

Pro Trailer Back Up Assist Camera Alignment

Special Tool(s)

	Mats, Camera Calibration 501-411
--	-------------------------------------

NOTE: Prior to beginning this procedure, perform the following:

- Retrieve and repair any IPMB Diagnostic Trouble Codes (DTCs).
- Inspect the rear parking aid camera and the associated mounting hardware and body components for damage. Damage or misalignment of any of these components can cause the PTBA camera alignment procedure to be unsuccessful.

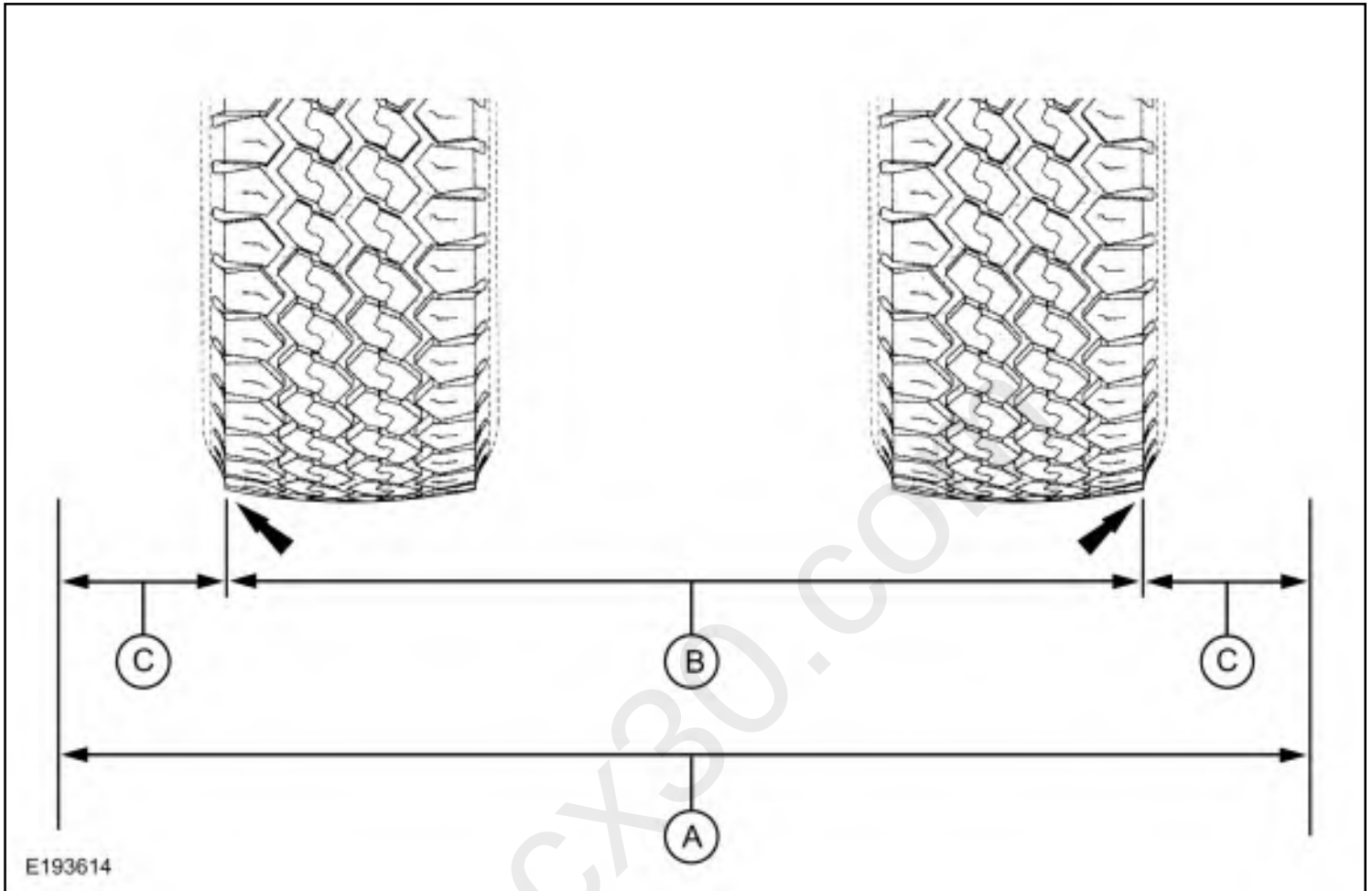
1. Park the vehicle in a flat, open area (preferably indoors) with the front wheels straight ahead, steering wheel centered, and with a minimum of 6 feet of open space to each side, 7 feet of open space in front, and 11 feet of open space behind the vehicle. The area where the vehicle is parked **must** be flat (total height variation of less than 1"), have uniform lighting of good quality, and be free of debris or obstacles.

NOTE: The area where the alignment is performed **must** be free of shadows and glare. Areas of shadow or bright light will degrade the ability of the rear parking aid camera to see the target pattern on the calibration mats. Facing the front of the vehicle towards the light source may reduce glare on the calibration mats.

2. Inspect and clean the rear parking aid camera lens.
3. Obtain the mat spacing specification and note this as measurement "A".
For additional information, refer to: [Specifications](#) (413-13D Parking Aid - Vehicles With: Trailer Back Up Assist (TBA), Specifications).

4. With the help of an assistant, measure the distance between the outer edge of the RH rear tire tread block and the outer edge of the LH rear tire tread block. Note this measurement of tire width as "B".

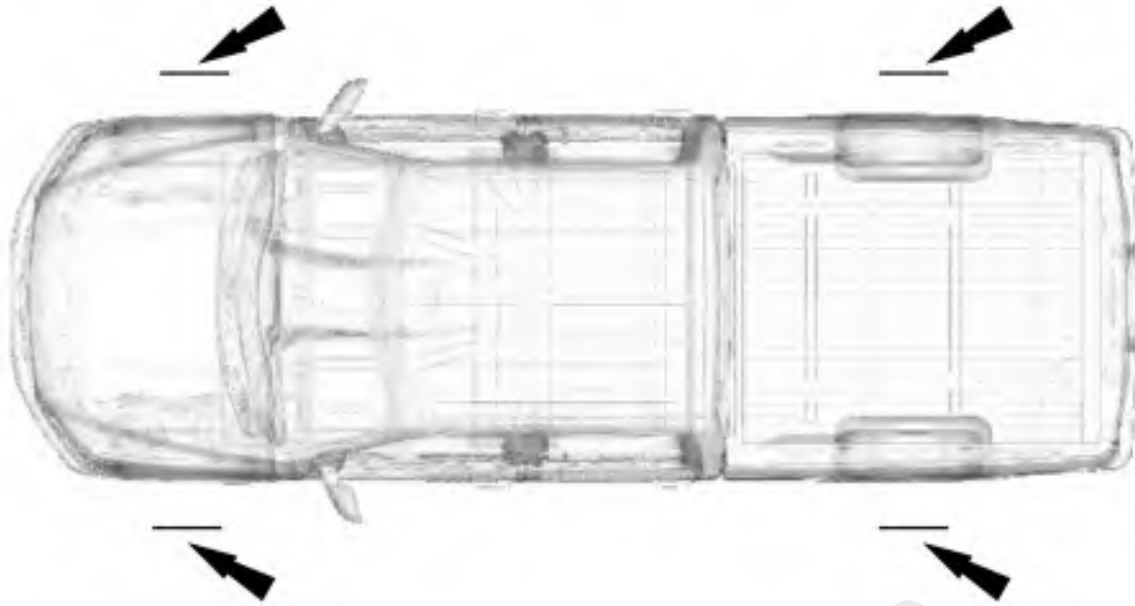
NOTE: Make sure the measurement is taken at the same location on both tires.



5. Calculate the mat spacing distance from the tire: $(A-B)/2=C$
 1. Subtract the tire width (measurement "B") from the mat spacing specification (measurement "A").
 2. Divide the result by 2. Note this measurement as "C". This is the mat spacing distance from the outer edge of the tire block.
6. Create mat spacing guidelines at all 4 tires:

NOTE: F-series shown, other vehicles similar.

1. Measure distance "C" from the outer edge of the tire tread block.
2. Using chalk, at distance "C" for each tire, draw a line on the ground parallel to the side of the vehicle that is several inches long and roughly aligned with the center of the axle.



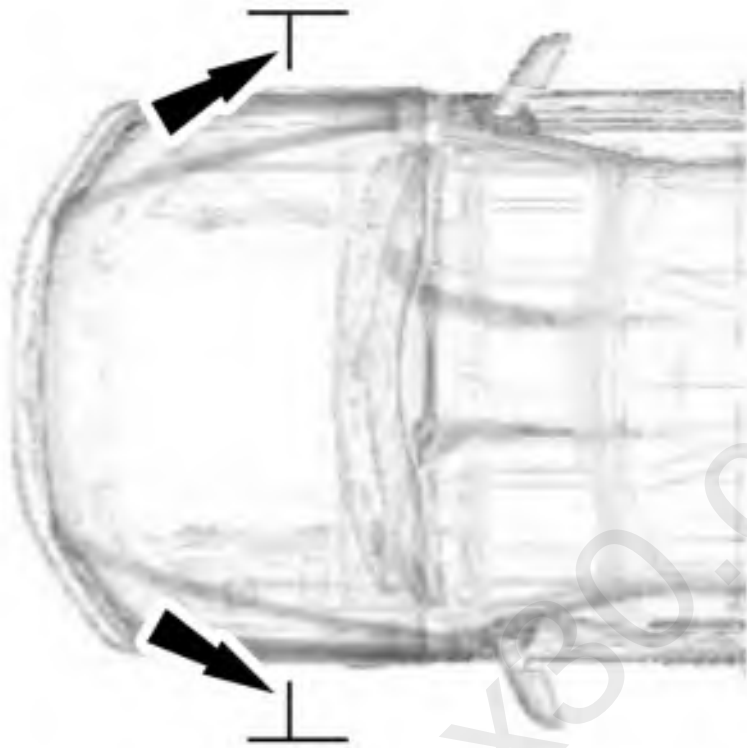
E193613



7. Create front axle alignment guidelines:

NOTE: *F-series shown, other vehicles similar.*

1. Locate the centerline of the front axle
2. Using chalk, draw a line on the ground extending outwards from the center of the front axle, perpendicular to the wheel.



E193611

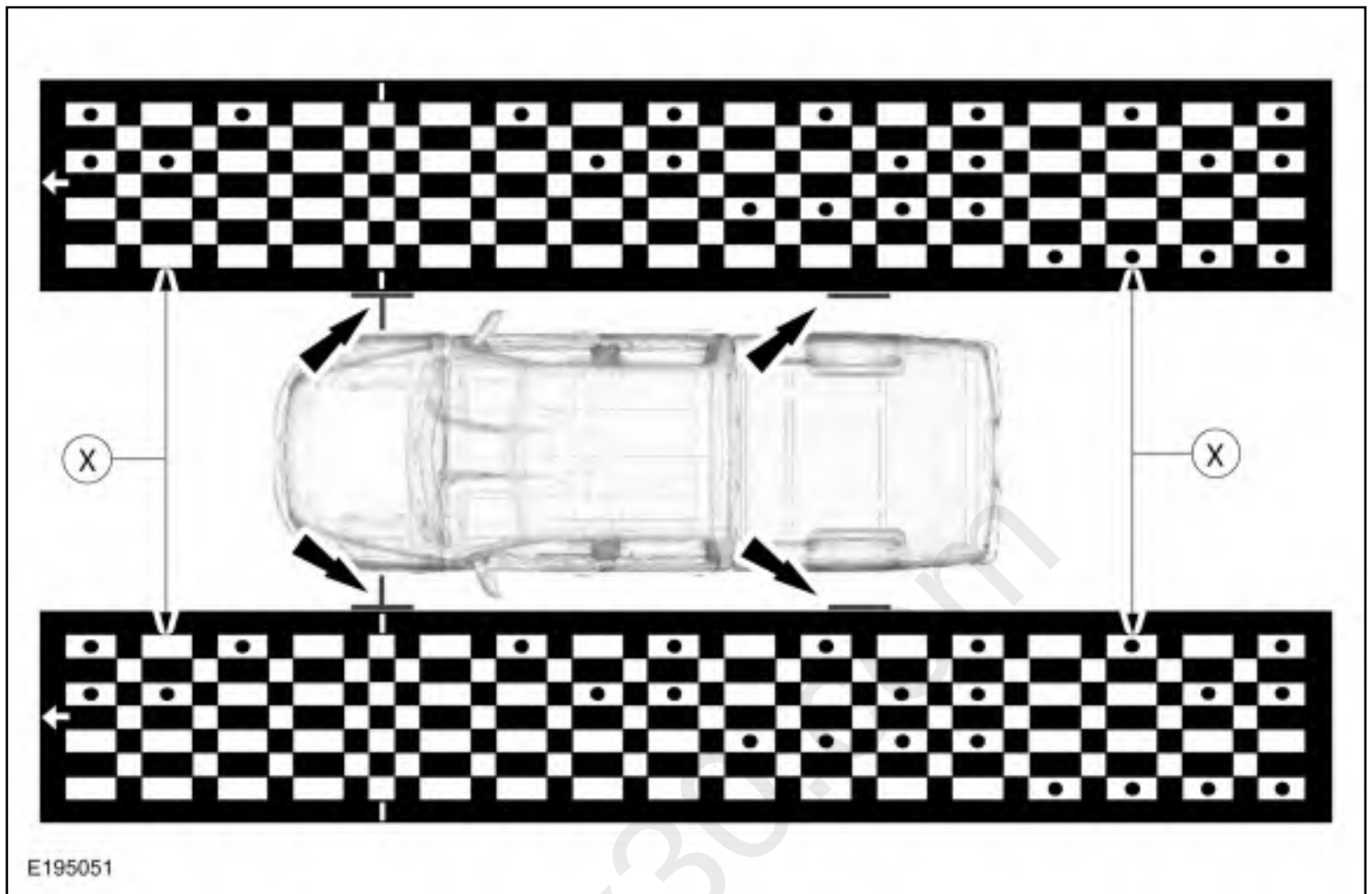


8. Position the calibration mats on both sides of the vehicle:

NOTE: *F-series shown, other vehicles similar.*

1. Align the front axle alignment mark on each mat with the front axle alignment guideline created in step 7.
2. Align the inside edge of each mat with the respective front and rear mat spacing guidelines created in step 6.
3. Verify the spacing between the target pattern blocks matches measurement "X" from the specifications in this section.

For additional information, refer to: [Specifications](#) (413-13D Parking Aid - Vehicles With:



9. Verify all vehicle doors and tailgate/luggage compartment lid are fully closed.
10. Turn the ignition ON. Do not start the engine.

NOTE: A battery voltage of greater than 11 volts must be maintained throughout the calibration procedure. A battery charger can be used to maintain the battery voltage. Make sure any extension cords that are used do not obstruct the calibration mats.

11. Using a diagnostic scan tool, perform the PTBA camera alignment procedure (also known as Trailer Angle Detection (TAD) calibration) following the on-screen instructions under Electrical>Service Functions>TAD Calibration.

The rear parking aid camera alignment success is indicated by the diagnostic scan tool.

If the rear parking aid camera alignment is unsuccessful, the diagnostic scan tool indicates one of the following faults:

Fault Condition	Fault Code	Action
Missing software	02	INSTALL a new IPMB. Refer to: Parking Aid - Vehicles With: Parking Aid Camera (413-13B).
PreCondition not correct (VRange)	03	INSPECT and VERIFY the battery voltage and condition. Battery voltage of at least 11 volts must be maintained during the PTBA camera alignment (TAD Calibration) procedure.
PreCondition not correct (NumCameras)	04	INSTALL IPMB as-built data from Professional Technician Society (PTS), following the diagnostic scan tool instructions under Module Programming>As-Built.
Missing Internal Link	05	• Turn the ignition OFF. • Wait 10 seconds. • Turn the ignition ON, engine off. • REPEAT the PTBA camera alignment procedure (TAD calibration) using a diagnostic scan tool.
Variant Coding Issue (Vehicle Type)	06	INSTALL IPMB as-built data from Professional Technician Society (PTS), following the diagnostic scan tool instructions under Module Programming>As-Built.
Target not found (Left)	08	VERIFY the following: • LH calibration mat placement at the rear of the vehicle. • Lighting on the LH calibration mat is uniform and of good quality (free of shadows and glare). • The LH calibration mat is free of obstructions and dirt. • The rear parking aid camera lens is clean and free of scratches. • The rear parking aid camera has been configured using a diagnostic scan tool. • Diagnose and repair any IPMB Diagnostic Trouble Codes (DTCs).

Target not found (Right)	09	VERIFY the following: ● RH calibration mat placement at the rear of the vehicle. ● Lighting on the RH calibration mat is uniform and of good quality (free of shadows and glare). ● The RH calibration mat is free of obstructions and dirt. ● The rear parking aid camera lens is clean and free of scratches. ● The rear parking aid camera has been configured using a diagnostic scan tool. ● Diagnose and repair any IPMB Diagnostic Trouble Codes (DTCs).
PreCondition not correct (Velocity)	10	● VERIFY that the vehicle is stationary during the alignment procedure. ● VERIFY the speedometer operates correctly. If the speedometer does not operate correctly, refer to: Instrumentation, Message Center and Warning Chimes (413-01). ● RETRIEVE and DIAGNOSE any PCM Diagnostic Trouble Codes (DTCs) that are present. Refer to the appropriate section in Group 303 for the procedure. ● RETRIEVE and DIAGNOSE any IPMB Diagnostic Trouble Codes (DTCs) that are present. For additional information, refer to: Parking Aid (413-13B).
PreCondition not correct (Doors)	11	● VERIFY that all doors and the tailgate/ luggage compartment lid are fully closed. ● RETRIEVE and DIAGNOSE any BCM Diagnostic Trouble Codes (DTCs) that are present. For additional information, refer to: Body Control Module (BCM) (419-10). ● RETRIEVE and DIAGNOSE any IPMB Diagnostic Trouble Codes (DTCs) that are present. For additional information, refer to: Parking Aid (413-13B).

Target Identification Error (Left)	0A	VERIFY the following: • LH calibration mat is oriented correctly. • LH calibration mat placement at the front of the vehicle. • Lighting on the LH calibration mat is uniform and of good quality (free of shadows and glare). • The LH calibration mat is free of obstructions and dirt. • The rear parking aid camera lens is clean and free of scratches. • The rear parking aid camera has been configured using a diagnostic scan tool. • Diagnose and repair any IPMB Diagnostic Trouble Codes (DTCs).
Target Identification Error (Right)	0B	VERIFY the following: • RH calibration mat is oriented correctly. • RH calibration mat placement at the front of the vehicle. • Lighting on the RH calibration mat is uniform and of good quality (free of shadows and glare). • The RH calibration mat is free of obstructions and dirt. • The rear parking aid camera lens is clean and free of scratches. • The rear parking aid camera has been configured using a diagnostic scan tool. • Diagnose and repair any IPMB Diagnostic Trouble Codes (DTCs).
Result Exceed Quality Limit	0C	VERIFY the following: • LH and RH calibration mat placement at the sides of the vehicle. • Lighting on the LH and RH calibration mat is uniform and of good quality (free of shadows and glare). • The LH and RH calibration mat are free of obstructions and dirt. • The rear parking aid camera lens is clean and free of scratches. • The rear parking aid camera is producing an

		image of good quality.
Not Calibrated	0D	REPEAT the PTBA camera alignment (TAD Calibration) using a diagnostic scan tool.
Aborted	0E	VERIFY the following: ● Battery condition and state of charge. ● All door and tailgate/luggage compartment lid are fully closed.
Missing Internal Link	0F	● Turn the ignition OFF. ● Wait 10 seconds. ● Turn the ignition ON, engine off. ● REPEAT the PTBA camera alignment procedure (TAD calibration) using a diagnostic scan tool.