

# FORD **Transit Custom/Tourneo Custom**

2020MY

## Supplemental Body and Equipment Mounting Manual Plug-In Hybrid Electric Vehicle (PHEV)



The information contained in this publication was correct at the time of going to print. In the interest of development the right is reserved to change specifications, design or equipment at any time without notice and without incurring any obligations. This publication, or part thereof, may not be reproduced nor translated without our approval. Errors and omissions excepted.

© Ford Motor Company 2021  
All rights reserved.

## 1 General Information

<b>1.1 About this Publication</b> .....	<b>4</b>
<b>1.2 About this Manual</b> .....	<b>4</b>
1.2.1 Introduction .....	4
<b>1.3 Commercial and Legal Aspects</b> .....	<b>4</b>
1.3.4 Legal and Vehicle Type Approval .....	4
1.3.13 High Voltage Vehicle Systems.....	4
<b>1.6 Conversion Homologation</b> .....	<b>4</b>
<b>1.13 Vehicle Transportation and Vehicle Storage</b> .....	<b>4</b>
<b>1.16 Load Distribution</b> .....	<b>4</b>
<b>1.17 Towing</b> .....	<b>5</b>

## 3 Powertrain

<b>3.1 Engine</b> .....	<b>6</b>
<b>3.2 Engine Cooling</b> .....	<b>6</b>
<b>3.3 Accessory Drive</b> .....	<b>6</b>
<b>3.7 Exhaust System</b> .....	<b>6</b>
<b>3.8 Fuel System</b> .....	<b>6</b>

## 4 Electrical

<b>4.0 Electrical System</b> .....	<b>7</b>
<b>4.1 Wiring Installation and Routing Guides</b> ..	<b>7</b>
4.1.12 Precautionary Drill Zones — Rear Cargo Area ..	7
<b>4.2 Communications Network</b> .....	<b>8</b>
4.2.1 CAN-Bus System Description and Interface .....	8
<b>4.3 Charging System</b> .....	<b>10</b>
4.3.1 General Information and Specific Warnings.....	10
<b>4.16 Cruise Control</b> .....	<b>10</b>
<b>4.21 Special Conversions</b> .....	<b>10</b>
<b>4.22 Electrical Connectors and Connections</b> .....	<b>10</b>
4.22.2 Customer Connection Points (CCP) .....	10
<b>4.23 Grounding</b> .....	<b>10</b>

## 5 Body & Paint

<b>5.1 Body</b> .....	<b>11</b>
5.1.4 Floor Precautionary Drill Zones - Fuel Tank and Batteries.....	11
Floor Precautionary Drill Zones - Fuel Tank and Batteries.....	11

## 6 Appendix

<b>6.0 Appendix</b> .....	<b>12</b>
6.1 Failure Mitigation .....	12
6.2 Brake- Shift Interlock .....	12
<b>Glossary</b> .....	<b>12</b>

## 1.1 About this Publication

This is a supplemental Body and Equipment Mounting Manual (BEMM) document to support the 2020MY Transit Custom Plug-In Hybrid Electric Vehicle (PHEV). This document only provides PHEV specific guidelines and recommendations and should be viewed in conjunction with the latest, live version, Transit Custom BEMM publication, which can be found on <https://azureford.sharepoint.com/sites/SVEBEMMPUBLIC>. It is the Vehicle Converter's responsibility to review both this document and the latest Transit Custom BEMM prior to starting any conversion.

**The numbering of the sections within this document directly relate to the existing sections in the live BEMM.**

For further information please contact your National Sales Company representative, or local Ford dealer. If they are unable to help you then please contact the Vehicle Converter Advisory Service at [VCAS@ford.com](mailto:VCAS@ford.com)

## 1.2 About this Manual

### 1.2.1 Introduction


It must be emphasised that any change to the basic vehicle which does not meet the enclosed guideline standards may severely inhibit the ability of the vehicle to perform its function. Mechanical failures, structure failure, component unreliability or vehicle instability will lead to customer dissatisfaction. Appropriate design and application of body, equipment and or accessories is key to ensuring that customer satisfaction is not adversely affected.

## 1.3 Commercial and Legal Aspects

### 1.3.4 Legal and Vehicle Type Approval

Significant changes to the vehicle may affect its legal compliance. Strict adherence to the original design intent for brakes, weight distribution, lighting, occupant safety and - hazardous materials compliance in particular - is mandatory.

#### 1.3.13 High Voltage Vehicle Systems

 **WARNING: Any personnel working with or undertaking any modifications to the Transit PHEV vehicle must receive training for HV vehicle systems prior to starting any work.**


Working on a High Voltage Electrical Vehicles is only allowed after completion of the appropriate training(s):

“**Working on Electrical Vehicles**” includes driving the vehicle, performing mechanical works, performing electrical work and switching activities on these vehicles.

“**Electrical Vehicle**” includes all possible types such as HEV (Full Hybrids), PHEV (Plug-In Hybrid Electric Vehicle), BEV (Battery Electric Vehicle) or other versions.

“**Appropriate Training**” means that you as a person who followed the training, has sufficient knowledge about the risks and that you have knowledge about the required safety measures to perform the work in a safe way. The competencies granted by this training are still up-to-date and have not expired.

 **WARNING: Orange coloured cables are HV system (400V) parts and must not be modified nor rerouted.**

 **CAUTION: There are limitations when adding additional electrical devices. Any power take-off consumption needs to be controlled within the guidelines. Extra equipment and usage may have an impact to weight and vehicle driving range.**


## 1.6 Conversion Homologation

For any homologation information or information regarding type approval, please refer to the Transit Custom/Tourneo Custom Body & Equipment Mounting Manual

## 1.13 Vehicle Transportation and Vehicle Storage

 **CAUTION: The vehicle can only be towed to safety or to recovery vehicle for a limited distance (20m maximum) and at a limited speed (10Kph).**

## 1.16 Load Distribution

 **WARNING: If the vertical centre of gravity is equal or less than 870mm and no modifications have been made to components of the braking system, suspension, wheels and tires the converted vehicle complies with ECE13-H, ANNEX 9 standard.**

If the centre of gravity of the converted vehicle exceeds 820mm, Ford Motor Company makes no representation as to conformity with ECE13-H, ANNEX 9 standard.

This applies for the base vehicle fitted with 16” tyres. 17” tyres are not permitted.

## 1.17 Towing

 **CAUTION: No tow bars are to be fitted**

The vehicle has no towing capability due to the risk of damaging the High Voltage motor during braking.

## 3.1 Engine

PHEVs are equipped with a 3 cylinder inline internal combustion gasoline engine coupled with a generator to supply electric power to the electric motors and the batteries.

## 3.2 Engine Cooling

 **CAUTION: Do not modify the PHEV cooling system.**

## 3.3 Accessory Drive

 **CAUTION: The Front End Accessory Drive (FEAD) of the internal combustion engine on the PHEV must not be modified.**

This vehicle has a DC/DC inverter/converter which replaces the alternator.

## 3.7 Exhaust System

 **CAUTION: Maintain existing routing and design of the exhaust system on the PHEV.**

## 3.8 Fuel System

 **WARNING: Do not modify the PHEV fuel system.**

 **CAUTION: Do not add an auxiliary fuel line on the PHEV fuel system.**

## 4.0 Electrical System

**⚠ WARNING:** Any component or part marked with the symbol below must not be drilled, damaged or modified in any way.



### 4.1 Wiring Installation and Routing Guides

#### 4.1.12 Precautionary Drill Zones — Rear Cargo Area

**⚠ WARNING:** Take precaution for drilling or any other operation in the marked zones in order to prevent damages to any components.

##### L1/H1 with Lift Gate (LHS)



##### L1/H1 with Lift Gate



##### L1/H1 with Lift Gate (RHS)



See also the following sections in the Transit Custom BEMM:

- Section 5.3 Racking Systems
- Section 5.4 Loadspace (Cargo Securing)
- Section 5.6 Body Closures (No Drill Zones)





**Communication Network System (Figure E294753 references)**

Item	Description
1	HS1-CAN - High Speed 1 - CAN <sup>(1)</sup>
2	HS2-CAN - High Speed 2 - CAN <sup>(1)</sup>
3	HS3-CAN - High Speed 3 - CAN <sup>(1)</sup>
4	MS1-CAN -Medium Speed 1 - CAN <sup>(2)</sup>
5	Standard ECU
6	Optional ECU
7	Standard PHEV ECU
A	Diag Connector (For Prototypes only)
ABS	Anti-Lock Brake System Control Module
ACCM	Adaptive Cruise Control Module
ACM <sub>1</sub>	Audio Control Module
ACM <sub>2</sub>	Audio Control Module
ACM <sub>3</sub>	Audio Control Module
APIM	Auxiliary Protocol Interface Module
BBS	Battery Backed-up Sounder
BCCM	Battery Charge Control Module
BCM	Body Control Module
BECM	Battery Energy Control Module
BMS	Battery Monitoring Sensor
CIM	CAN Interface Module
CMR	Camera Module Rear
CSI	Charge Status
CSM	Combined Sensor Module
DDS	Driver Door Switch Pack
DDM	Driver Door Module
FCIMB <sub>1</sub>	Electronic Finisher Panel (10 Button)

Item	Description
FCIMB <sub>2</sub>	Electronic Finisher Panel (5 Button)
GWM	Gateway Module (CGEA 1.3)
HCM	Headlamp Control Module
HVAC -RCCM	HVAC Controls (Remote Climate Control Module)
HV PTC	High Voltage Positive Temperature Coefficient Heater
INCON1	Generator
INCON2	Motor
IPC	Instrument Panel Cluster
IPMA	Image processing Module A (Lane Departure System Camera)
ITM	Integrated Key Transmitter (PATS)
JB	Junction Box
MLS	Main Light Switch
PACM	Pedestrian Alert Control Module
PAM	Parking Aid Module
PCM_HPCM	Hybrid Powertrain Control Module
PDM	Passenger Door Module
PSCM	Power Steering Control Module
RCM	Restraints Control Module
RSM	Rain Sensing Module
RTM	Radio Transceiver Module (RKE & TPMS Receiver)
SCCM	Steering Column Control Module (incl absolute SAS)
SDM4	Slim Display Monitor 4"
SDM8	Slim Display Monitor 8"
TCU_CPPM	Transmission Control Module
WMM <sub>1</sub>	Wiper Motor Module (Master)
WMM <sub>2</sub>	Wiper Motor Module (Slave)

<sup>(1)</sup>500kb/s (kilobits per second)

<sup>(2)</sup>125kb/s (kilobits per second)

## 4.3 Charging System

### 4.3.1 General Information and Specific Warnings



**WARNING:** It is not permitted to keep the DC/DC active by leaving the keys in the ignition to position 2 (for Third Party systems) or incorporating a RUNLOCK system.

**NOTE:** The DC/DC 12V power supply is activated at Ignition ON and deactivated at Ignition OFF. When activated, the voltage supplied is at “conventional charging” mode and based on the battery temperature. For details on conventional charging mode, please refer to the owner’s manual.

**NOTE:** Should you have a power requirement larger than 60 A please contact [conversionworks@ford.com](mailto:conversionworks@ford.com)

## 4.16 Cruise Control

**NOTE:** The Adaptive Cruise Control Module is present but not active.

## 4.21 Special Conversions



**WARNING:** There are restrictions on the 12V power take-off. If your conversion requirements deviate from the advice given in this document please contact [conversionworks@ford.com](mailto:conversionworks@ford.com)

## 4.22 Electrical Connectors and Connections

### 4.22.2 Customer Connection Points (CCP)

Before removing the CCP cover, move the driver’s seat pedestal forward to provide sufficient access, avoiding the need to remove any body trim.

The Third Party system must only be active whilst the handbrake is active and must be battery guard protected to a voltage no lower than 11.8V. Please refer to section 4.4 in the 2018.5 Transit Custom BEMM for load drop compensation where in summary, a threshold can be set to 11.5V if there is a 20A or greater load, compensating for voltage drop.

## 4.23 Grounding

Where a second eyelet is added to an existing Ground, the added Third Party eyelet should be placed on top of the Ford eyelet already present, so that the Ford eyelet is always in direct contact with the Body. Where two eyelets are already present, do not add a third. All equipment casing should be interconnected and grounded onto the vehicle body structure with ground strap, with a conductor. The individual application details can be asked to VCAS.

## 5.1 Body

### 5.1.4 Floor Precautionary Drill Zones - Fuel Tank and Batteries

**WARNINGS:**

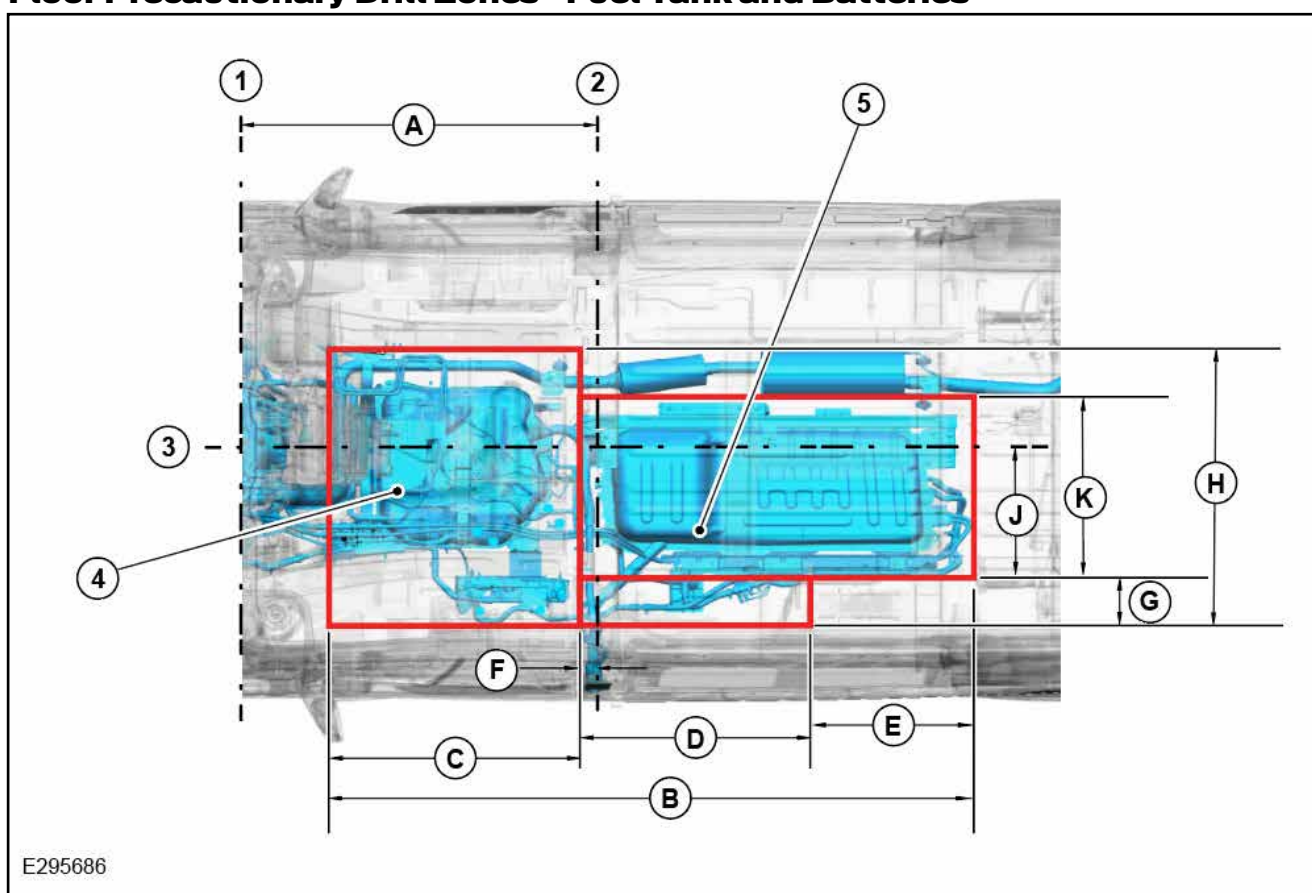
**⚠ Take precaution for drilling or any other operation in the red marked zones in order to prevent damages to the components placed underneath the floor, in particular the fuel tank, the fuel system components, the battery and high voltage system components.**

**⚠ Do not exceed the total gross vehicle mass, which must include kerb weight, driver, all passengers and any additional loads to the vehicle.**

It is advised to weigh the vehicle after the Third Party equipment is added (simulating tools, equipment mass, and distribution) and adjust for the known weight of operators if the information can be obtained from the particular Fleet.

It is recommended to bias the weight of any installed equipment including weight of customer-laden equipment in e.g. racking systems towards to rear axle rather than front axle in order to not overload the front axle.

### Floor Precautionary Drill Zones - Fuel Tank and Batteries



Item	Description	Item	Description
1	Centre Line Front Wheel Axle	D	835mm
2	Centre of 'B' Pillar	E	615mm
3	Centre Line of Vehicle	F	85mm
4	Fuel Tank	G	175mm
5	Li-Io (400V) Battery	H	1070mm
A	1230mm	J	475mm
B	2400mm	K	655mm
C	950mm		

## 6.0 Appendix

### 6.1 Failure Mitigation

**NOTE:** You can determine that the Hybrid system is active by opening the driver's door. If active, then a cluster pop-up message indicates 'Vehicle is On'.

#### Retry Strategy #1

1. Key off
2. Open driver's door
3. Close driver's door
4. Wait ~10 sec
5. Retry

#### Retry Strategy #2

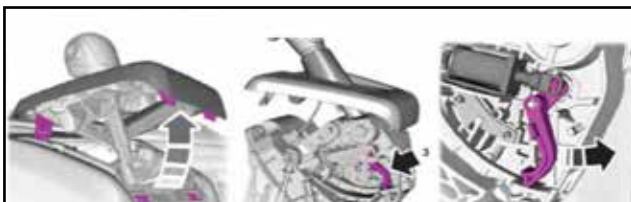
1. Key off
2. Open driver's door
3. Close driver's door
4. Wait for CAN busses to sleep Cluster dims completely
5. Retry

### 6.2 Brake- Shift Interlock

Your vehicle has a brake-shift interlock feature. This prevents you from shifting the gearshift lever from the park (P) position, unless the brake pedal is pressed.

In the event of an electrical malfunction, or if the vehicle battery has run out of charge, use the following procedure to shift the gearshift lever from the park (P) position.

1. Apply the parking brake and switch the ignition off.
2. Use a suitable tool, for example a screwdriver, to carefully remove the housing cover.
3. Locate the white lever, situated on the left hand side of the gearshift lever.
4. Move the white lever toward the rear of your vehicle.
5. Shift the gearshift lever out of park (P) and into neutral (N).
6. Replace the gearshift lever housing cover, apply the brake pedal, switch the ignition on and release the parking brake.



## Glossary

BEMM	Body & Equipment Mounting Manual
SDB	Signal Database
EPAS	Electric Power Assisted Steering
SoC	State of Charge
EV	Electric Vehicle
REx	Range Extender
FEAD	Front End Accessory Drive
TCS	Traction Control System
FPBG	Ford Programmable Battery Guard
VCAS	Vehicle Converter Advisory Service
IPC	Instrument Panel Cluster
WLTP	Worldwide Harmonised Light Vehicle Test Procedure
PHEV	Plug-In Hybrid Electric Vehicle
VCM	Vehicle Communication Module



