



# Replace Bolts In 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, dated 2-Apr-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 5 bolts in the steering rack housing and apply wax sealant. If any of the bolts are damaged, or get damaged during the repair, replace the steering rack.

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 NOTE: 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

**Shop supplies:**

Alcohol wipes (1054788-00-A)

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

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

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 1).

**⚠ 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.

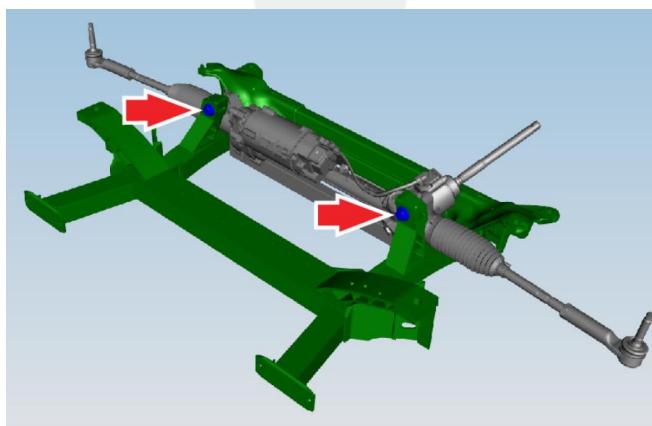


Figure 1

6. Use a plastic trim tool or block between the steering rack and the front subframe to raise and support the RH side of the steering rack (Figure 2).



**Figure 2 (Red plastic trim tool highlighted)**

7. Partially raise the vehicle so that it is at a comfortable working height.
8. Remove the RH front wheel (refer to Service Manual procedure 34015001).
9. Clean the area around the front lower steering rack housing bolt with a shop towel, and then clean debris away with compressed air (Figure 3).

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



**Figure 3**

10. Inspect the front lower steering rack housing bolt (Figure 3):

- If the front lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).
- If the front lower steering rack housing bolt is not sheared off or damaged, continue to the next step.

**⚠ WARNING:** During the next steps, remove 1 bolt of the steering rack housing at a time. Removing several bolts at once could result in damage to the steering rack. This damage might lead to a loss of steering.

11. Remove and discard the front lower steering rack housing bolt (Figure 3).

**⚠ WARNING:** If the front lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

12. Install a new front lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 3), and then mark the bolt with a paint pen.

13. Put the RH front wheel onto the RH front wheel hub, and then hand-tighten the lug nuts.

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

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

15. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clear any debris away with compressed air (Figure 4).

**⚠ 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 4

16. Inspect the front middle steering rack housing bolt (Figure 5):

- If the front middle steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).
- If the front middle steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 5**

17. Remove and discard the front middle steering rack housing bolt (Figure 5).

**⚠ WARNING:** If the front middle steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

18. Install a new front middle steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 5), and then mark the bolt with a paint pen.

19. Remove the plastic trim tool or block that was supporting the steering rack (Figure 6).



**Figure 6 (Red plastic trim tool highlighted)**

20. 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.

21. 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.

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

23. Inspect the rear lower steering rack housing bolt (Figure 7):

- If the rear lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).
- If the rear lower steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 7**

24. Remove and discard the rear lower steering rack housing bolt (Figure 7).

**⚠ WARNING:** If the rear lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

25. Install a new rear lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 7), and then mark the bolt with a paint pen.

26. Inspect the rear upper steering rack housing bolt (Figure 8):

- If the rear upper steering rack housing bolt is sheared off or damaged, replace the steering rack (refer to Service Manual procedure 32010102).
- If the rear upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 8**

27. Remove and discard the rear upper steering rack housing bolt (Figure 8).

**⚠ WARNING:** If the rear upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

28. Install a new rear upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 8), and then mark the bolt with a paint pen.

29. Inspect the front upper steering rack housing bolt (Figure 9):

- If the front upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).
- If the front upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 9**

30. Remove and discard the front upper steering rack housing bolt (Figure 9).

**⚠ WARNING:** If the front upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32010102).

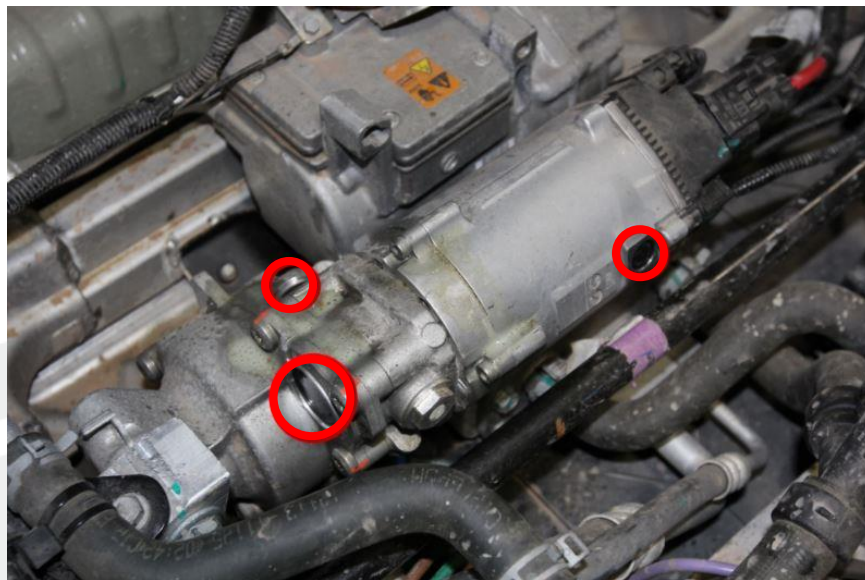
31. Install a new front upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 9), and then mark the bolt with a paint pen.

32. Lower the vehicle until the tires are touching the ground.

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

34. Clean the steering rack housing bolts and seams with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute.

35. Clean the sealing plugs (x3) on the steering gear with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute (Figure 10).



**Figure 10**

36. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 11).



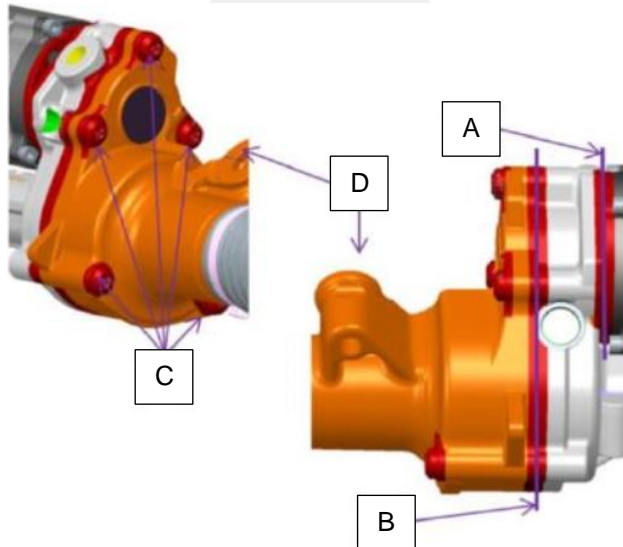
**Figure 11**

37. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 12).



**Figure 12**

38. 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 13):
- 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 13**

39. Allow the first coat to partially dry for 3 minutes.
40. Apply a second coat of the wax sealant to the same areas described in step 38.
41. Close the lid on the wax sealant container.

**NOTE:** The wax sealant solidifies if the wax sealant container is left opened for an extended period of time.

42. Remove the shop towels that were used to protect the components near the steering rack.
43. Wipe up any excess wax sealant.
44. Remove the tape covering the sealing plugs on the steering rack.
45. Reconnect 12V power (refer to Service Manual procedure 17010100).
46. Install the underhood storage unit (refer to Service Manual procedure 15240701).

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

1. Remove the underhood storage unit (refer to Service Manual procedure 15242001).
2. Disconnect 12V power (refer to Service Manual procedure 17010200).
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 14).

**⚠ 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.

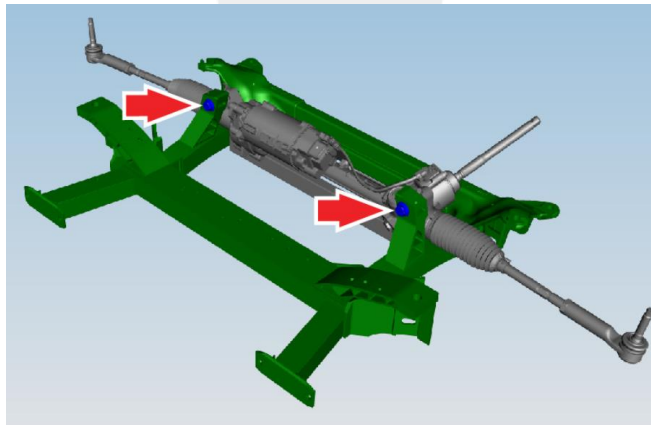


Figure 14

6. Use a plastic trim tool or block between the steering rack and the front subframe to raise and support the RH side of the steering rack (Figure 15).



**Figure 15 (Red plastic trim tool highlighted)**

7. Partially raise the vehicle so that it is at a comfortable working height.
  8. Remove the RH front wheel (refer to Service Manual procedure 34015001).
  9. Clean the area around both lower steering rack housing bolts with a shop towel, and then clean debris away with compressed air (Figure 16).
- ! CAUTION:** Do not use a steel or brass brush to clean the area around the lower steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 16**

10. Inspect the front lower steering rack housing bolt (Figure 16):

- If the front lower steering rack housing bolt is sheared off or damaged, discontinue with procedure and replace the steering rack (refer to Service Manual procedure 32012202).
- If the front lower steering rack housing bolt is not sheared off or damaged, continue to the next step.

**⚠ WARNING:** During the next steps, remove 1 bolt of the steering rack housing at a time. Removing several bolts at once could result in damage to the steering rack. This damage might lead to loss of steering.

11. Remove and discard the front lower steering rack housing bolt (Figure 16).

**⚠ WARNING:** If the front lower steering rack housing bolt is damaged or sheared off during removal, discontinue with procedure and replace the steering rack (refer to Service Manual procedure 32012202).

12. Install a new front lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 16), and then mark the bolt with a paint pen.

13. Inspect the rear lower steering rack housing bolt (Figure 17):

- If the rear lower steering rack housing bolt is sheared off or damaged, discontinue with procedure and replace the steering rack (refer to Service Manual procedure 32012202).
- If the rear lower steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 17**

14. Remove and discard the rear lower steering rack housing bolt (Figure 17).

**⚠ WARNING:** If the rear lower steering rack housing bolt is damaged or sheared off during removal, discontinue with procedure and replace the steering rack (refer to Service Manual procedure 32012202).

15. Install a new rear lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 17), and then mark the bolt with a paint pen.

16. Put the RH front wheel onto the RH front wheel hub, and then hand-tighten the lug nuts.

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

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

18. Remove the plastic trim tool or block that was supporting the steering rack (Figure 18).



**Figure 18 (Red plastic trim tool highlighted)**

19. 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.

20. 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.

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

22. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clear any debris away with compressed air (Figure 19).

**! 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 19**

23. Inspect the rear upper steering rack housing bolt (Figure 20):

- If the rear upper steering rack housing bolt is sheared off or damaged, discontinue with procedure and replace the steering rack (refer to Service Manual procedure 32012202).
- If the rear upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



Figure 20

24. Remove and discard the rear upper steering rack housing bolt (Figure 20).

**⚠ WARNING:** If the rear upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012202).

25. Install a new rear upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 20), and then mark the bolt with a paint pen.

26. Inspect the front middle steering rack housing bolt (Figure 21):

- If the front middle steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012202).
- If the front middle steering rack housing bolt is not sheared off or damaged, continue to the next step.



Figure 21

27. Remove and discard the front middle steering rack housing bolt (Figure 21).

**⚠ WARNING:** If the front middle steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012202).

28. Install a new front middle steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 21), and then mark the bolt with a paint pen.

29. Inspect the front upper steering rack housing bolt (Figure 22):

- If the front upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012202).
- If the front upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 22**

30. Remove and discard the front upper steering rack housing bolt (Figure 22).

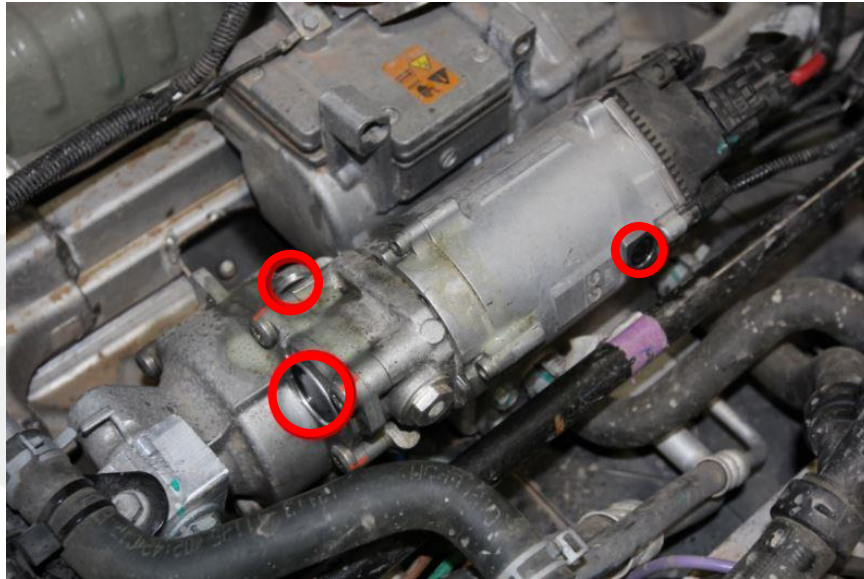
**⚠ WARNING:** If the front upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012202).

31. Install a new front upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 22), and then mark the bolt with a paint pen.

32. Lower the vehicle until the tires are touching the ground.

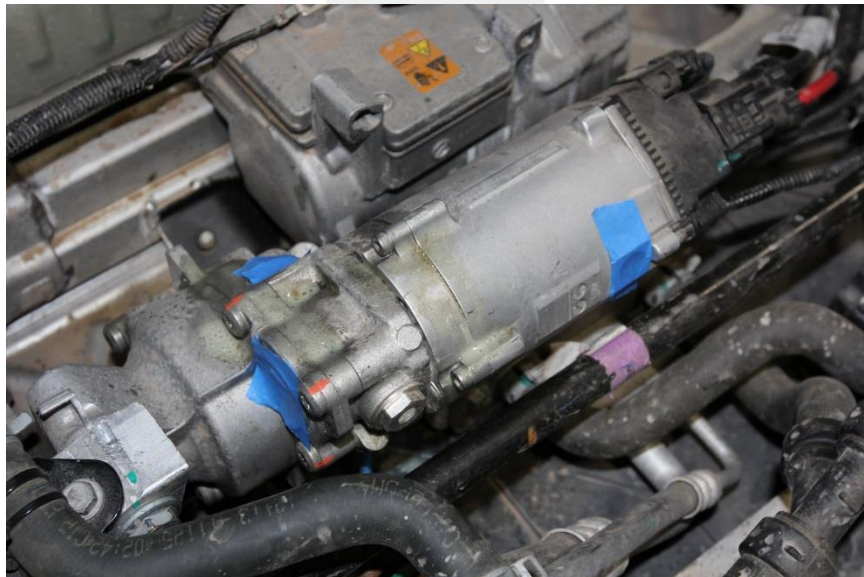
33. Tighten the RH front wheel lug nuts (torque 175 Nm).

34. Clean the 5 steering rack housing bolts and the steering rack housing seams with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute.
35. Clean the sealing plugs (x3) on the steering gear with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute (Figure 23).



**Figure 23**

36. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 24).



**Figure 24**

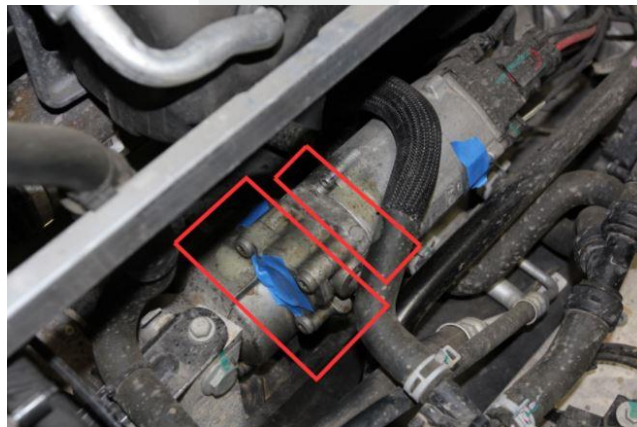
37. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 25).



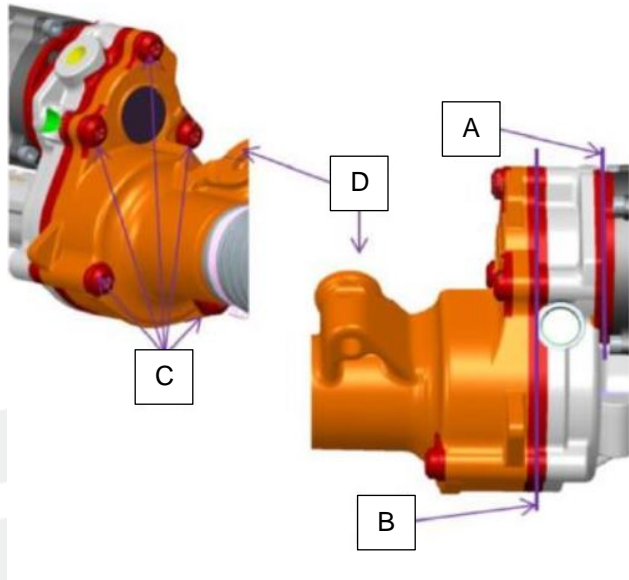
**Figure 25**

38. Apply the wax sealant to the steering rack housing bolts and steering rack housing seams (Figure 26). 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 27):

- 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 26**



**Figure 27**

39. Allow the first coat to partially dry for 3 minutes.
40. Apply a second coat of wax sealant to the same areas described in step 38.
47. Close the lid on the wax sealant container.

**NOTE:** The wax sealant solidifies if the wax sealant container is left opened for an extended period of time.

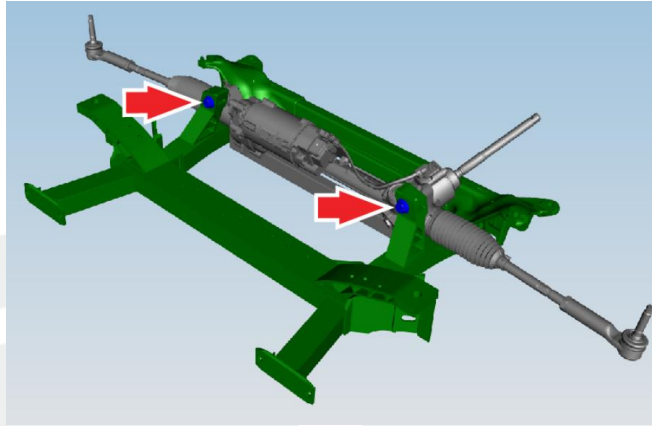
41. Remove the shop towels protecting the components near the steering rack.
42. Wipe up any excess wax sealant.
43. Remove the tape covering the sealing plugs on the steering rack.
44. Reconnect 12V power (refer to Service Manual procedure 17010200).
45. Install the underhood storage unit (refer to Service Manual procedure 15242001).

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

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 28).

**⚠ 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 28**

6. Use a plastic trim tool or block between the steering rack and the front subframe to raise and support the LH side of the steering rack (Figure 29).



**Figure 29 (White plastic trim tool highlighted)**

7. Partially raise the vehicle so that it is at a comfortable working height.
8. Remove the LH front wheel (refer to Service Manual procedure 34015001).

9. Clean the area around the front lower steering rack housing bolt with a shop towel, and then clean debris away with compressed air (Figure 30).

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



**Figure 30**

10. Inspect the front lower steering rack housing bolt (Figure 30):

- If the front lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front lower steering rack housing bolt is not sheared off or damaged, continue to the next step.

**! WARNING:** During the next steps, remove 1 bolt of the steering rack housing at a time. Removing several bolts at once could result in damage to the steering rack. This damage might lead to loss of steering.

11. Remove and discard the front lower steering rack housing bolt (Figure 30).

**! WARNING:** If the front lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

12. Install a new front lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 30), and then mark the bolt with a paint pen.

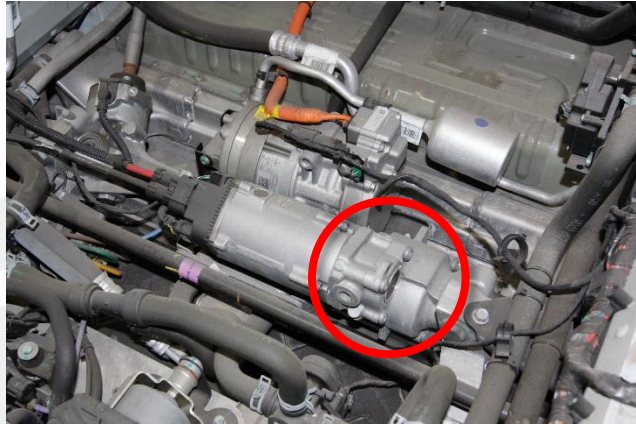
13. Put the LH front wheel onto the LH front wheel hub, and then hand-tighten the LH front wheel lug nuts.

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

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

15. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clear any debris away with compressed air (Figure 31).

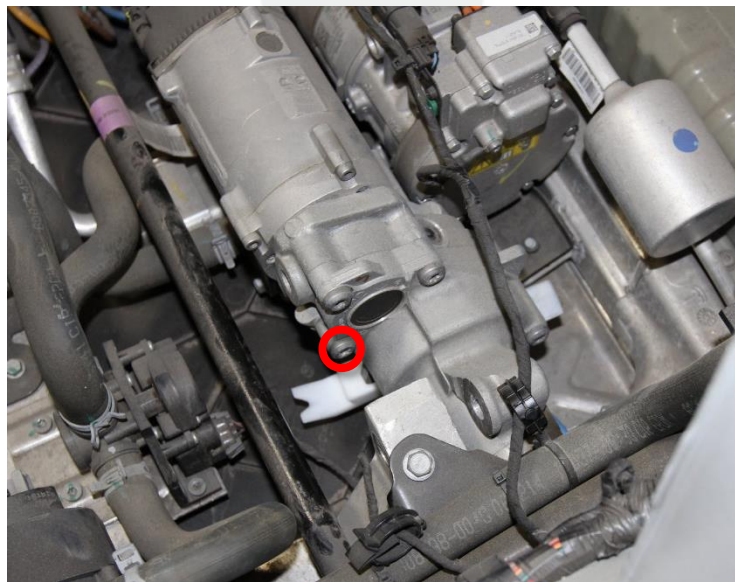
**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 31**

16. Inspect the front middle steering rack housing bolt (Figure 32):

- If the front middle steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front middle steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 32**

17. Remove and discard the front middle steering rack housing bolt (Figure 32).

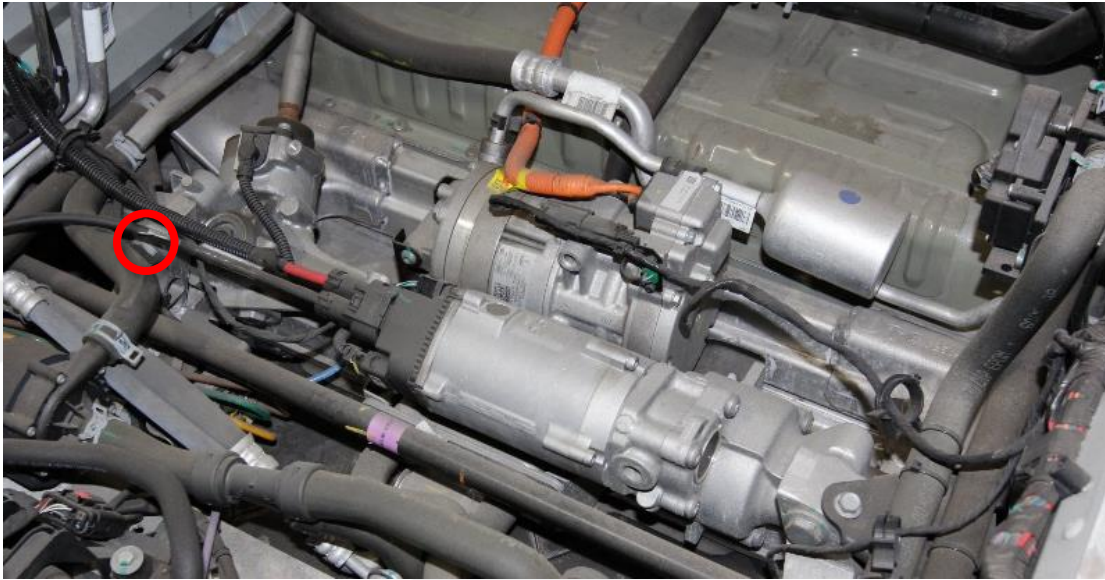
**⚠ WARNING:** If the front middle steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

18. Install a new front middle steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 32), and then mark the bolt with a paint pen.

19. Remove the plastic trim tool or block that was supporting the steering rack.

20. Hand-tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe.(Figure 33)

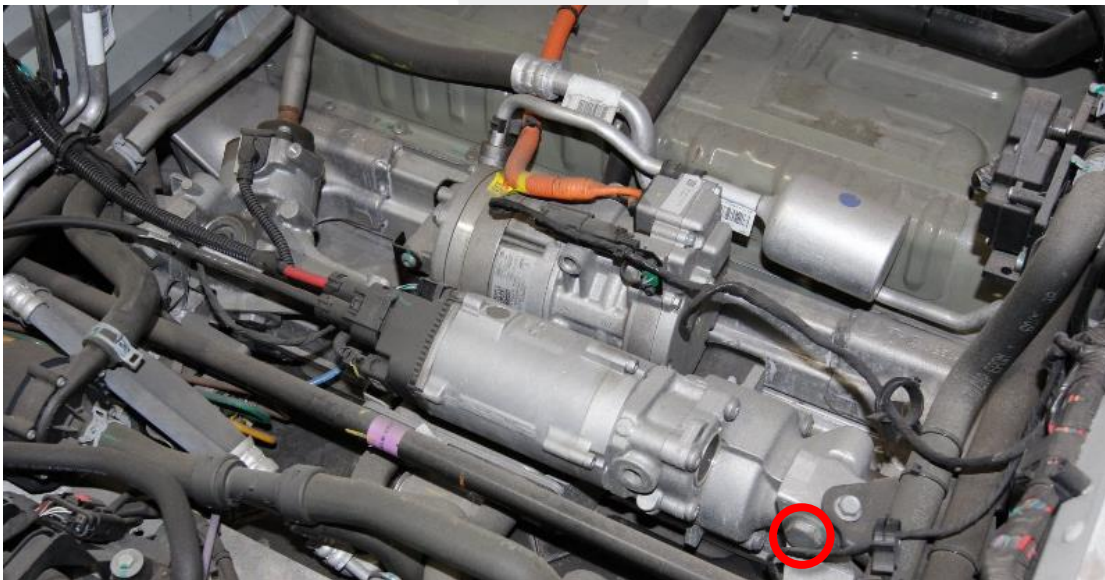
**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.



**Figure 33**

21. Install the LH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm) (Figure 34).

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



**Figure 34**

22. Tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm) (Figure 33).

23. Inspect the rear lower steering rack housing bolt (Figure 35):

- If the rear lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the rear lower steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 35**

24. Remove and discard the rear lower steering rack housing bolt (Figure 35).

**⚠ WARNING:** If the rear lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

25. Install a new rear lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 35), and then mark the bolt with a paint pen.

26. Inspect the rear upper steering rack housing bolt (Figure 36):

- If the rear upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the rear upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 36**

27. Remove and discard the rear upper steering rack housing bolt (Figure 36).

**⚠ WARNING:** If the rear upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

28. Install a new rear upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 36), and then mark the bolt with a paint pen.

29. Inspect the front upper steering rack housing bolt (Figure 37):

- If the front upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 37**

30. Remove and discard the front upper steering rack housing bolt (Figure 37).

**⚠ WARNING:** If the front upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

31. Install a new front upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 37), and then mark the bolt with a paint pen.

32. Lower the vehicle until the tires are touching the ground.

33. Tighten the LH front wheel lug nuts (torque 175 Nm).

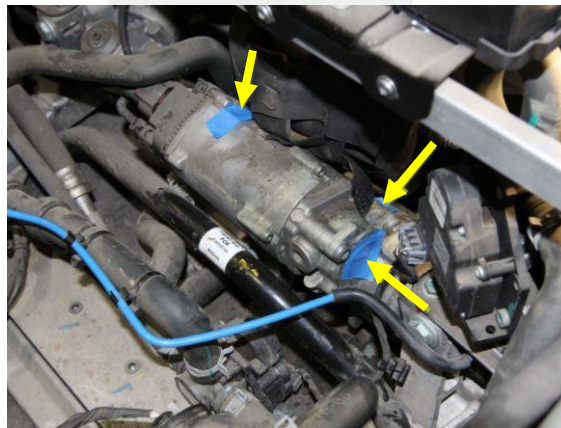
34. Clean the 5 steering rack housing bolts and the steering rack housing seams with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute.

35. Clean the sealing plugs (x3) on the steering gear with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute (Figure 38).



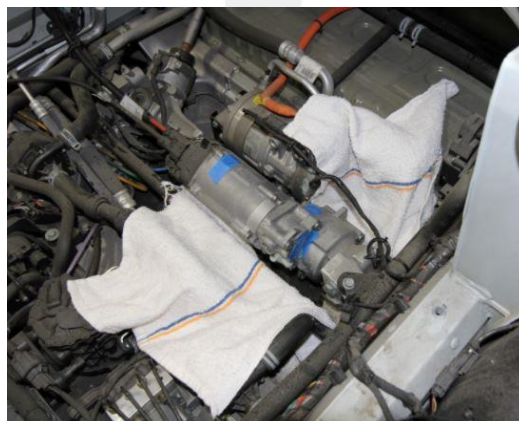
**Figure 38**

36. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 39).



**Figure 39**

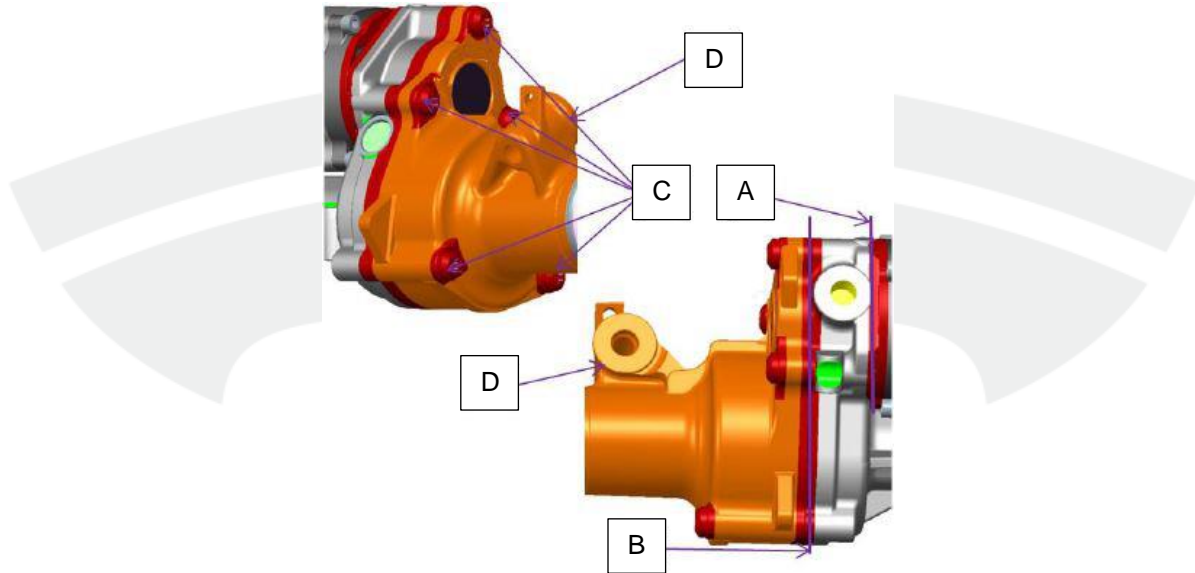
37. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 40).



**Figure 40**

38. 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 41):

- 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 41**

39. Allow the first coat to partially dry for 3 minutes.

40. Apply a second coat of wax sealant to the same areas described in step 38.

48. Close the lid on the wax sealant container.

**NOTE:** The wax sealant solidifies if the wax sealant container is left opened for an extended period of time.

41. Remove the shop towels protecting the components near the steering rack.

42. Wipe up any excess wax sealant.

43. Remove the tape covering the sealing plugs on the steering rack.

44. Reconnect 12V power (refer to Service Manual procedure 17010100).

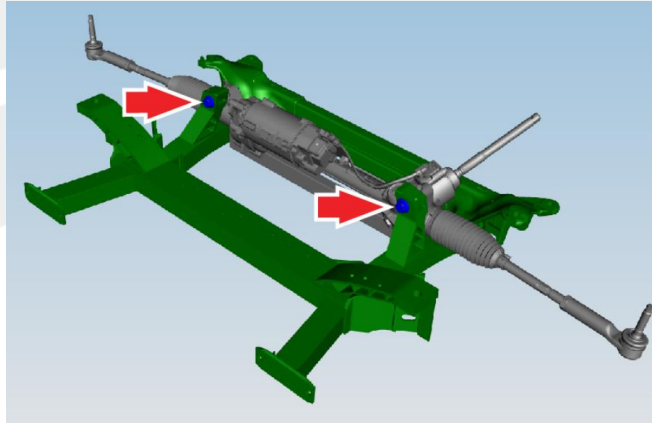
45. Install the underhood storage unit (refer to Service Manual procedure 15240701).

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

1. Remove the underhood storage unit (refer to Service Manual procedure 15242001).

2. Disconnect 12V power (refer to Service Manual procedure 17010200).
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 42).

**⚠ 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 42**

6. Use a plastic trim tool or block between the steering rack and the front subframe to raise and support the LH side of the steering rack (Figure 43).



**Figure 43 (White plastic trim tool highlighted)**

7. Partially raise the vehicle so that it is at a comfortable working height.
8. Remove the LH front wheel (refer to Service Manual procedure 34015001).

9. Clean the area around both lower steering rack housing bolts with a shop towel, and then clean debris away with compressed air (Figure 44).

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



**Figure 44**

10. Inspect the front lower steering rack housing bolt (Figure 44):

- If the front lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front lower steering rack housing bolt is not sheared off or damaged, continue to the next step.

**! WARNING:** During the next steps, remove 1 bolt of the steering rack housing at a time. Removing several bolts at once could result in damage to the steering rack. This damage might lead to loss of steering

11. Remove and discard the front lower steering rack housing bolt (Figure 44).

**! WARNING:** If the front lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

12. Install a new front lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 44), and then mark the bolt with a paint pen.

13. Inspect the rear lower steering rack housing bolt (Figure 45):

- If the rear lower steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the rear lower steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 45**

14. Remove and discard the rear lower steering rack housing bolt (Figure 45).

**⚠ WARNING:** If the rear lower steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

15. Install a new rear lower steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 45), and then mark the bolt with a paint pen.

16. Put the LH front wheel onto the LH front wheel hub, and then hand-tighten the LH front wheel lug nuts.

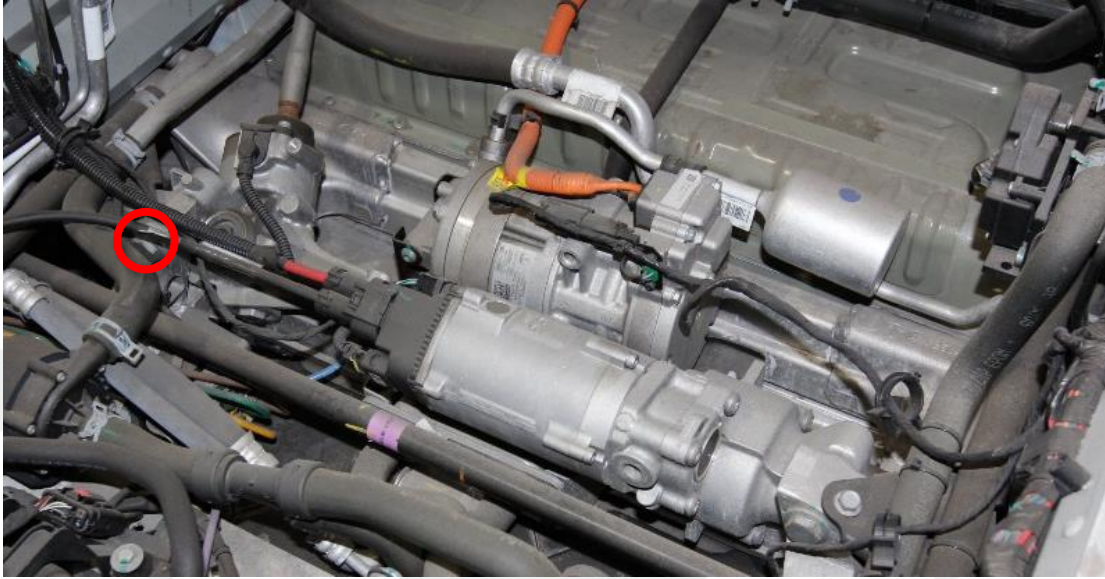
**NOTE:** The LH front wheel lug nuts are torqued later in this procedure.

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

18. Remove the plastic trim tool or block that was supporting the steering rack.

19. Hand-tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe.(Figure 46)

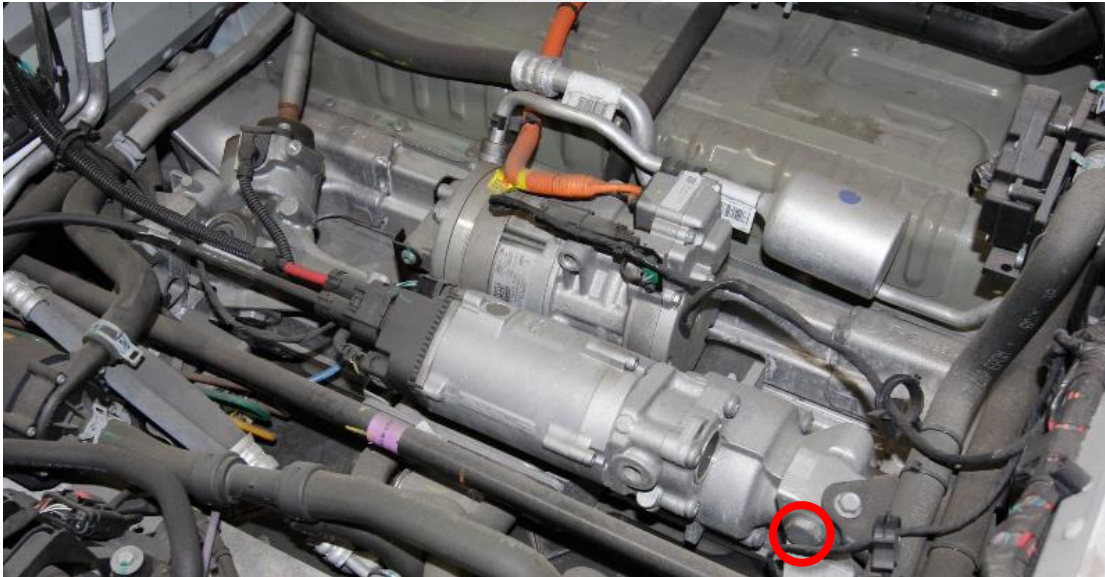
**NOTE:** Install the washer between the steering rack and the front subframe, if a washer was installed previously.



**Figure 46**

20. Install the LH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm) (Figure 47).

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

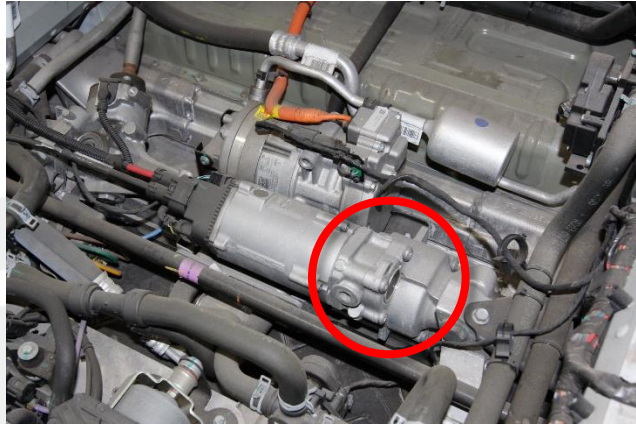


**Figure 47**

21. Tighten the RH steering rack mounting bolt that attaches the steering rack to the front subframe (torque 175 Nm) (Figure 46).

22. Clean the area around the remaining steering rack housing bolts with a shop towel, and then clear any debris away with compressed air (Figure 48).

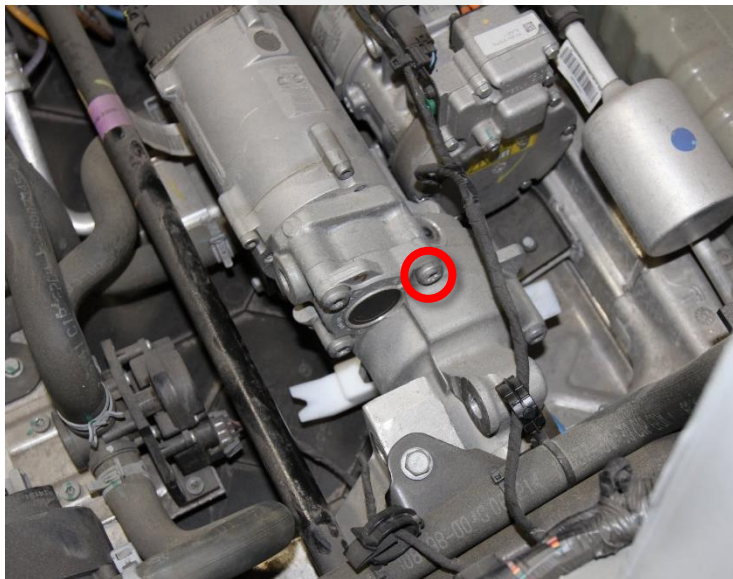
**⚠ CAUTION:** Do not use a steel or brass brush to clean the area around the steering rack housing bolts. Rust damage to the steering rack might result.



**Figure 48**

23. Inspect the rear upper steering rack housing bolt (Figure 49):

- If the rear upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the rear upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 49**

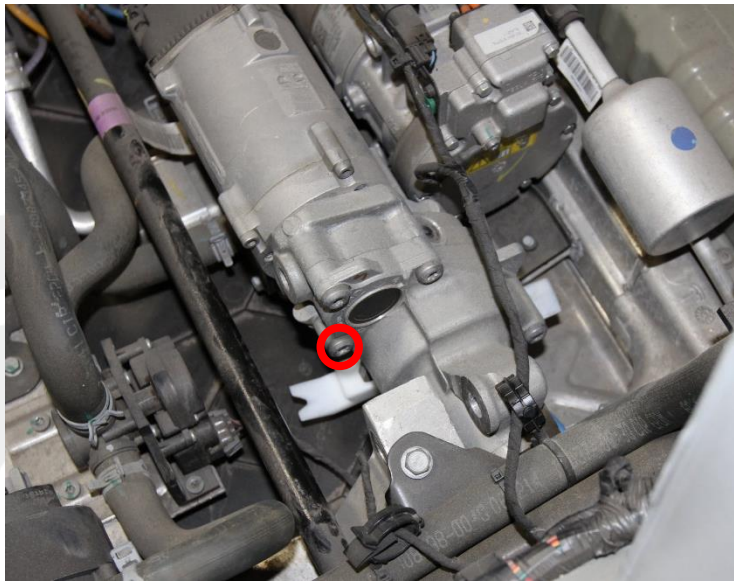
24. Remove and discard the rear upper steering rack housing bolt (Figure 49).

**⚠ WARNING:** If the rear upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

25. Install a new rear upper steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 49), and then mark the bolt with a paint pen.

26. Inspect the front middle steering rack housing bolt (Figure 50):

- If the front middle steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front middle steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 50**

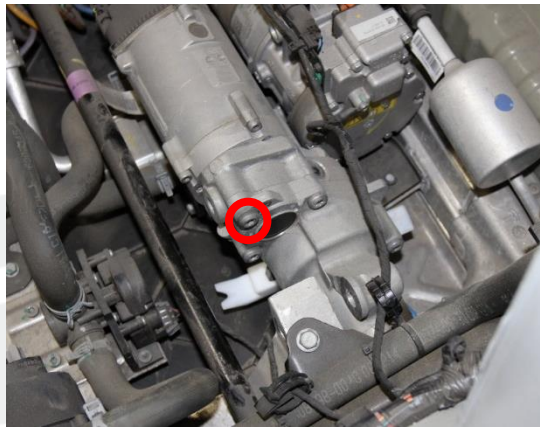
27. Remove and discard the front middle steering rack housing bolt (Figure 50).

**⚠ WARNING:** If the front middle steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

28. Install a new front middle steering rack housing bolt, tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 50), and then mark the bolt with a paint pen.

29. Inspect the front upper steering rack housing bolt (Figure 51):

- If the front upper steering rack housing bolt is sheared off or damaged, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).
- If the front upper steering rack housing bolt is not sheared off or damaged, continue to the next step.



**Figure 51**

30. Remove and discard the front upper steering rack housing bolt (Figure 51).

**⚠ WARNING:** If the front upper steering rack housing bolt is damaged or sheared off during removal, discontinue this procedure and replace the steering rack (refer to Service Manual procedure 32012602).

31. Install a new front upper steering rack housing bolt; tighten the bolt to 5 Nm (+/- 0.5 Nm) plus 90 degrees (Figure 51), and then mark the bolt with a paint pen.

32. Lower the vehicle until the tires are touching the ground.

33. Tighten the LH front wheel lug nuts (torque 175 Nm).

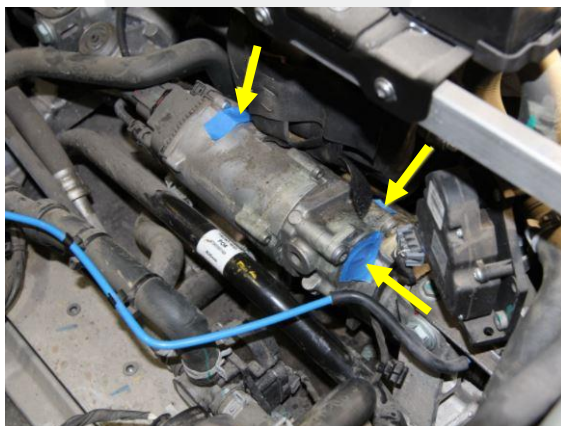
34. Clean the 5 steering rack housing bolts and the steering rack housing seams with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute.

35. Clean the sealing plugs (x3) on the steering gear with isopropyl alcohol (IPA) wipes, and then allow the area to dry for at least 1 minute (Figure 52).



**Figure 52**

36. Apply masking tape to cover the sealing plugs (x3) on the steering rack (Figure 53).



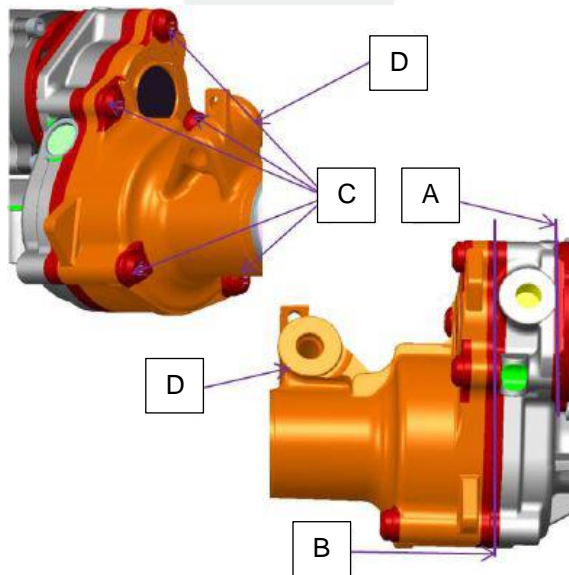
**Figure 53**

37. Cover the components near the steering rack with shop towels to protect from drips during wax sealant application (Figure 54).



**Figure 54**

38. Apply the wax sealant to the 5 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 55):
- 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 55**

39. Allow the first coat to partially dry for 3 minutes.
40. Apply a second coat of wax sealant to the same areas described in step 38

49. Close the lid on the wax sealant container.

**NOTE:** The wax sealant solidifies if the wax sealant container is left opened for an extended period of time.

41. Remove the shop towels protecting the components near the steering rack.

42. Wipe up any excess wax sealant.

43. Remove the tape covering the sealing plugs on the steering rack.

44. Reconnect 12V power (refer to Service Manual procedure 17010200).

45. Install the underhood storage unit (refer to Service Manual procedure 15242001).

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**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).