



# Replace Bolts in the Steering Rack Housing

**Classification** Recall Bulletin      **Section/Group** 32 - Steering      **Country/Region** All

**Year** 2012-2016      **Model** Model S      **Version** All

**Bulletin Classification:** This Recall bulletin must be applied to all vehicles listed below. Recall Bulletins are mandatory service procedures that must be carried out by Tesla-certified Service Centers only. Work must be logged and tracked by Tesla Service. Any work carried out by uncertified technicians on this issue may not be appropriately performed or recorded and could lead to an unsafe condition and/or void warranty provisions.

This Service Document supersedes SB-18-32-002 R2, dated 12-Nov-18. Each content change is marked by a vertical line in the left margin. Discard the previous version and replace it with this one.

## Condition

Long-term exposure to high-corrosion environments might weaken the bolts that attach the power steering motor to the steering rack housing.

## Correction

Replace the bolts (x5) that attach the steering rack housing to the power steering motor and apply wax sealant.

**⚠ CAUTION:** If any of the bolts are damaged upon initial inspection, the steering rack must be replaced (refer to Service Manual procedure 32010102).

Correction Description	Correction	Time
Replace Bolts In Steering Rack Housing And Apply Wax Sealant (LHD RWD)	S011832002	0.95
Replace Bolts In Steering Rack Housing And Apply Wax Sealant (LHD Dual Motor)	S021832002	0.80
Replace Bolts In Steering Rack Housing And Apply Wax Sealant (RHD RWD)	S031832002	1.00
Replace Bolts In Steering Rack Housing And Apply Wax Sealant (RHD Dual Motor)	S041832002	0.75
Replace Steering Rack (RWD) (With Coil Suspension)	S051832002	2.25
Replace Steering Rack (RWD) (With Air Suspension)	S061832002	2.35
Replace Steering Rack (Dual Motor)	S071832002	4.10
Replace Steering Rack (RHD)	S081832002	2.50

Required Part(s):	Part Number	Description	Quantity
	1460671-00-A	STEEL BOLTS FOR BOSCH STEERING GEAR (set of 5)	1
	1465753-00-A	PFINDER AP 13/18 WAX CAN <b>NOTE:</b> 1 can of wax sealant services approximately 20 vehicles. Shake the can before use.	1
<b>If Necessary:</b>			
	1458873-00-B	LHD STEERING GEAR - STEEL BOLTS+WAX,RWK	1
	1453628-00-B	LHD STEERING GEAR - STEEL BOLTS+WAX	1
	1464760-00-A	RHD STEERING GEAR - STEEL BOLTS+WAX, RWK	1
	1453629-00-B	RHD STEERING GEAR - STEEL BOLTS+WAX	1
	1483205-00-A	Kit, Steering Gear Bolt Extraction	1

**Shop Supplies:**

Alcohol wipes (1054788-00-A)

Plastic trim tool, plastic block, inflatable bag, or similar

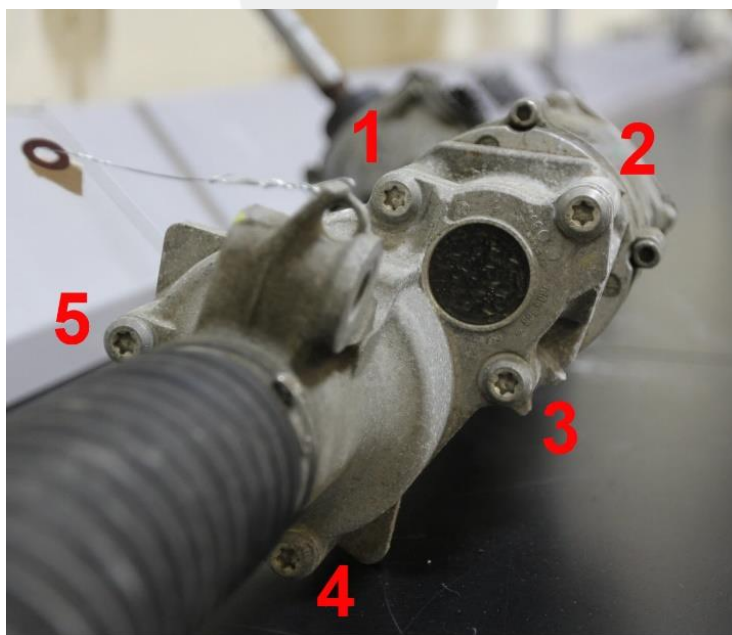
Nylon brush (1057223-00-A)

Brake cleaner aerosol: North America (1023297-00-A, 1023297-03-A), EMEA (1099802-00-A, 1023297-07-A), APAC (1023297-02-A, 1023297-04-A, 1023297-06-A)

Paint pen, orange (1054783-00-A)

These part numbers were current at the time of publication. Use the revisions listed or later, unless otherwise specified in the Parts Manual.

## How to Access the Steering Rack Housing Bolts



**Figure 1**

- **Rear Wheel Drive (RWD) Vehicles** – Access bolts 1, 2, 3, and 5 from above the vehicle. Access bolt 4 from the front RH wheel well on LHD vehicles, and LH wheel well on RHD vehicles.
- **Dual Motor Vehicles** – Access bolts 1, 2, and 3 from above the vehicle. Access bolts 4 and 5 from the front RH wheel well on LHD vehicles, and LH wheel well on RHD vehicles.

## Procedure – Left Hand Drive (LHD) Rear Wheel Drive (RWD) Vehicles

**⚠ WARNING:** Examine all bolts before beginning the procedure. If any bolts are damaged upon initial inspection, the steering rack must be replaced (refer to Service Manual procedure 32010102).

**⚠ WARNING:** During the steps in this procedure, remove one steering rack housing bolt at a time. Removing more than one bolt at a time could result in damage to the steering rack. This damage might lead to a loss of steering. If more than one bolt has been removed at the same time at any point, the steering rack must be replaced.

1. Remove the underhood storage unit (refer to Service Manual procedure 15240701).
2. Disconnect 12V power (refer to Service Manual procedure 17010100).
3. Loosen the RH front wheel lug nuts.
4. Raise the vehicle slightly so that the tires are off the ground.
5. Remove the LH and RH steering rack mounting bolts that attach the steering rack to the front subframe (Figure 2).

**⚠ CAUTION:** A washer might be located between the steering rack and the subframe. If there is a washer, retain and use this washer during reinstallation of the steering rack mounting bolts later in this procedure.

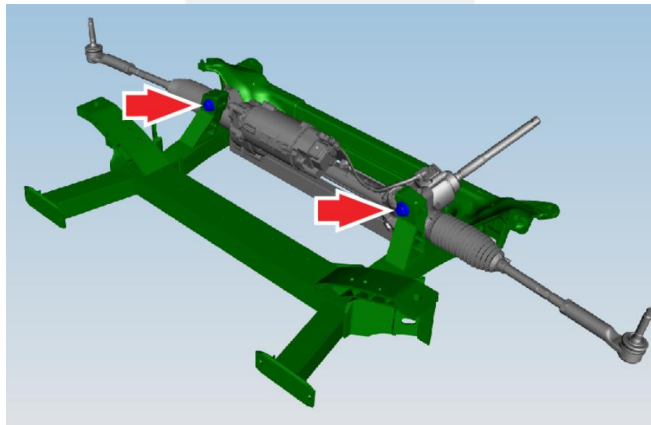


Figure 2

6. To access the steering rack without damaging components, use a plastic trim tool, block, or similar spacer as needed between the steering rack and the front subframe to raise and support the RH side of the steering rack (Figure 3).



Figure 3

7. Examine the steering rack housing for broken or damaged bolts in locations 1 through 5.

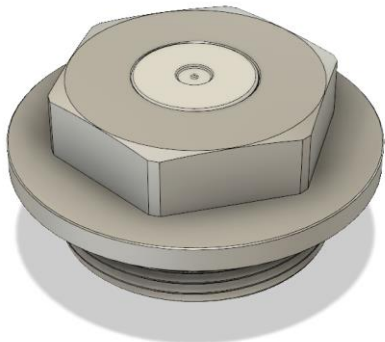
**⚠ CAUTION:** If any of the bolts appear to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

8. Visually inspect the valve body on the steering rack housing, if equipped (Figure 4).

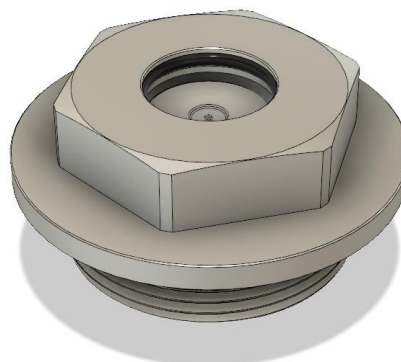


**Figure 4**

**⚠ CAUTION:** The center valve plunger should be flush to the valve body (Figure 5). If the center valve plunger is not flush with the valve body (Figure 6), it has been in contact with water and the steering gear must be replaced (refer to Service Manual procedure 32010102).



**✓ Figure 5**



**✗ Figure 6**

9. To access bolt 4 from the front RH wheel well, remove the RH front wheel (refer to Service Manual procedure 34015001).

**NOTE:** Do not remove the wheel arch liner.

10. Clean the area around steering rack housing bolt 4 with a shop towel, and then clean debris away with compressed air (Figure 7).

**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 7**

11. Inspect steering rack housing bolt 4 (Figure 7).

**⚠ CAUTION:** If the bolt appears to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

12. Remove steering rack housing bolt 4 (Figure 7).

**NOTE:** If the steering rack housing bolt becomes sheared off or damaged during removal, use the Steering Gear Bolt Extraction Kit (1483205-00-A) to remove the bolt (refer to tool profile TP-1483205-00-A).

13. Inspect the removed bolt before discarding it to determine whether the threads of the steering gear housing are damaged.

**⚠ CAUTION:** If extraction is unsuccessful, or if the steering rack housing threads appear to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

14. Install a new steering rack housing bolt in location 4 (Figure 7).

15. Torque the bolt to 5 Nm (+/- 0.5 Nm).

16. Inspect the bolt to make sure it is fully seated against the steering rack housing (Figure 8). If the bolt does not seat properly (Figure 9), remove the bolt and inspect the hole on the steering gear to make sure there is no debris or damage causing the bolt not to fully seat.





✓ **Figure 8**



✗ **Figure 9**

17. Torque the bolt to 90 degrees, and then mark the torqued bolt with an orange paint pen.

18. Reinstall the RH front wheel and hand-tighten the lug nuts.

**NOTE:** The RH front wheel lug nuts are torqued later in this procedure.

19. Lower the vehicle so that the tires are just above the ground.

20. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clean debris away with compressed air (Figure 10).

**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 10**

21. Inspect the remaining steering rack housing bolts from above the vehicle (Figure 10).

**⚠ CAUTION:** If any of the bolts appear to be damaged upon initial inspection, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

22. Remove one steering rack housing bolt at a time.

**NOTE:** If a steering rack housing bolt becomes sheared off or damaged during removal, use the Steering Gear Bolt Extraction Kit (1483205-00-A) to remove the bolt (refer to tool profile TP-1483205-00-A).

23. Inspect the removed bolt before discarding it to determine whether the threads of the steering gear housing are damaged.

**⚠ CAUTION:** If bolt extraction is unsuccessful, or if the steering rack housing threads appear to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

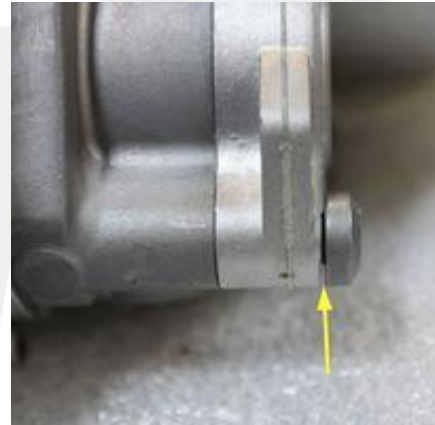
24. Install a new steering rack housing bolt in the affected location.

25. Tighten the bolt to 5 Nm (+/- 0.5 Nm).

26. Inspect the bolt to make sure it is fully seated against the steering rack housing (Figure 11). If the bolt does not seat properly (Figure 12), remove the bolt and inspect the hole on the steering gear to make sure there is no debris or damage causing the bolt not to fully seat.



✓ **Figure 11**



✗ **Figure 12**

27. Torque the bolt to 90 degrees, and then mark the torqued bolt with an orange paint pen.

28. When all steering rack housing bolts have been examined and replaced as necessary, remove the plastic trim tool or block that was supporting the steering rack.

29. Hand-tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe.

**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.

30. Install the LH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm).

**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.

31. Tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm).

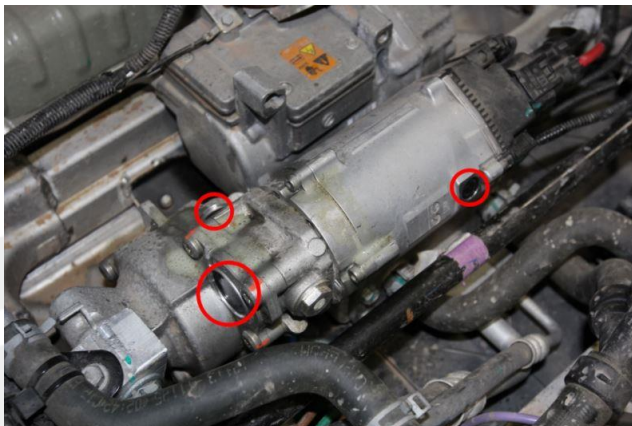
32. Tighten the RH front wheel lug nuts (torque 175 Nm).

33. Using a nylon brush and brake cleaner aerosol, clean the 5 steering rack housing bolts and the steering rack housing seams.

**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.

34. Using isopropyl alcohol (IPA) wipes, clean the sealing plugs (x3) on the steering gear (Figure 13). Allow the area to dry for at least 1 minute.

**⚠ CAUTION:** Do not use brake cleaner on the sealing plugs on the steering gear.



**Figure 13**

35. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 14).



**Figure 14**

36. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 15).

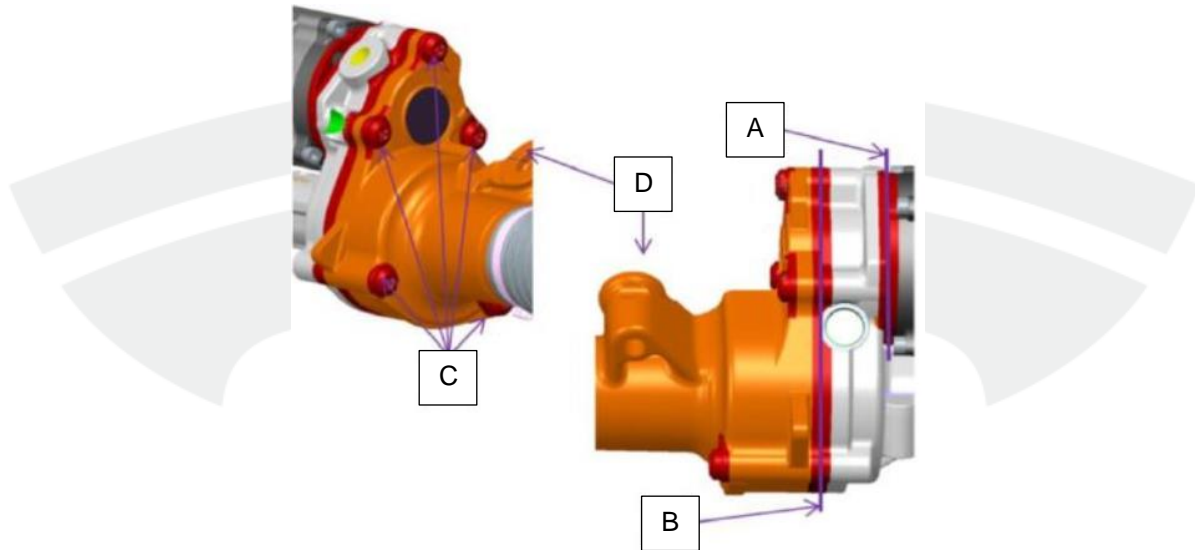


**Figure 15**



37. Apply the wax sealant to the steering rack housing bolts and steering rack housing seams. Make sure to apply wax sealant to the underside of the steering rack, as well as the motor housing. Completely cover the following areas with the wax sealant (Figure 16):

- A. The entire flange at the interface of the steering rack housing and the motor
- B. The entire flange at the interface of the steering rack housing and the gear cover
- C. All 5 bolt heads
- D. The open screw thread bore



**Figure 16**

- 38. Allow the first coat to partially dry for 3 minutes.
- 39. Apply a second coat of the wax sealant to the same areas described in step 37.
- 40. Close the lid on the wax sealant container when finished so that contents do not solidify.
- 41. Remove the shop towels and wipe up any excess wax sealant.
- 42. Remove the tape covering the sealing plugs on the steering rack.
- 43. Reconnect 12V power (refer to Service Manual procedure 17010100).
- 44. Install the underhood storage unit (refer to Service Manual procedure 15240701).

## Procedure – Left Hand Drive (LHD) Dual Motor Vehicles

The steps to examine and replace steering rack housing bolts for dual motor vehicles are similar to the steps in the section above except for the following:

- Access steering rack housing bolt 5 from the RH wheel well (Figure 17).



Figure 17

## Procedure – Right Hand Drive (RHD) Rear Wheel Drive (RWD) Vehicles

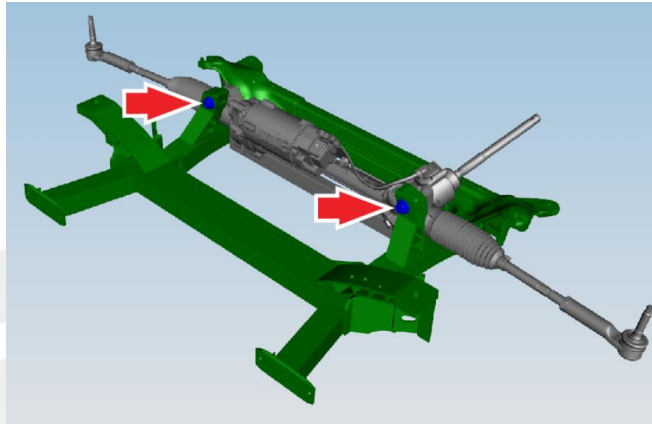
**⚠ WARNING:** Examine all bolts before beginning the procedure. If any bolts are damaged upon initial inspection, the steering rack must be replaced (refer to Service Manual procedure 32010102).

**⚠ WARNING:** During the steps in this procedure, remove one steering rack housing bolt at a time. Removing more than one bolt at a time could result in damage to the steering rack. This damage might lead to a loss of steering. If more than one bolt has been removed at the same time at any point, the steering rack must be replaced.

1. Remove the underhood storage unit (refer to Service Manual procedure 15240701).
2. Disconnect 12V power (refer to Service Manual procedure 17010100).
3. Loosen the LH front wheel lug nuts.
4. Raise the vehicle slightly so that the tires are off the ground.

5. Remove the LH and RH steering rack mounting bolts that attach the steering rack to the front subframe (Figure 18).

**⚠ CAUTION:** A washer might be located between the steering rack and the subframe. If there is a washer, retain and use this washer during reinstallation of the steering rack mounting bolts later in this procedure.



**Figure 18**

6. To access the steering rack without damaging components, use a plastic trim tool, block, or similar spacer as needed between the steering rack and the front subframe to raise and support the LH side of the steering rack (Figure 19).



**Figure 19**

7. Examine the steering rack housing for broken or damaged bolts in locations 1 through 5.

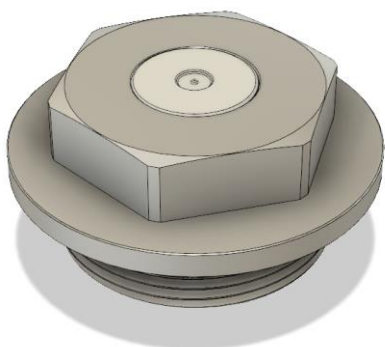
**⚠ CAUTION:** If any of the bolts appear to be damaged upon initial inspection, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

8. Visually inspect the valve body on the steering rack housing, if equipped (Figure 20).

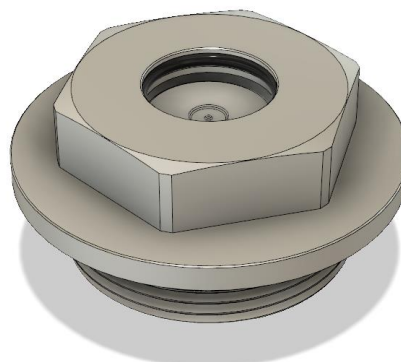


**Figure 20**

**⚠ CAUTION:** The center valve plunger should be flush to the valve body (Figure 21). If the center valve plunger is not flush with the valve body (Figure 22), it has been in contact with water and the steering gear must be replaced (refer to Service Manual procedure 32010102).



**✓ Figure 21**



**✗ Figure 22**

9. To access bolt 4 from the front LH wheel well, remove the LH front wheel (refer to Service Manual procedure 34015001).

**NOTE:** Do not remove the wheel arch liner.

10. Clean the area around steering rack housing bolt 4 with a shop towel, and then clean debris away with compressed air (Figure 23).

**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 23**

11. Inspect steering rack housing bolt 4 (Figure 23).

**! CAUTION:** If the bolt appears to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

12. Remove steering rack housing bolt 4 (Figure 23).

**NOTE:** If the steering rack housing bolt becomes sheared off or damaged during removal, use the Steering Gear Bolt Extraction Kit (1483205-00-A) to remove the bolt (refer to tool profile TP-1483205-00-A).

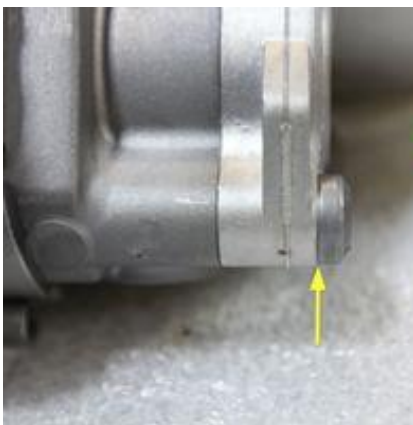
13. Inspect the removed bolt before discarding it to determine whether the threads of the steering gear housing are damaged.

**! CAUTION:** If bolt extraction is unsuccessful or if the steering rack housing threads appear to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

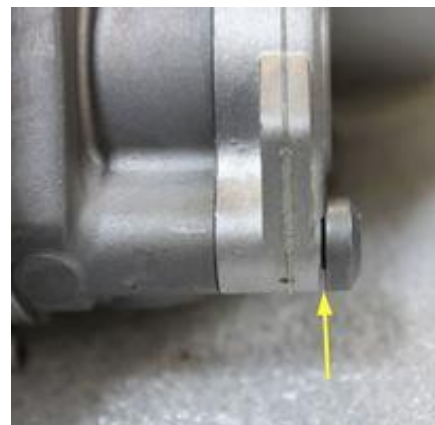
14. Install a new steering rack housing bolt in location 4 (Figure 23).

15. Tighten the bolt to 5 Nm (+/- 0.5 Nm).

16. Inspect the bolt to make sure it is fully seated against the steering rack housing (Figure 24). If the bolt does not seat properly (Figure 25), remove the bolt and inspect the hole on the steering gear to make sure there is no debris or damage causing the bolt not to fully seat.



**✓ Figure 24**



**✗ Figure 25**



17. Torque the bolt to 90 degrees, and then mark the torqued bolt with an orange paint pen.

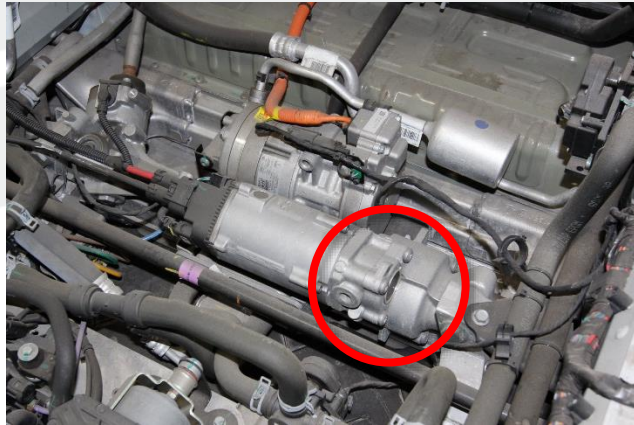
18. Reinstall the LH front wheel and hand-tighten the lug nuts.

**NOTE:** The LH front wheel lug nuts are torqued later in this procedure.

19. Lower the vehicle so that the tires are just above the ground.

20. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clean debris away with compressed air (Figure 26).

**! CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 26**

21. Inspect the remaining steering rack housing bolts from above the vehicle (Figure 26).

**! CAUTION:** If any of the bolts appear to be damaged upon initial inspection, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

22. Remove and discard one steering rack housing bolt at a time.

**NOTE:** If a steering rack housing bolt becomes sheared off or damaged during removal, use the Steering Gear Bolt Extraction Kit (1483205-00-A) to remove the bolt (refer to tool profile TP-1483205-00-A).

23. Inspect the removed bolt before discarding it to determine whether the threads of the steering gear housing are damaged.

**! CAUTION:** If bolt extraction is unsuccessful, or if the steering rack housing threads appear to be damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

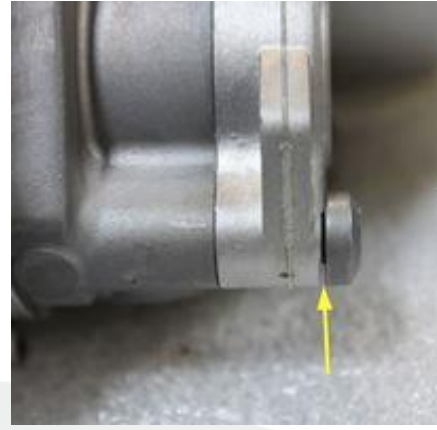
24. Install a new steering rack housing bolt in the affected location.

25. Tighten the bolt to 5 Nm (+/- 0.5 Nm).

26. Inspect the bolt to make sure it is fully seated against the steering rack housing (Figure 27). If the bolt does not seat properly (Figure 28), remove the bolt and inspect the hole on the steering gear to make sure there is no debris or damage causing the bolt not to fully seat.



✓ **Figure 27**



✗ **Figure 28**

27. Torque the bolt to 90 degrees, and then mark the torqued bolt with an orange paint pen.
28. When all steering rack housing bolts have been examined and replaced as necessary, remove the plastic trim tool or block that was supporting the steering rack.
29. Hand-tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe.  
**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.
30. Install the LH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm).  
**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.
31. Tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm).
32. Tighten the RH front wheel lug nuts (torque 175 Nm).
33. Using a nylon brush and brake cleaner aerosol, clean the 5 steering rack housing bolts and the steering rack housing seams.

**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.

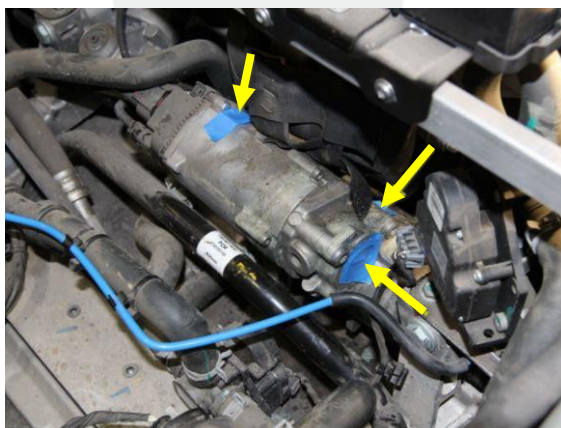
34. Using isopropyl alcohol (IPA) wipes, clean the sealing plugs (x3) on the steering gear (Figure 29). Allow the area to dry for at least 1 minute.

**⚠ CAUTION:** Do not use brake cleaner on the sealing plugs on the steering gear.



**Figure 29**

35. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 30).



**Figure 30**

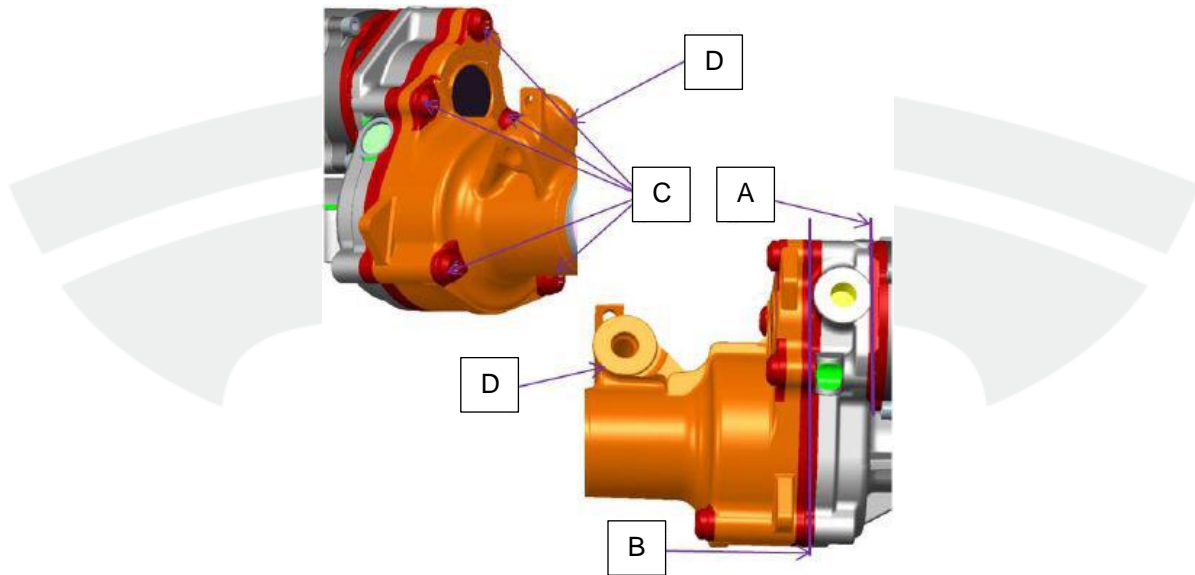
36. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 31).



**Figure 31**

37. Apply the wax sealant to the steering rack housing bolts and the steering rack housing seams. Make sure to apply wax sealant to the underside of the steering rack, as well as the motor housing. Completely cover the following areas with the wax sealant (Figure 32):

- A. The entire flange at the interface of the steering rack housing and the motor
- B. The entire flange at the interface of the steering rack housing and the gear cover
- C. All 5 bolt heads
- D. The open screw thread bore



**Figure 32**

- 37. Allow the first coat to partially dry for 3 minutes.
- 38. Apply a second coat of wax sealant to the same areas described in step 37.
- 39. Close the lid on the wax sealant container when finished so that contents do not solidify.
- 40. Remove the shop towels and wipe up any excess wax sealant.
- 41. Remove the tape covering the sealing plugs on the steering rack.
- 42. Reconnect 12V power (refer to Service Manual procedure 17010100).
- 43. Install the underhood storage unit (refer to Service Manual procedure 15240701).

## Procedure – Right Hand Drive (RHD) Dual Motor Vehicles

The steps to examine and replace steering rack housing bolts for dual motor vehicles are similar to the steps in the section above except for the following:

- Access steering rack housing bolt 5 from the LH wheel well (Figure 33).



Figure 33

---

**Affected VIN(s)** Affected Model S vehicles that had the steering rack installed in the factory before approximately April 9, 2016.

**NOTE:** This is a simplified summary of the affected VIN list. Refer to the VIN/Bulletin Tracker or Customer/Vehicle profile to determine applicability of this bulletin for a particular vehicle.

For feedback on the accuracy of this document, email [ServiceBulletinFeedback@tesla.com](mailto:ServiceBulletinFeedback@tesla.com).