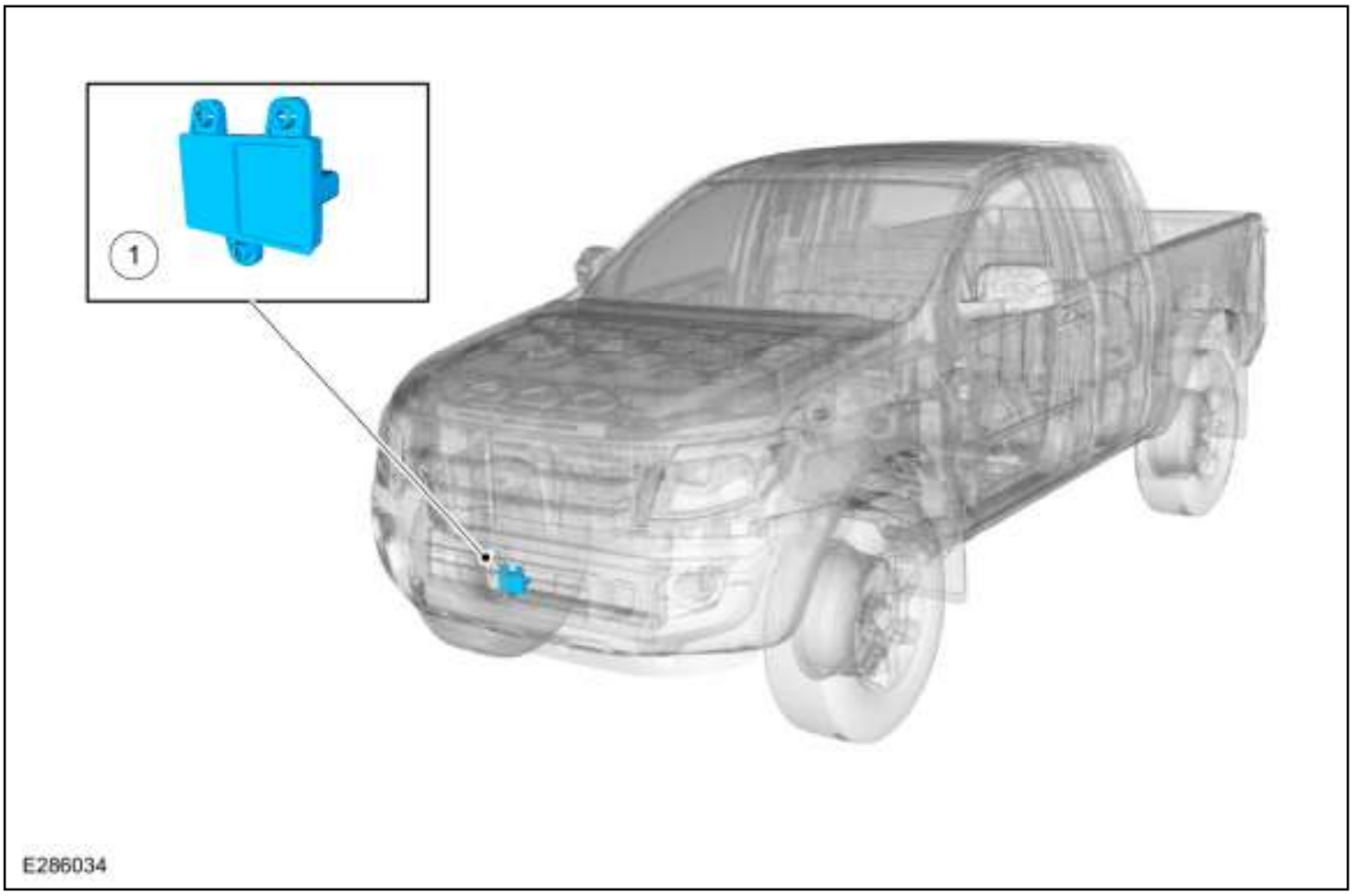
Cruise Control - Component Location



Item	Description
1	CCM

Cruise Control - Overview

Overview

The cruise control system is controlled by the PCM.

The cruise control mode is selected from the steering wheel mounted switches (ON/OFF, RES+, SET-, GAP+, GAP- and CANCL), which are integrated into the LH steering wheel switch.

The gap setting is selected from the steering wheel mounted switch (GAP), which is integrated into the LH steering wheel switch.

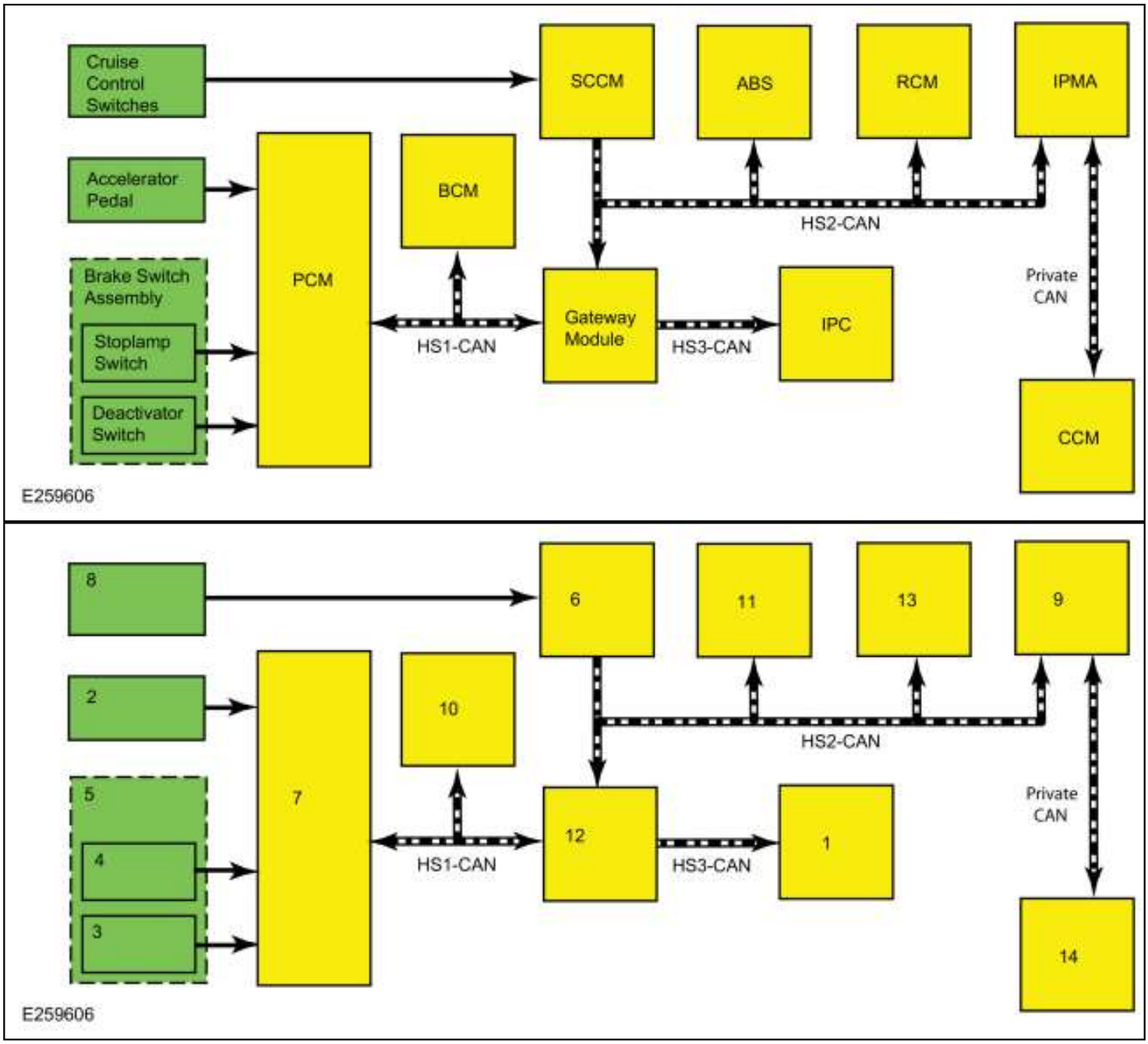
The ACC system maintains a selected vehicle speed between 20 km/h (18 mph) and the maximum limited vehicle speed. When a MyKey® restricted key is in use and the max speed limiter is turned on, vehicle speed is limited that predetermined MyKey® set speed up to 129 km/h (80 mph).

During normal driving, the vehicle speed can vary slightly from the set speed due to road conditions. The vehicle speed can fluctuate when driving up and down a steep hill. If the vehicle speed decreases more than 16 km/h (10 mph) below the set speed, the cruise control disengages.

Cruise Control - System Operation and Component Description

System Operation

Adaptive Cruise Control



Network Message Chart

Network Input Messages - ABS Module

Broadcast Message	Originating Module	Message Purpose
ACC deceleration request	IPMA	Used for cruise control automatic braking.
ACC stop mode request	PCM	Used for ACC automatic braking.
Brake pedal applied	PCM	Used for brake switch input.
Cruise control overide	PCM	Driver overriding cruise control with accelerator pedal.

Network Input Messages - IPMA

Broadcast Message	Originating Module	Message Purpose
APP	PCM	Used for accelerator pedal status.
ACC enabled	IPC	Activates ACC
ACC stop mode request	PCM	Used for ACC automatic braking.
ACC switch commands	SCCM	Used for speed control enable/disable, gap settings and operating mode request.
Brake pedal applied	PCM	Used for brake switch input.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.
Ignition status	BCM	Used for ignition switch position input.
Stability control event in progress	ABS module	Deactivates cruise control when requested.
Traction control event in progress		
Vehicle yaw rate		
Vehicle lateral acceleration	RCM	Deactivates cruise control when requested.
Vehicle longitudinal acceleration		
Vehicle configuration data	BCM	Used for comparison checking adaptive cruise control configuration.

Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
ACC gap distance display	IPMA	Data used to generate message center display indicating adaptive cruise control gap setting.
ACC follow mode display	IPMA	Data used to activate the follow vehicle indicator.
ACC stop mode display	IPMA	Data used to activate the stop and go auto mode indicator.
ACC resume display	IPMA	Data used to activate the stop and go auto resume mode indicator.
Cruise control set speed display	PCM	Data used to activate the select cruise control display.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.
Cruise control status	PCM	Data used for cruise control indicator status.

Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
Steering wheel switch speed control request	SCCM	Used for cruise control enable/disable and operating mode request.
Stability control event in progress	ABS module	Deactivates cruise control when requested.
Traction control event in progress		
Vehicle lateral acceleration	RCM	Deactivates cruise control when requested.
Vehicle longitudinal acceleration		
Vehicle yaw rate		

ACC Operation

NOTE: *For a complete illustration of the ACC indicators and graphic displays, refer to the Owner's Literature.*

The ACC system functions much like a standard cruise control system. The ACC system automatically adjusts the vehicle speed to maintain a set distance gap from the front of the vehicle and the vehicle in the same path of travel. When the ACC system is on and is following a vehicle or a vehicle enters the same driving lane, a follow vehicle graphic is displayed in the message center.

The ACC system does not function if the vehicle speed is below 20 km/h (12 mph). As the vehicle slows down during automatic braking, the ACC system discontinues braking at 20 km/h (12 mph). At that speed, an audible alarm sounds and the automatic braking from the ABS module is released. The driver must take over the vehicle braking control.

The cruise control deactivator switch (which is integral to the BPP switch) is an additional safety feature. When the

brake pedal is applied, the cruise control system deactivator switch opens and removes the ground signal from the PCM input circuit, releasing the throttle and immediately deactivating the system.

The CCM is on a dedicated CAN with the IPMA. The IPMA acts as a gateway module and relays the network messages and DTCs from the CCM to other modules that are utilized for the ACC system.

The CCM monitors the yaw rate signal from the ABS module and compares it to the wheel speed and steering wheel angle signals. If the ABS module determines the yaw rate is invalid, the CCM disables the ACC system. The message center displays the message COLLISION WARNING MALFUNCTION and/or ADAPTIVE CRUISE MALFUNCTION.

The CCM monitors the environment in front of the vehicle while active. If the radar beam is obstructed by a buildup of snow, ice, rain or other debris or the vehicle is driven in a desert environment with no other traffic for extended periods of time, the sensor triggers an "ADAPTIVE CRUISE NOT AVAILABLE SENSOR BLOCKED SEE MANUAL" message in the message center and disables the ACC. The ACC resumes once the obstruction is cleared and the radar is able to detect targets or upon a key cycle.

The ACC system does not engage properly if the front radar sensor is not aligned correctly and the message center displays FRONT SENSOR NOT ALIGNED. The ACC resumes once the radar is aligned and is able to properly detect targets.

The ABS module estimates brake temperature by monitoring applied brake pressure over a period of time and sends a message to the CCM when the estimated temperature is above a given threshold. An alarm sounds and the ACC system is deactivated until the estimated brake temperature returns to cooler operating conditions. This condition can happen in a hilly or mountainous driving terrain.

Cruise Control Indicator

The ACC indicator located in the IPC illuminates a gray indicator lamp and displays the previous gap setting and SET graphic indicating the systems in standby mode. This notifies the driver the system is ready and the vehicle can be accelerated to the desired speed. A green ACC indicator illuminates when the system is active.

Steering Wheel Switch Function

The ACC steering wheel mounted switches are momentary contact switches that toggle up and down for the cruise control switch state. Pressing and releasing the steering wheel cruise control ON/OFF switch turns the cruise control system on. Pressing up (SET+) and releasing the SET switch sets the vehicle's speed and stores the set speed in memory. The ACC indicator illuminates and the message center displays the set speed and gap setting graphic.

There are two ways to change the set speed. The first way is to accelerate or brake to the desired speed and press and release the SET cruise control switch until the desired set speed is shown on the message center. The second way is by tapping the SET+ or the SET- switch while in the set mode, increasing or decreasing the displayed set speed by 1.6 km/h (1 mph) per tap. If the respective button is pressed and held, the displayed set speed continues to increase or decrease until the button is released. The ACC system may apply the brakes to slow the vehicle down to the new set speed. The set speed displays continuously in the message center while the ACC system is active.

Pressing and releasing the OFF switch or switching the ignition to OFF, turns the ACC system off. The ACC set speed memory is erased.

Applying the brake or pressing the CNCL switch puts the ACC system in standby mode and the last set speed is

displayed in the message center with a strike through. Pressing the RES button when the ACC system is in standby mode causes the vehicle to accelerate to the last set speed. The set speed continuously displays in the message center while the ACC system is active. The RES button does not function if the OFF button is pressed, the ignition is cycled OFF or if the current vehicle speed is below the minimum operational speed.

The ACC system has the capability for the driver to change from ACC to standard cruise control. The LH 5-way steering wheel switch is used to switch from the ACC system to standard cruise control system within the message center. For information on selecting the standard cruise control in the message center, refer to Owner's Literature. Once the driver has selected the standard cruise control in the message center, the ACC indicator is replaced by the standard cruise control indicator. The vehicle no longer responds to lead vehicles or automatic braking. Upon the next vehicle ignition cycle, the vehicle defaults back to the ACC system.

Gap Setting

When a vehicle ahead enters the same lane or a slower vehicle is ahead in the same lane, the vehicle speed adjusts automatically to maintain a preset distance gap. A bar graph with four preset distance gap settings are displayed in the message center. Pressing up (decrease) or down (increase) on the steering wheel cruise control gap switch increases or decreases the distance from the vehicle ahead. If all of the bars are illuminated, this is the longest gap setting. If only one bar is illuminated, that is the shortest gap setting.

The vehicle maintains the distance gap to the vehicle ahead until:

- the vehicle ahead accelerates to a speed above the set speed.
- the vehicle ahead moves out of the lane or out of view.
- the vehicle speed falls below 20 km/h (12 mph).
- a new gap distance is set.

After each ignition cycle, the previous gap setting is remembered and the system is set to that gap setting.

The distance gap can be overridden by pressing the accelerator pedal. The follow vehicle graphic is not displayed in the message center and the green indicator illuminates. When the accelerator pedal is released, the ACC system returns to normal operation and the vehicle speed decreases to the set speed or a lower speed if following a vehicle ahead.

Deceleration Control

The CCM commands the ABS module, which controls the brakes, to automatically apply the brakes to slow the vehicle to maintain a safe distance to the vehicle in front.

Pre-Collision Assist System Operation

The pre-collision assist system is an additional safety feature on vehicles equipped with ACC. The system is active whether the ACC system is on or off. If the system detects a vehicle, pedestrian or other object in the vehicle path of travel, the system provides three levels of functionality:

- Visual and audible alert
- Brake support
- Active braking

The system uses object detection information from the radar sensor integrated in the CCM and the forward-looking camera in the IPMA mounted on the front windshield below the rear view mirror. The CCM and the IPMA scan a

designated area in front of the vehicle. Messages are sent between the CCM and the IPMA on dedicated private CAN circuit.

Component Description

Steering Wheel Switches

The cruise control steering wheel mounted switches are momentary contact switches that toggle up and down for the switch state. The switches are an input to the SCCM.

Brake Switch

When the brake pedal is applied, an electrical signal from stoplamp circuit to the PCM deactivates the system. Under increased brake pedal effort, the cruise control deactivator switch opens and removes the ground signal from the PCM input circuit releasing the throttle, immediately deactivating the system.

CCM

The CCM contains a radar sensing unit which measures the relative speed and the distance between the front of the vehicle and the vehicle being followed. The IPMA is responsible for requesting the PCM to increase vehicle speed and the ABS module to brake, when necessary.

IPMA

The IPMA is located on the windshield, below the interior rear view mirror. The IPMA contains a forward-looking camera with a designated sight line in front of the moving vehicle.

Cruise Control

DTC Charts

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

DTC Chart: PCM

PCM DTC Chart

DTC	Description	Action
P0504:00	Brake Switch A/B Correlation: No Sub Type Information	GO to Pinpoint Test H
P0572:00	Brake Switch A Circuit Low: No Sub Type Information	GO to Pinpoint Test H
P0573:00	Brake Switch A Circuit High: No Sub Type Information	GO to Pinpoint Test H
P1703:00	Brake Switch Out Of Self-Test Range: No Sub Type Information	GO to Pinpoint Test H
P1935:00	Brake Switch Sensor/Signal: No Sub Type Information	GO to Pinpoint Test H
All other Diagnostic Trouble Codes (DTCs)	–	REFER to: Electronic Engine Controls (303-14 Electronic Engine Controls - 2.3L EcoBoost (201kW/273PS), Diagnosis and Testing).

DTC Chart: SCCM

SCCM DTC Chart

DTC	Description	Action
B137F:11	Steering Wheel Left Switch Pack: Circuit Short To Ground	GO to Pinpoint Test B
B137F:13	Steering Wheel Left Switch Pack: Circuit Open	GO to Pinpoint Test B
B137F:4A	Steering Wheel Left Switch Pack: Incorrect Component Installed	GO to Pinpoint Test B
B137F:96	Steering Wheel Left Switch Pack: Component Internal Failure	GO to Pinpoint Test B
B137F:9E	Steering Wheel Left Switch Pack: Stuck On	GO to Pinpoint Test B
All other Diagnostic Trouble Codes (DTCs)	–	REFER to: Steering Wheel and Column Electrical Components (211-05 Steering Wheel and Column Electrical Components, Diagnosis and Testing).

DTC Chart: CCM

CCM DTC Chart

DTC	Description	Action
B142E:78	Forward Looking Sensor Horizontal Alignment: Alignment or Adjustment Incorrect	GO to Pinpoint Test C
B1432:78	Forward Looking Sensor Vertical Alignment: Alignment or Adjustment Incorrect	GO to Pinpoint Test C
B1433:54	Forward Looking Sensor Alignment: Missing Calibration	GO to Pinpoint Test C
C1001:08	Vision System Camera: Bus Signal / Message Failure	GO to Pinpoint Test D
C1A67:96	Forward Looking Sensor: Component Internal Failure	GO to Pinpoint Test E

C1A67:97	Forward Looking Sensor: Component or System Operation Obstructed or Blocked	GO to Pinpoint Test F
C1A67:98	Forward Looking Sensor: Component or System Over Temperature	GO to Pinpoint Test G
U2100:00	Initial Configuration Not Complete: No Sub Type Information	GO to Pinpoint Test K
U2300:55	Central Configuration: Not Configured	GO to Pinpoint Test K
U3000:41	Control Module: General Checksum Failure	GO to Pinpoint Test M
U3000:42	Control Module: General Memory Failure	GO to Pinpoint Test M
U3000:44	Control Module: Data Memory Failure	GO to Pinpoint Test M
U3000:49	Control Module: Internal Electronic Failure	GO to Pinpoint Test M
U3002:62	Vehicle Identification Number: Signal Compare Failure	GO to Pinpoint Test L
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test I
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test J

DTC Chart: IPMA

IPMA DTC Chart

DTC	Description	Action
C1A67:08	Forward Looking Sensor: Bus Signal/Message Failure	GO to Pinpoint Test D
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Lane Keeping System (419-07 Lane Keeping System, Diagnosis and Testing).

Symptom Chart(s)

Symptom Chart: ACC

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic

practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom Chart

Condition	Possible Sources	Actions
The CCM does not communicate with the diagnostic scan tool	• Fuse • Wiring, terminals or connectors • Private CAN communication concern • CCM • IPMA	GO to Pinpoint Test A
The ACC is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test B
The cruise control switch is inoperative/ does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test B
The ACC does not function in rain or snow conditions	Refer to the Pinpoint Test	GO to Pinpoint Test F
ADAPTIVE CRUISE NOT AVAILABLE SENSOR BLOCKED SEE MANUAL message in the IPC message center	Refer to the Pinpoint Test	GO to Pinpoint Test F
The ACC indicator lamp is never/ always on	• Wiring, terminals and connectors • PCM • IPC	REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).

Unexpected ACC braking	• CCM • Front bumper cover	The ACC system can occasionally detect and respond to out-of path vehicles especially on curves, entry/exit ramps or when changing lanes. CHECK the CCM and front bumper cover for damage. RETEST the ACC system.
Lack of ACC braking	• CCM • Front bumper cover	The ACC system may not detect and respond to vehicles carrying out close cut-ins or on tight curves (especially for vehicles on the passenger side) due to limited CCM field of view. CHECK the CCM and front bumper cover for damage. If no damage is observed, RETEST the ACC system.
Noise during ACC braking	• Low speeds • Brake concern	The driver can detect some noise at low speeds when ACC braking occurs. If braking noise continues, REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).
The cruise control cannot set above 105 kmh (65 mph), 113 kmh (70 mph), 121 kmh (75 mph) or 129 kmh (80 mph)	A MyKey® restricted key is in use and MyKey® max speed limiter is turned on	VERIFY a MyKey® restricted key is in use. With an admin key, VERIFY if MyKey® max speed limiter is turned on. REFER to the Owner's Literature. If necessary, VERIFY cruise control normal operation with an admin key.

Pinpoint Tests

PINPOINT TEST A : THE CCM (CRUISE CONTROL MODULE) DOES NOT COMMUNICATE WITH THE DIAGNOSTIC SCAN TOOL

- [ ] PINPOINT TEST B : THE ADAPTIVE CRUISE CONTROL IS INOPERATIVE
- [ ] PINPOINT TEST C : B142E:78, B1432:78 OR B1433:54
- [ ] PINPOINT TEST D : THE PRE-COLLISION ASSIST SYSTEM IS INOPERATIVE
- [ ] PINPOINT TEST E : C1A67:96
- [ ] PINPOINT TEST F : C1A67:97
- [ ] PINPOINT TEST G : C1A67:98
- [ ] PINPOINT TEST H : P0504:00, P0572:00, P0573:00, P1703:00 OR P1935:00
- [ ] PINPOINT TEST I : U3003:16
- [ ] PINPOINT TEST J : U3003:17
- [ ] PINPOINT TEST K : U2100:00 OR U2300:55
- [ ] PINPOINT TEST L : U3002:62
- [ ] PINPOINT TEST M : U3000:41, U3000:42, U3000:44 OR U3000:49

Cruise Control Radar Alignment

Activation

NOTE: *Make sure that the tire pressures are to specification and that the vehicle is unladen.*

Vertical Alignment

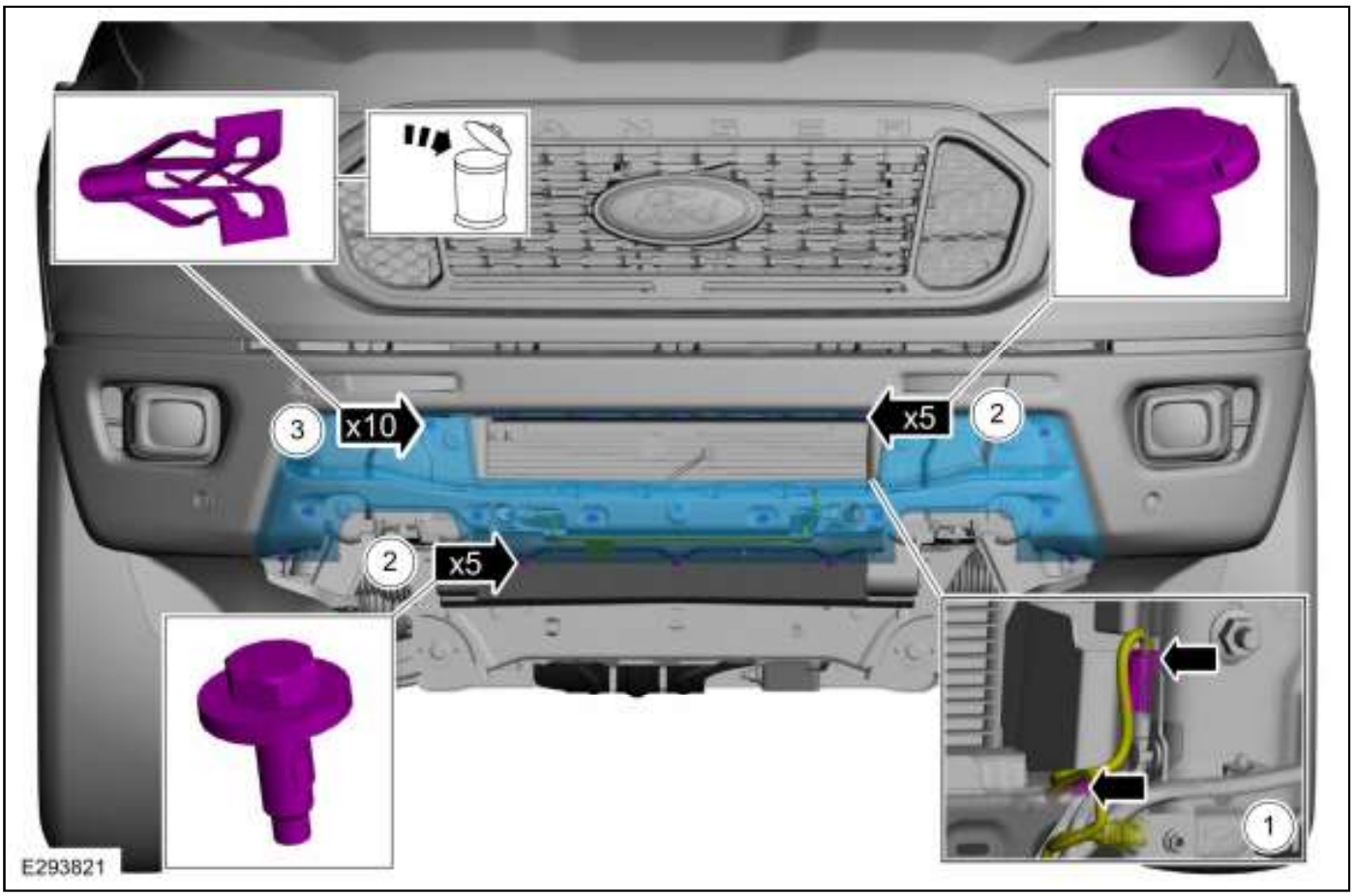
NOTE: *In order to align the CCM, the front bumper cover must be removed to access the sensor and the vehicle must be in a wheel alignment bay station so that the vehicle is level.*

NOTE: *Damage to the CCM bracket may affect correct alignment. When aligning the CCM, inspect the CCM bracket for damage and repair as necessary before carrying out the alignment procedure.*

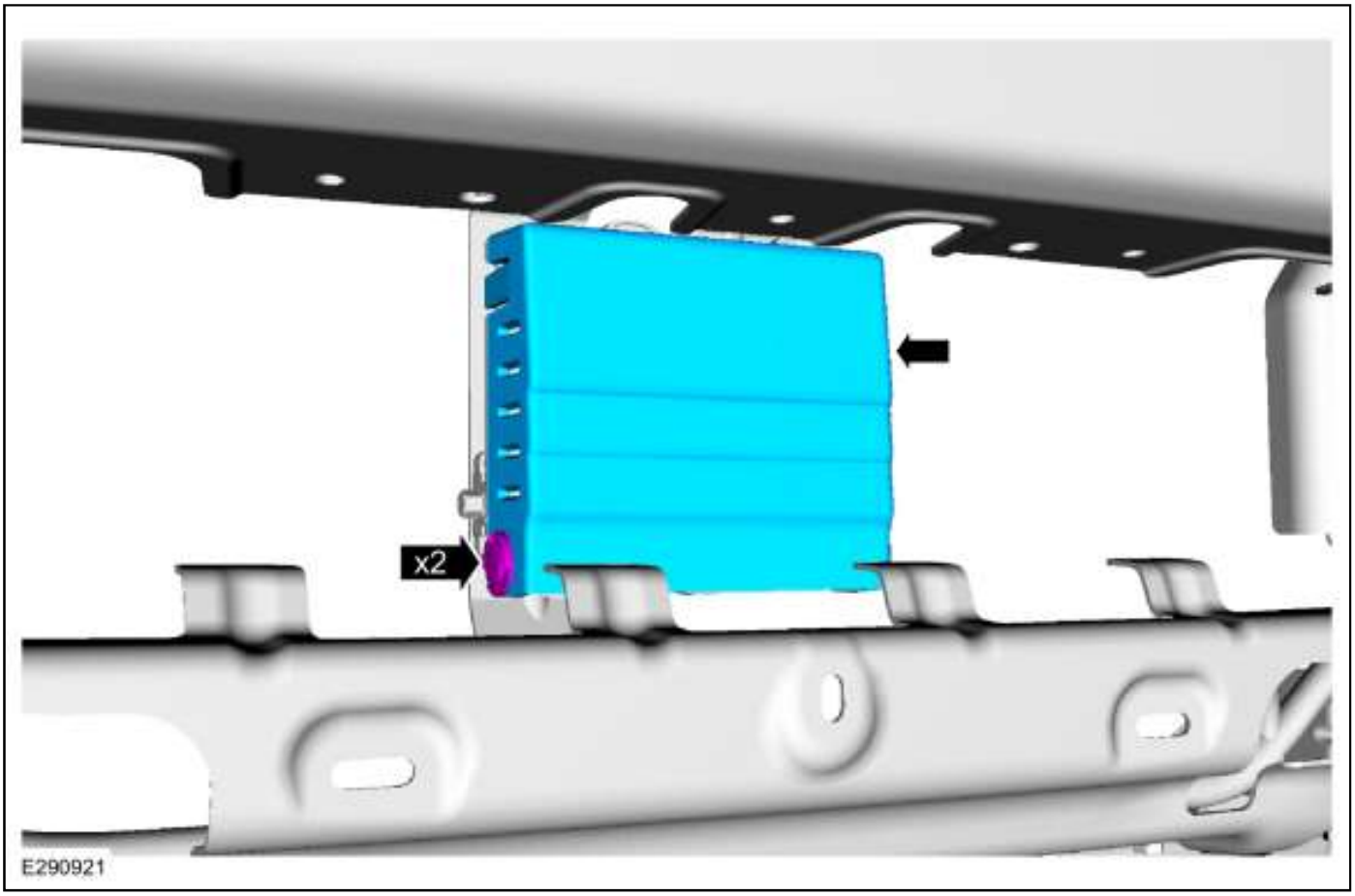
NOTE: *Damage to the lower grill may affect the performance of the CCM. When aligning the CCM, inspect the lower grill for damage and repair as necessary before carrying out the alignment procedure.*

1. Remove the front bumper valence cover.
    1. Disconnect the electrical connector, the retainer and position the wiring harness aside.
    2. Remove the push pins and the bolts.
       Torque: 36 lb.in (4.1 Nm)
    3. **NOTE:** *Use a suitable tool to prevent damage to the component during removal.*

       Remove and discard the clips. Remove the front bumper valence cover.



2. Remove the retainers and the CCM cover.

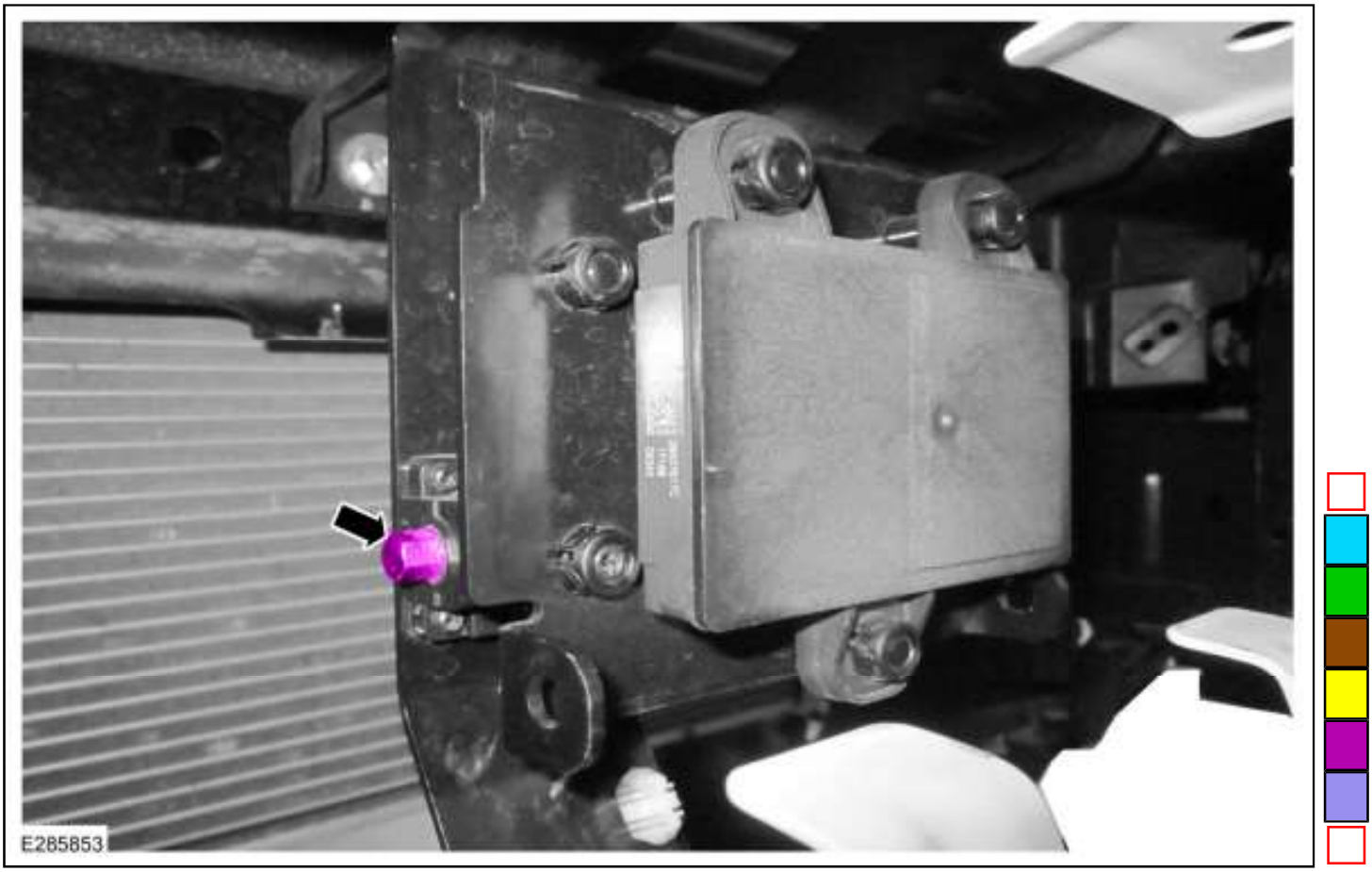


3. **NOTE:** *Make sure there is no physical damage to any component and if all components are fit correctly on to the vehicle. This will ensure correct operation of the CCM module.*

   Place the vehicle on a wheel alignment bay station.

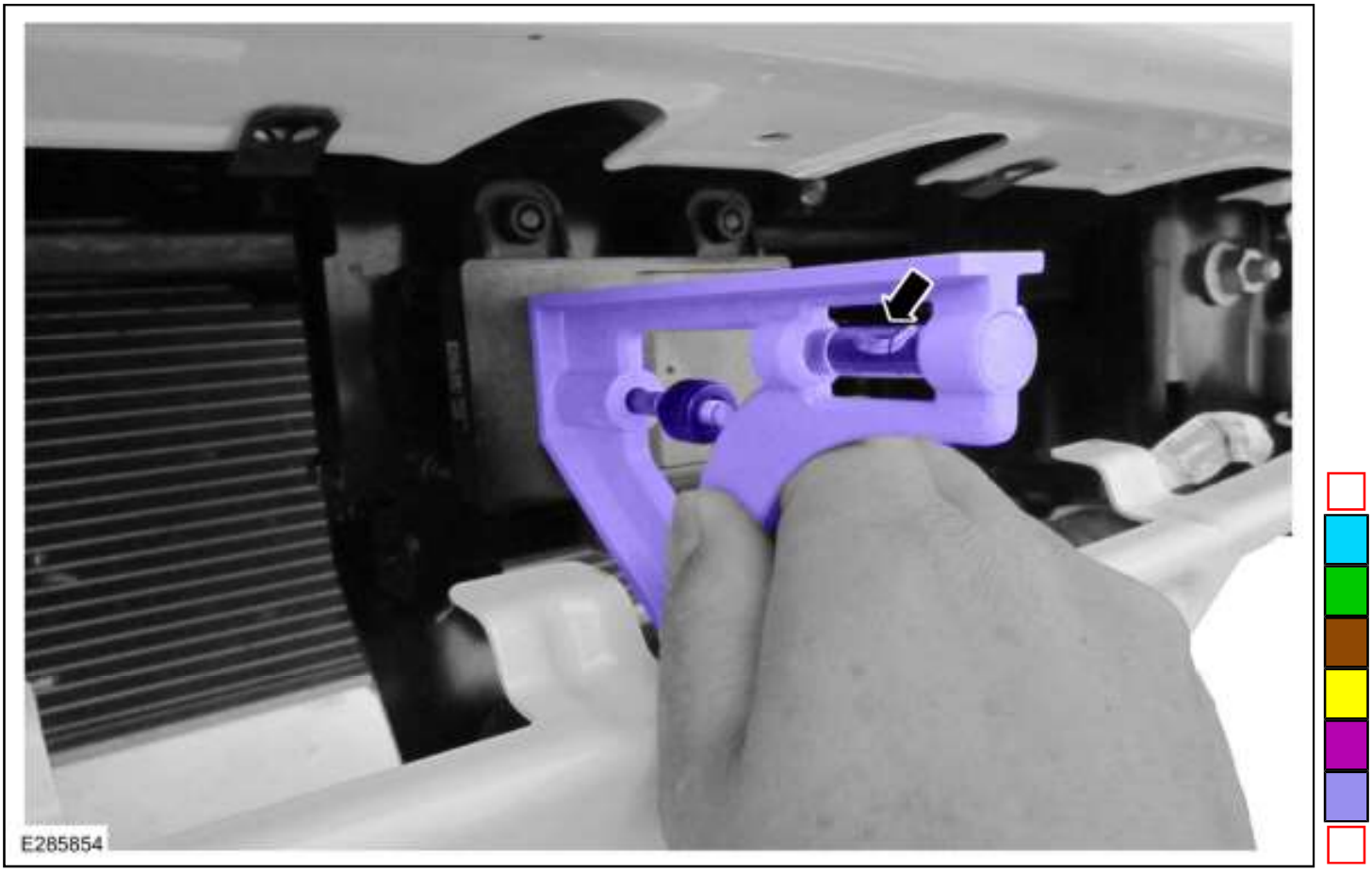
4. **NOTE:** *Similar application shown.*

   Locate the CCM alignment screw.



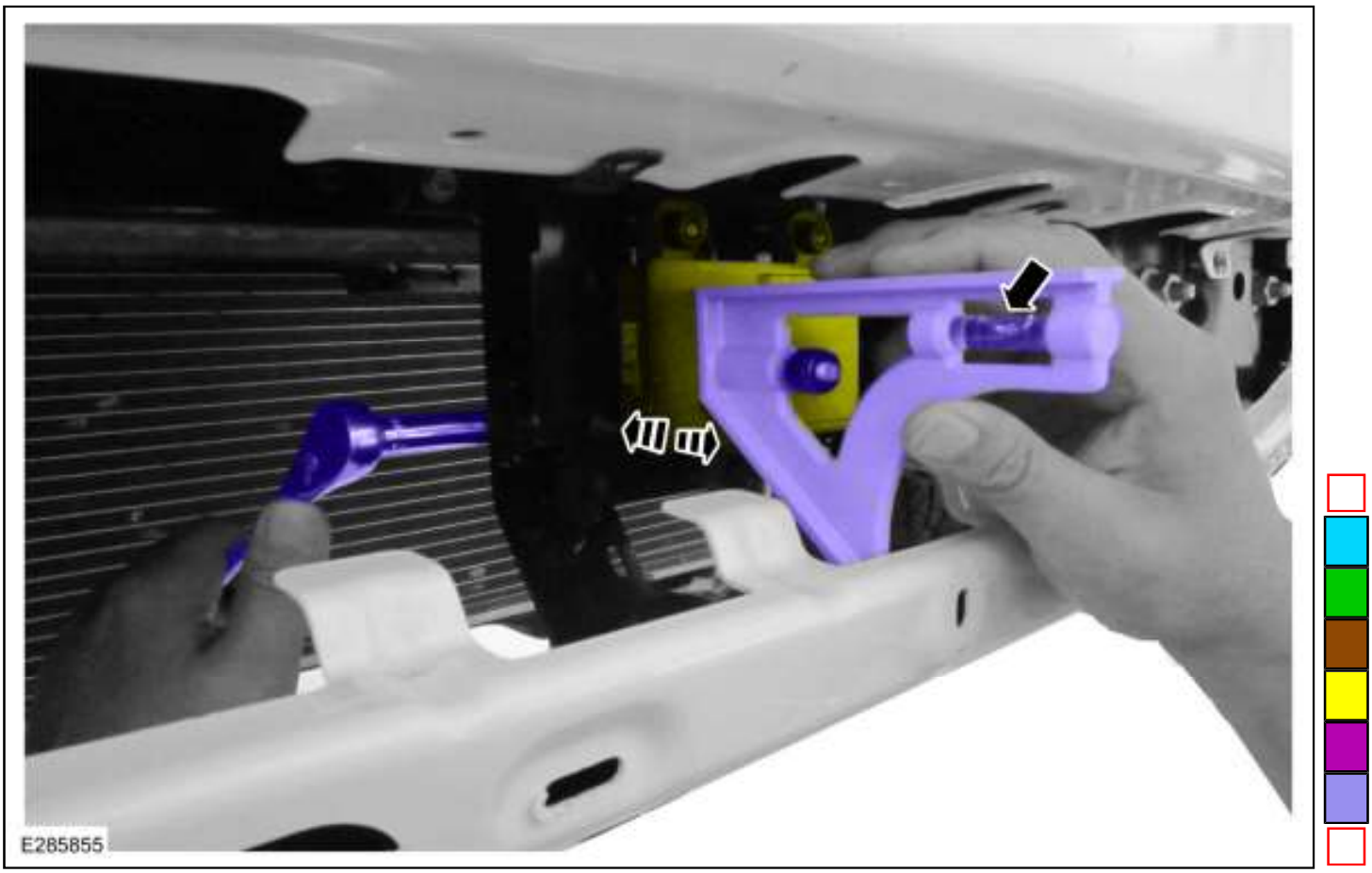
5. **NOTE:** *Similar application shown.*

   Place a combination square level on the face of the CCM and check the alignment.



6. **NOTE:** *Similar application shown.*

   Keeping the combination square level on the face of the CCM, adjust the pitch by adjusting the screw until the CCM is vertical and level.



7. To install, reverse the removal procedure.

Horizontal Alignment

NOTE: *Prior to software calibration for horizontal alignment, make sure the CCM vertical alignment has been completed.*

NOTE: *The horizontal alignment for the CCM is a software calibration check that is performed by the scan tool to insure the CCM radar is pointed straight. No manual adjustment is needed for this procedure. The scan tool calibrates the CCM through the CCM procedure in programmable parameters. The Alignment Offset specification is +/- 3.0 degrees of offset.*

8. **NOTICE: The vehicle's engine must be running during the horizontal alignment procedure. Failure to leave the engine running throughout the entire procedure results in the cancellation of the alignment procedure and the system remains non-functional.**

   Start the engine.

9. Follow the scan tool on-screen instructions to carry-out the CCM calibration procedure.

Cruise Control Module (CCM)

Removal

NOTE: *Removal steps in this procedure may contain installation details.*

Cruise control module (CCM)

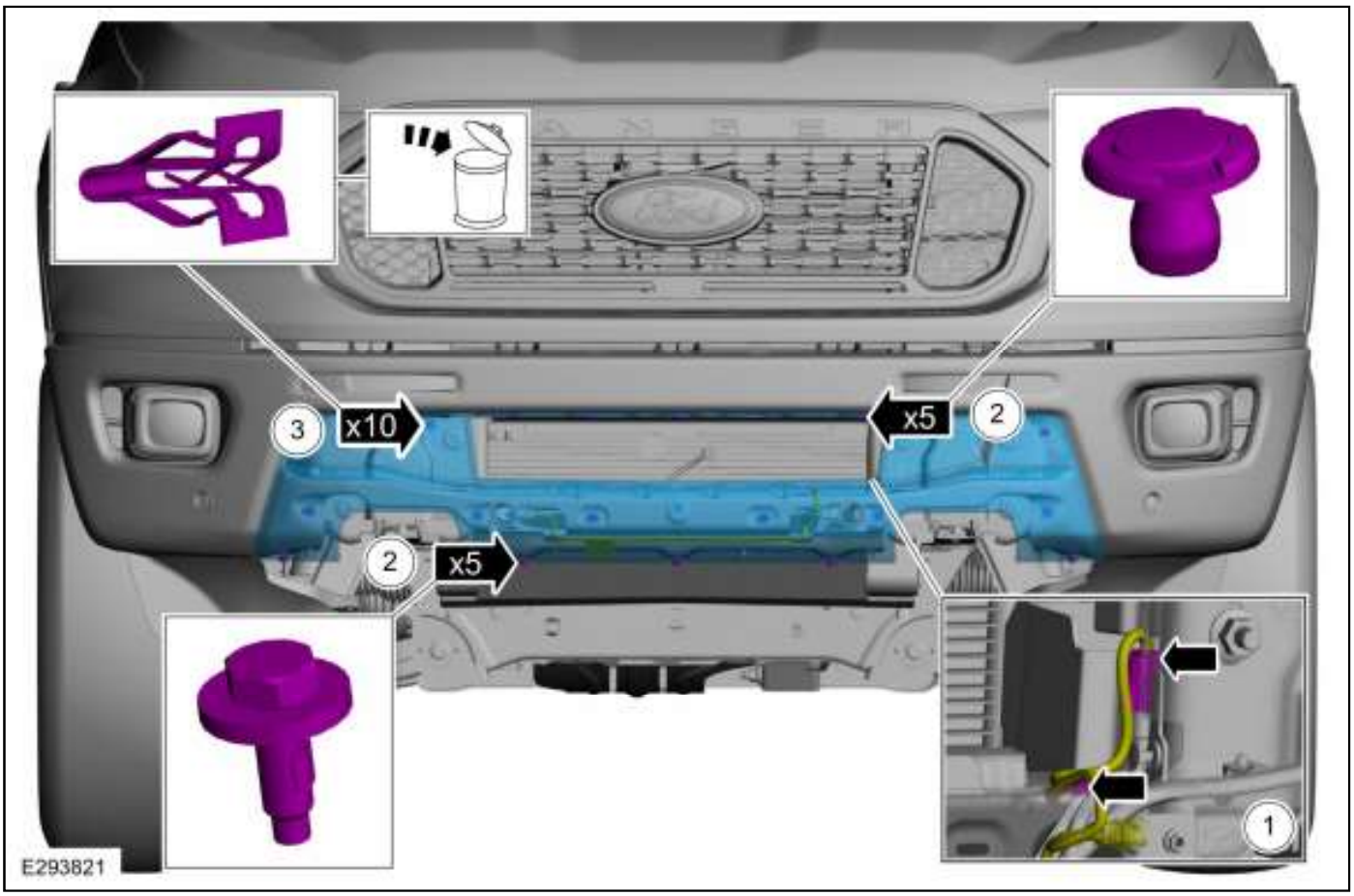
1. **NOTE:** *If installing a new CCM, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new CCM after installation.*

   Using a diagnostic scan tool, begin the PMI process for the CCM following the on-screen instructions.

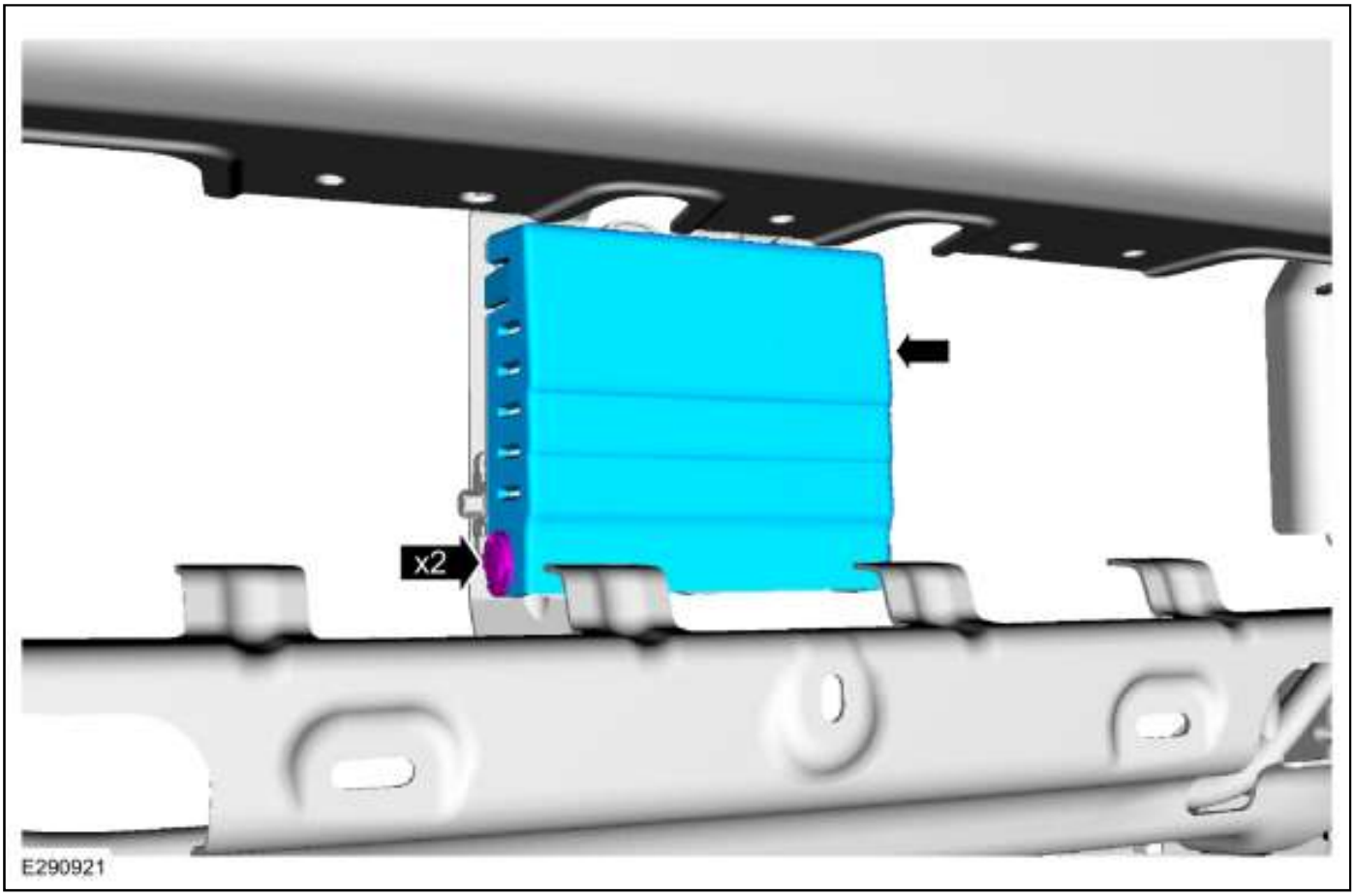
2. With the vehicle in NEUTRAL, position it on a hoist.
   Refer to: Jacking and Lifting (100-02 Jacking and Lifting, Description and Operation).

3. Remove the front bumper valence cover.
   1. Disconnect the electrical connector, the retainer and position the wiring harness aside.
   2. Remove the push pins and the bolts.
      Torque: 36 lb.in (4.1 Nm)
   3. **NOTE:** *Use a suitable tool to prevent damage to the component during removal.*

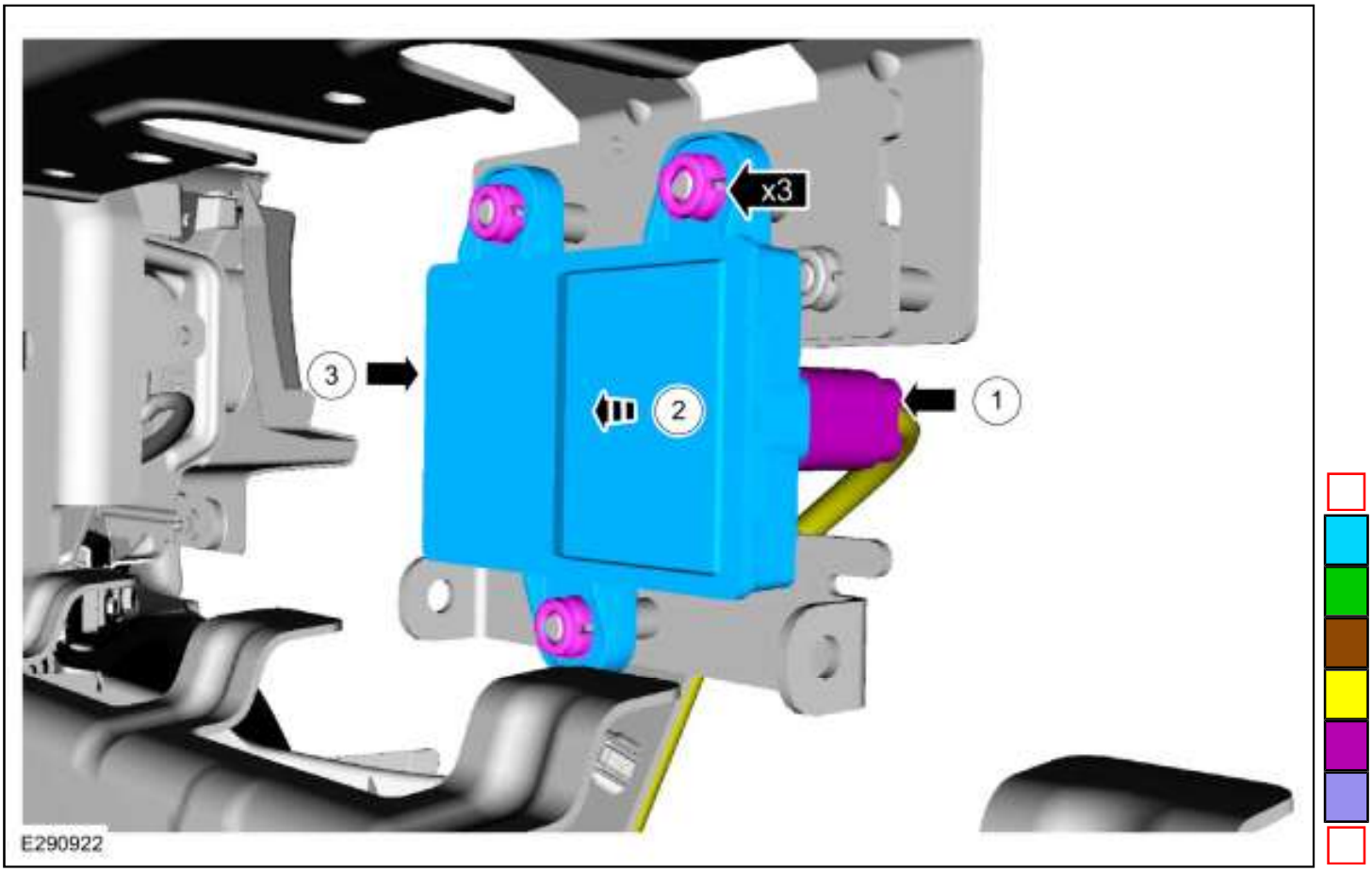
      Remove and discard the clips. Remove the front bumper valence cover.



4. Remove the retainers and the CCM cover.

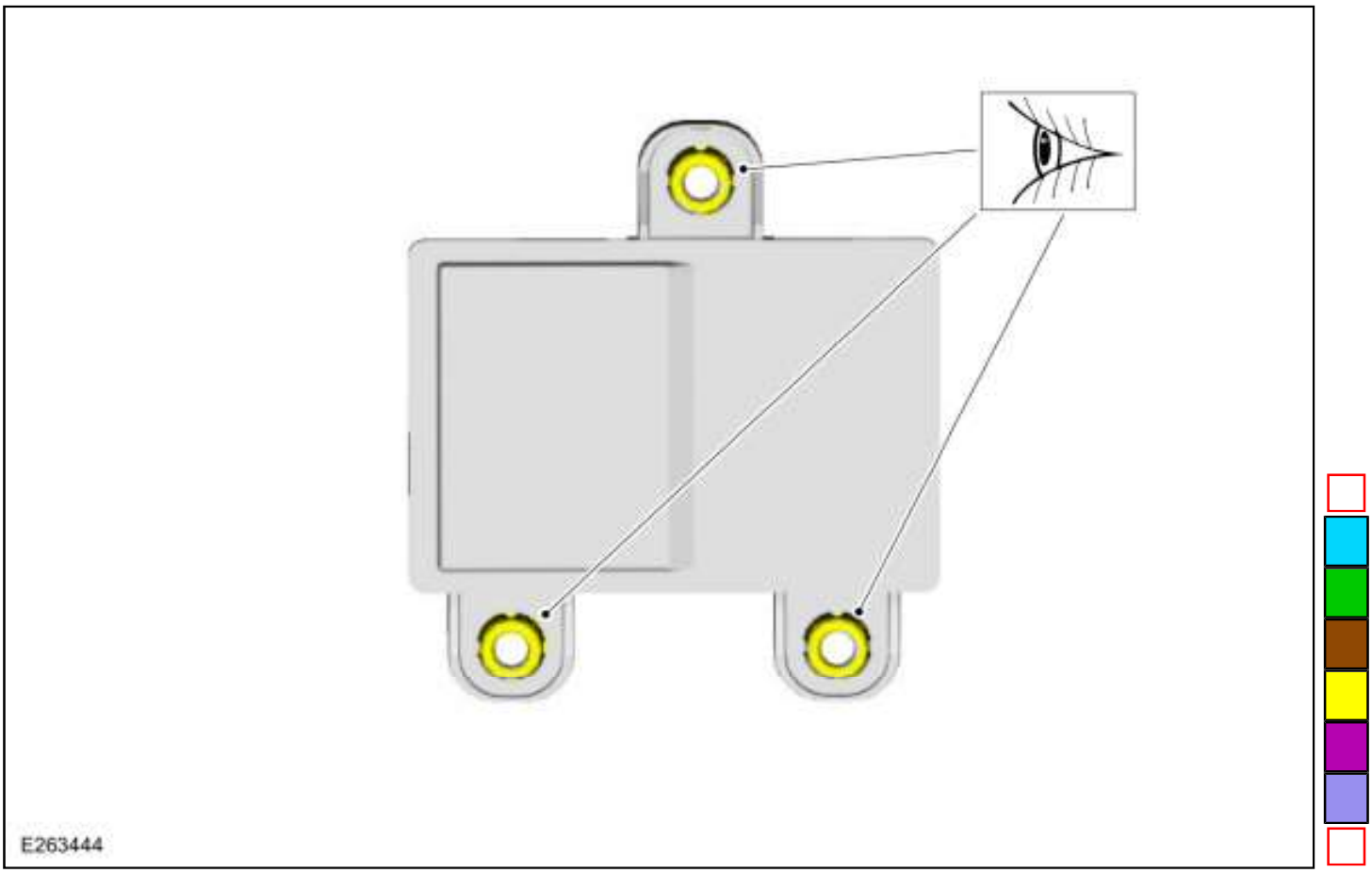


1. Disconnect the CCM electrical connector.
2. Detach the CCM grommets from the CCM bracket studs by pulling outward.
3. Remove the CCM.



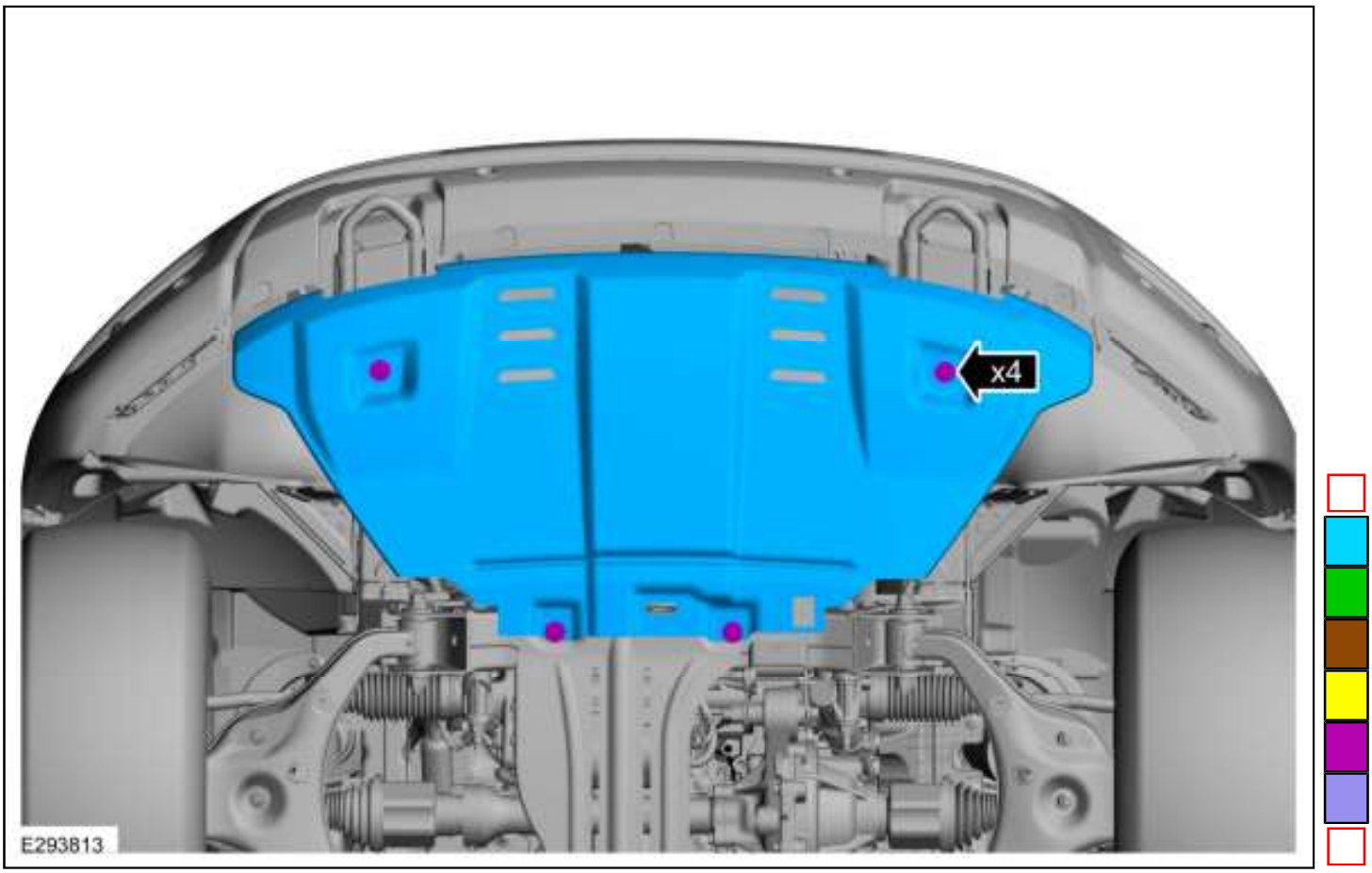
6. **NOTE:** *Replace any damaged CCM grommets.*

   Inspect the CCM grommets for damage.

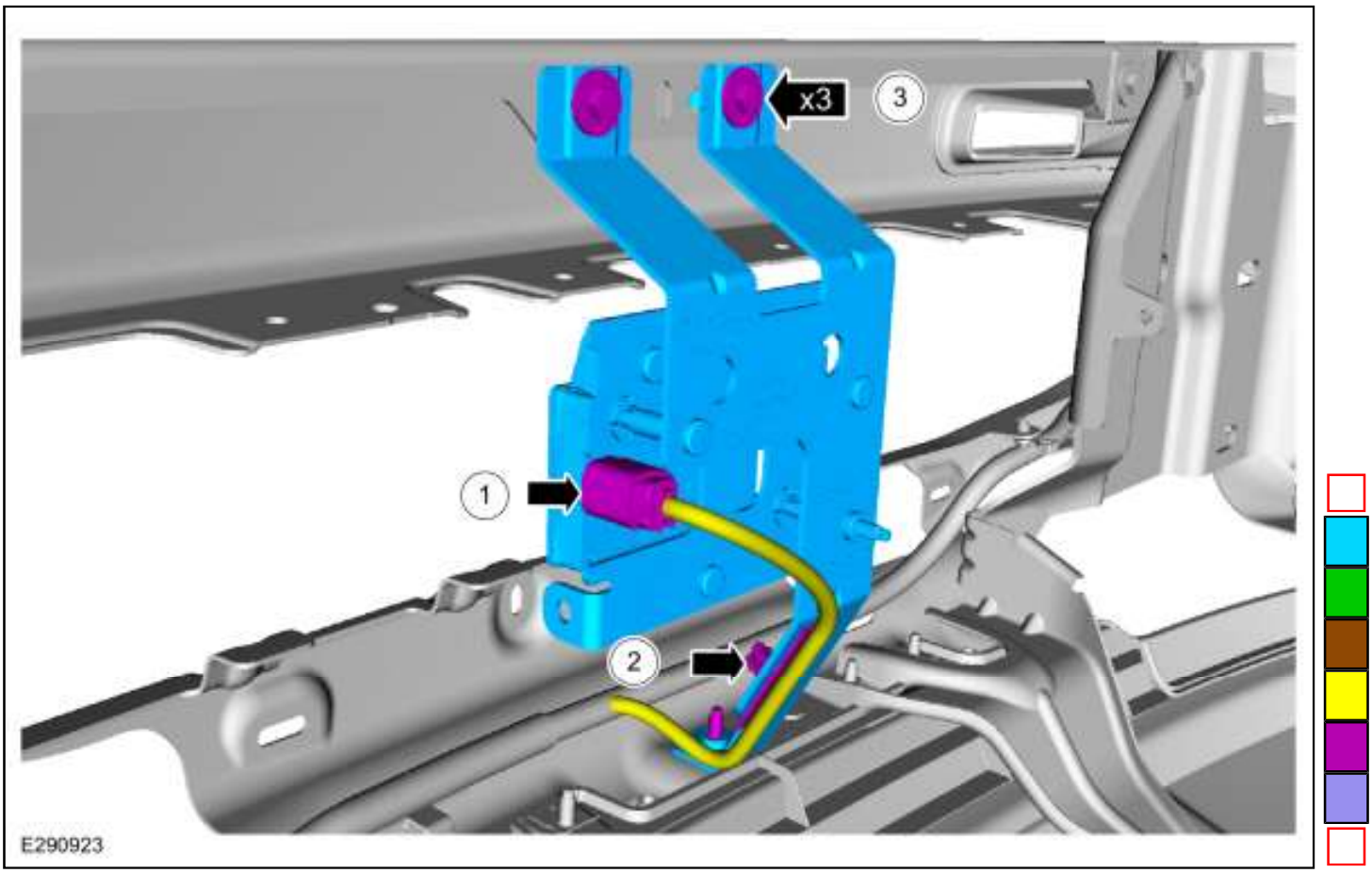


CCM bracket

7. If equipped.
   Remove the bolts and the skid plate.
   Torque: 22 lb.ft (30 Nm)



1. Disconnect the CCM electrical connector.
2. Detach the wiring harness retainer from the CCM bracket.
3. Remove the bracket bolts and the CCM and bracket.
   Torque: 106 lb.in (12 Nm)



Installation

1. **NOTE:** *This step is only necessary when installing a new component.*

   Using a diagnostic scan tool, complete the PMI process for the CCM following the on-screen instructions.

2. **NOTE:** *Cruise control radar alignment must be completed before the installation of the CCM (cruise control module) cover and the front bumper valence cover.*

   Align the CCM after installation.
   Refer to: Cruise Control Radar Alignment (419-03B Cruise Control - Vehicles With: Adaptive Cruise Control, General Procedures).

3. To install, reverse the removal procedure.