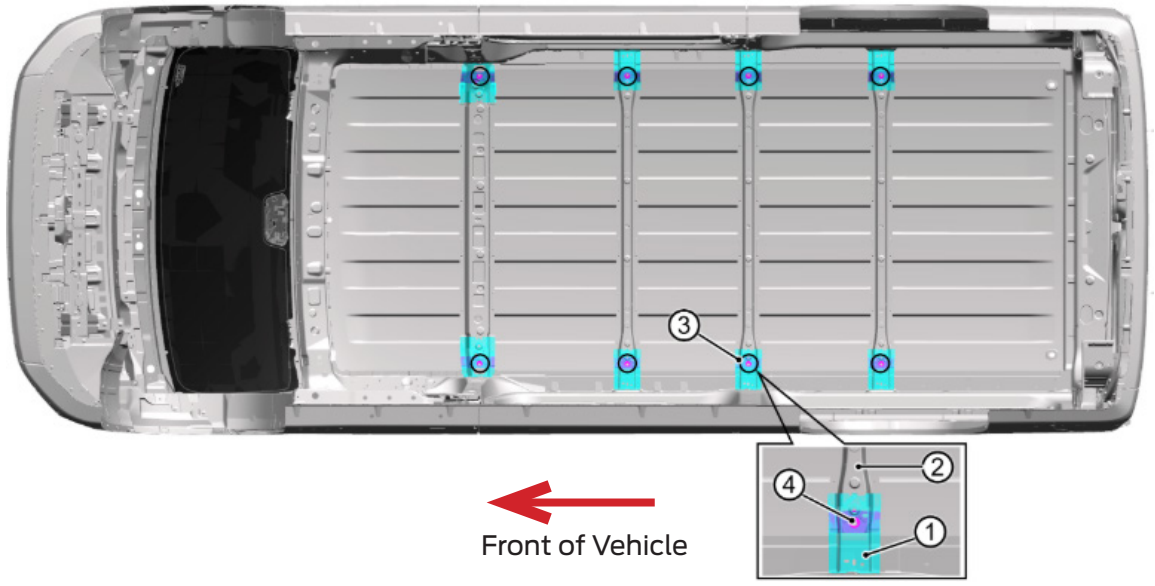
NOTE: Refer to the Owner's Manual for maximum roof load, including roof rack.

NOTE: Read and obey the manufacturer’s instructions when you install a roof rack.

For the roof racks that are fitted to H1 Van as illustrated in figure F50120, satisfy the points that follow:

- The total load, which includes the weight of the roof rack, must not exceed the maximum roof load that is specified in the Owner's Manual
- Distribute the load evenly across the roof rack(Convertor to make sure owner's handbook identifies this limitation).
- The load on a single attachment point must not exceed 75 kg.
- Install the roof rack to the roof using one or two M8 bolts for each attachment. See figure F50120.
- Do not install the leading edge of the roof rack forward of the rear edge of the driver's door or the B-pillar.

H1 Roof Rack Mounting



F50120

Item	Description
1	Roof Cross Member Bracket
2	Roof Cross Member
3	The through-hole for the roof rack fixing bolts
4	Roof Rack Mounting Bracket (Purple Component)

5.11 Corrosion Prevention

This section has information about corrosion prevention, including general guidelines, specific warnings for Battery Electric Vehicles, procedures for repairing damaged paint, underbody protection, and methods to prevent contact corrosion.

5.11.1 Corrosion Prevention -General Information

WARNING: Extreme heat, such as from paint drying ovens, damages the high-voltage battery. You must remove the high-voltage battery before you use paint drying ovens for longer than 45 minutes or with temperatures above 60°C. Failure to obey this instruction can cause damage to the high-voltage battery, which could cause serious personal injury or death in a fire or explosion.

WARNING: Do not apply any coating or corrosion prevention treatment to the HV battery pack area and connectors.

Avoid drilling into closed frame body members to avoid the risk of corrosion from swarf.

If drilling is required, however:

- Re-paint metal edges and protect against corrosion after cutting or drilling operations.
- Try to remove all swarf from inside the side member and treat it to prevent corrosion.
- Apply corrosion protection inside and outside of the chassis frame.

For Welding, refer to 5.1.2 Welding.

5.11.2 Repairing Damaged Paint

CAUTION: You must repair all damaged paint after you cut or rework any sheet metal to prevent corrosion.

Use only materials that are compatible with Ford specifications. The repair must restore the original performance of the vehicle's finish.

5.11.3 Under Body Protection and Material

WARNING: Do not over-coat or contaminate surfaces of components such as brakes. Coatings can cause brake failure or create a fire hazard.

CAUTION: You must use materials that are compatible with Ford specifications. Some products can damage the original vehicle coatings. The repair must restore the original performance of the vehicle's finish.

Some proprietary products affect the original coatings.

5.11.4 Painting Road Wheels

WARNING: Do not apply paint or any other coating to the critical mounting surfaces of a wheel. A coating in these areas can reduce the clamping force of the wheel nuts. This can cause the wheel to loosen or detach from the vehicle, which can result in a loss of control and serious injury. Mask the wheel when changing the colour or repairing the paint.

5.11.5 Contact Corrosion

CAUTION: You must prevent contact corrosion when you join materials that have different electrochemical potentials. A potential difference between dissimilar materials causes corrosion.

Use one of the methods that follow to prevent this:

- Isolate the materials from each other with a suitable non-conductive material.
- Select materials that have a minimal difference in electrochemical potential.

5.12 Frame and Body Mounting

This section has information about frame and body mounting, including guidelines for mounting points, self-supporting body structures, and non-standard rear chassis frame extensions. It also gives guidelines on ancillary equipment subframe mounting

5.12.1 Mounting Points and Tubing

The holes on the frame are a result of the production process. They are not designed for fixing additional equipment.

NOTE: After you drill, deburr and countersink all holes. Remove chips from the frame. Follow the corrosion prevention guidelines.

For additional information, refer to 5.11 Corrosion Prevention.

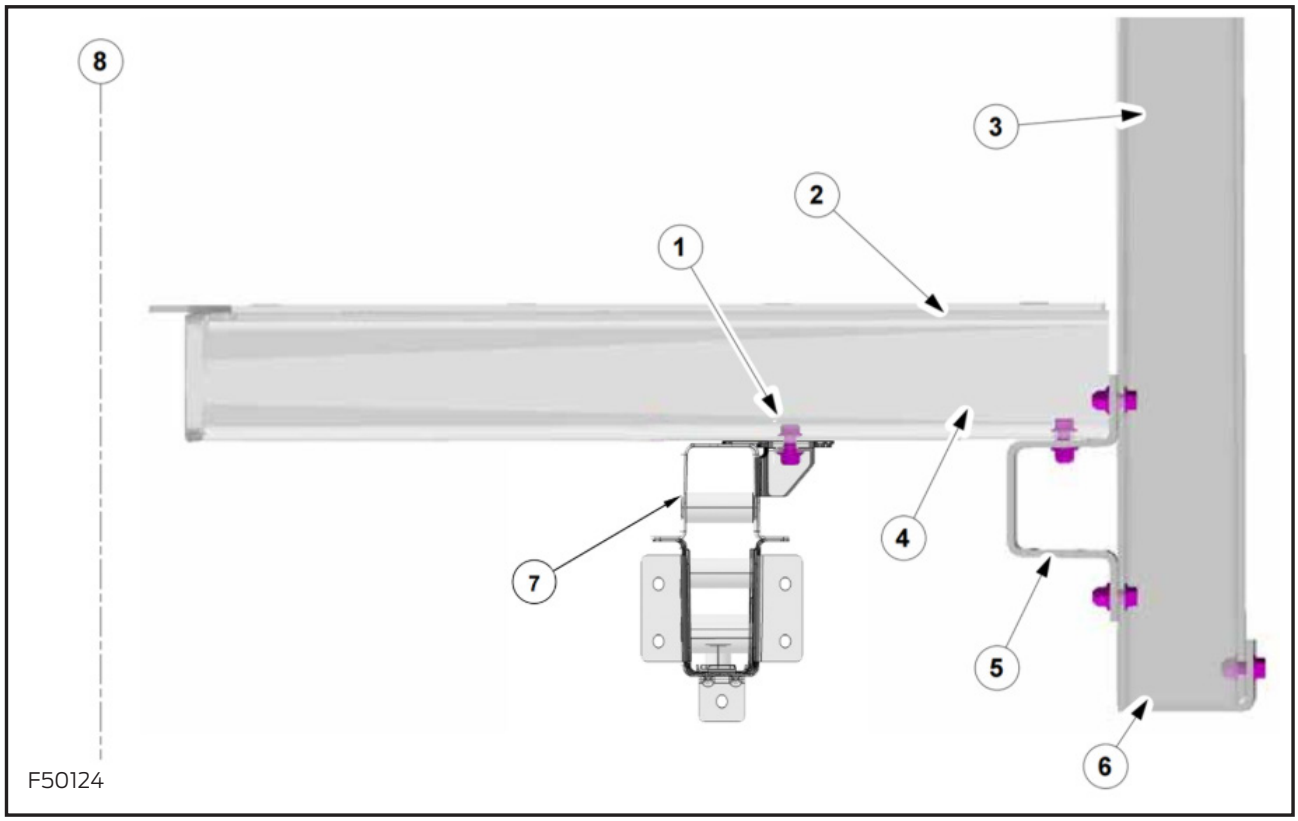
5.12.2 Self-Supporting Body Structure

You can judge bodies and structures as self-supporting, if they maintain the following rules:

- You use crossmembers at each chassis mounting point. Refer to section 5.1.7 Chassis Cab - Chassis Frame Body Attachment
- Each crossmember has a suitably engineered connection to the body side wall (3) or to the continuous floor frame (5), which is shown in figure F50124.
- The body side wall or the continuous floor frame supports any overhang beyond the chassis frame, whether on a standard frame or an extended frame.

It is important to the overall function of the vehicle structure that each outrigger connects to a continuous longitudinal floor side frame or a structural body side structure assembly.

Typical Design Principle of a Self-Supporting Structure



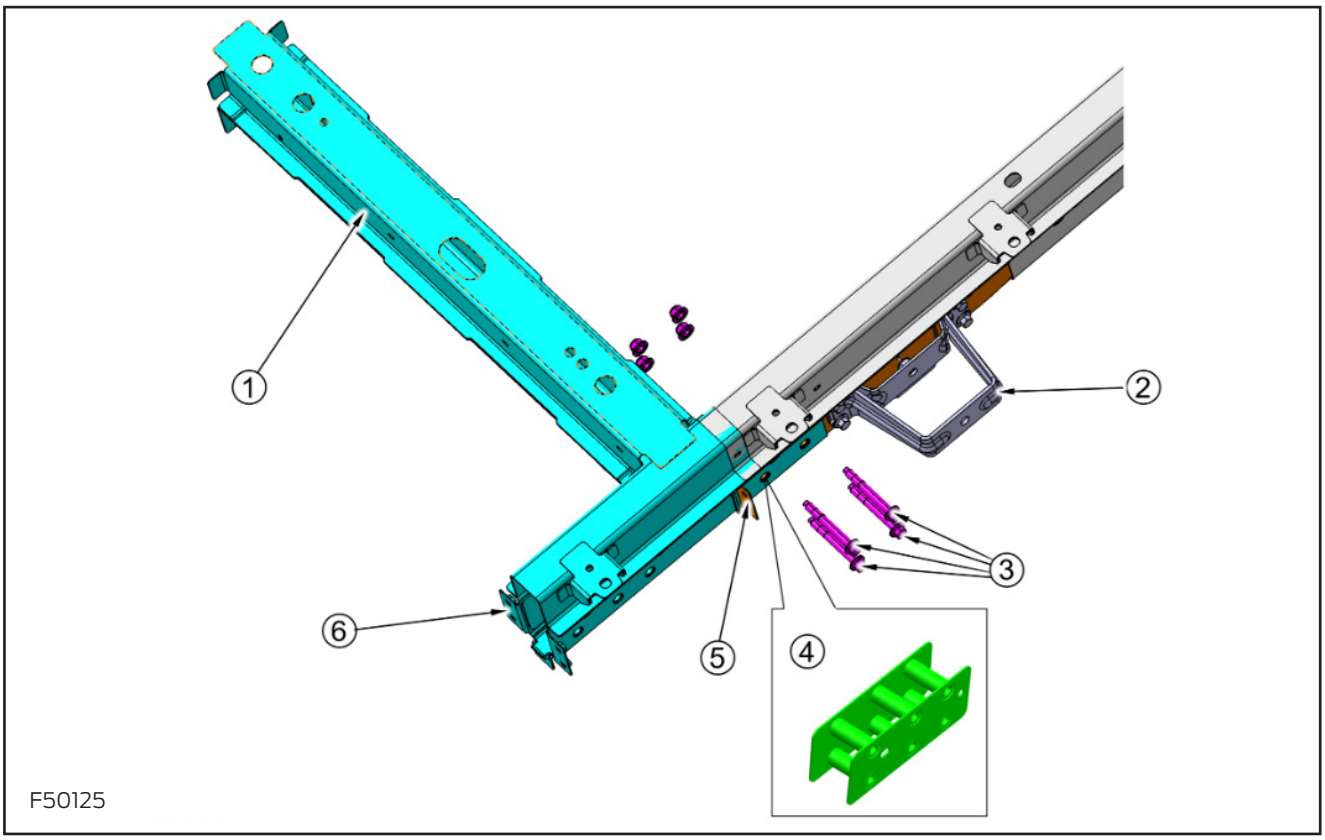
Item	Description
1	Use all standard locations with M10 fixings
2	Floor Panel
3	Body Side Frames
4	Floor Cross Members
5	Continuous Floor U-profile Frame
6	Longitudinal L-profile
7	Chassis Frame Rail of Base Vehicle
8	Vehicle Centre Line of Base Vehicle

5.12.3 Non Standard Rear Chassis Frame Extension

Extensions that are longer than the standard Regular Production Option must obey the following guidelines:

- Support bodies or equipment that exceed the standard extension length. See figure F50123 low body longitudinal members or figure F50124 self-supporting body structures.
- The convertor must mark the available payload in the Owner's Manual. Do not exceed the axle plated weights and the maximum allowable axle mass shown in this manual.
- Plan the vehicle for uniformly distributed loads.
- Reposition the original rear cross member, the under-run bar, or an equivalent component to the end of any altered extension to meet legislation. See figure F50125 non standard rear chassis frame extensions.
- Bolts secure the standard under-run bar as shown in figure F50125.
- Include a cross member adjacent to the end of the original chassis frame in the altered extension assembly to replace the relocated under-run bar.
- The convertor or the equipment supplier must engineer continuous longitudinal members for flat-beds built onto extensions to resolve the worst-case moments at the rear bump stop.
- Secure the extensions to the chassis frame sandwiched under the rear spring shackle bracket. Use the 4 bolts and 4 holes in the rear of the chassis frame, totalling 8 for each vehicle. See figure F50125.
- Tighten the spring shackle bracket bolts and nuts to the correct torque.
- If you sleeve extensions over the outside of the chassis frame, remove the under-run bar attachment flanges that turn out at the ends of the chassis frame. Protect the cut edges against corrosion. Refer to section 5.11 Corrosion Prevention.
- The convertor can choose an equivalent open section for the extension assembly.
- The convertor can cut lightening holes in the new extension and cross members.
- Do not weld the original chassis frame except as specified when you add reinforcing tubes. See figure F50125.
- Do not drill the top or bottom surface of the chassis frame, including the turned-out flanges, except as recommended above for continuity of closure.
- The convertor can use an alternative finish, such as hot-dip galvanizing, if it does not have a detrimental effect on the original Ford product. Refer to 5.11 Corrosion Prevention.

Non Standard Rear Chassis Frame Extension



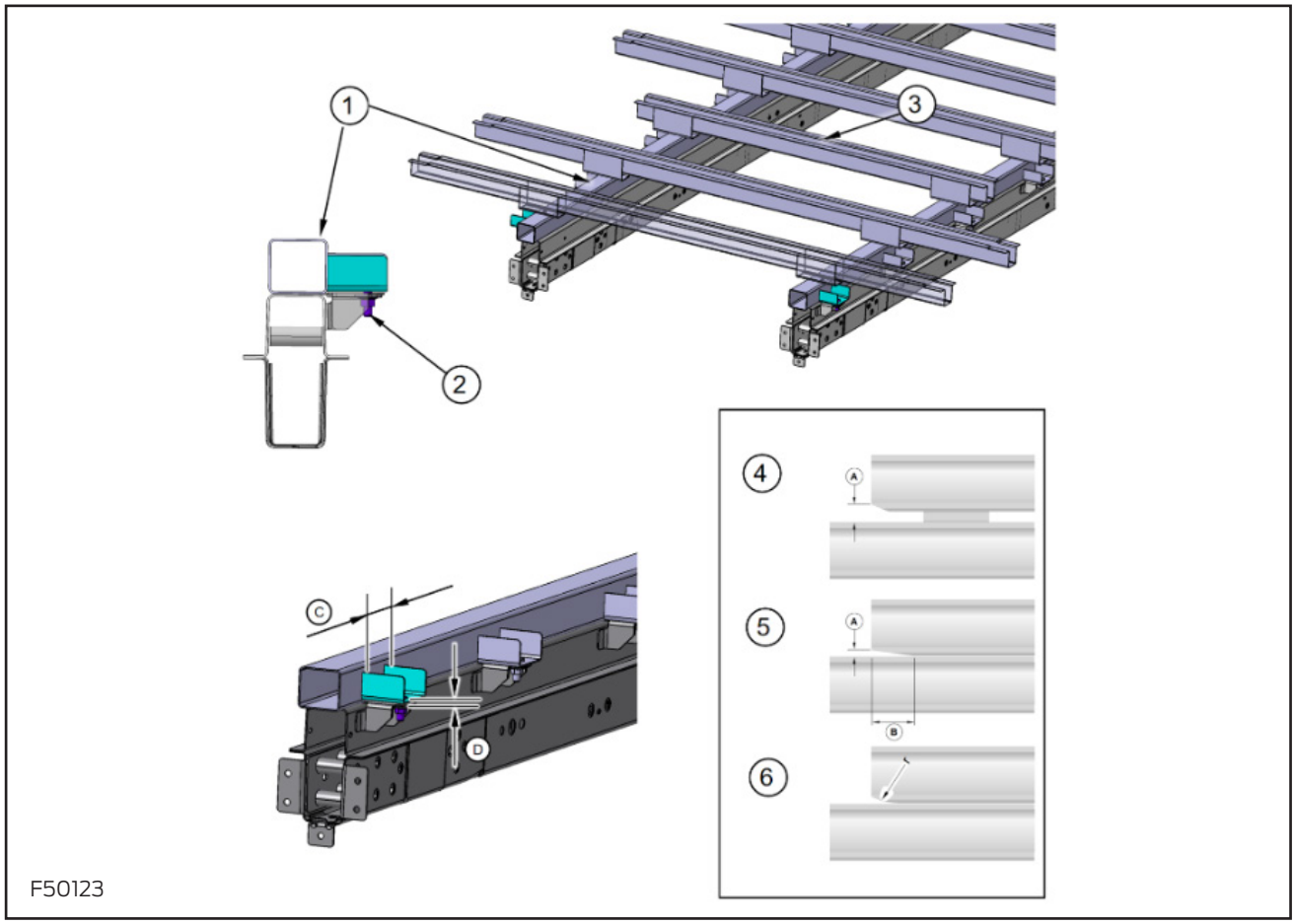
Item	Description
1	Cross Member
2	Rear Spring Hanger
3	4 x M12 Bolts
4	Spacer Tube Assembly
5	Flanges removed
6	New Flanges for Under-run Bar

5.12.4 Ancillary Equipment - Subframe Mounting

Typical subframes and longitudinal members for flatbed and low or dropside bodies or equipment that exceeds the standard or Regular Production Order frame length must adhere to the following guidelines:

- Flat beds and low bodies that are mounted on integral longitudinal members, channel, or box section metal, not wood, must use both sides of all frame mounting brackets. See figure F50123.
- You must relieve longitudinal members at the front end if they contact the chassis frame top surface to minimise stress concentrations. See figure F50123. However, it is preferable to mount the longitudinal onto the mounting brackets with a clearance to the chassis frame top surface.
- Each set of brackets must use two M10 bolts, grade 8.8 minimum.
- The rear two sets of chassis frame mounting holes or locations must have a full bolt torque with 100% grip. The attachment to the remaining forward chassis frame holes or locations must be precisely located and retained but allow some relative flexing between the subframe and the chassis frame. For example, clamp control devices such as conical washer stacks or machine springs with self-locking fasteners.
- Minimum floor heights need wheel arch boxes to clear the rear tyres. See Vehicle Data sheets for relevant tyre jounce.

Subframe for Equipment - Chassis Cab



F50123

Item	Description
1	Continuous longitudinal float or body support member
2	Always use both sides of all chassis mounts
3	Cross member
4, 5, 6	Relief front end longitudinal if there is a risk of stress concentration on chassis frame from longitudinal contact
A	Minimum 5 mm
B	Minimum 50 mm
C	69 mm width for all brackets
D	Avoid longitudinal contact if possible which may create stress concentration
r	Minimum 20 mm

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