

2009 Toyota Highlander Limited

2009 DRIVELINE/AXLES Axle - Highlander

2009 DRIVELINE/AXLES**Axle - Highlander****AXLE SYSTEM****PROBLEM SYMPTOMS TABLE****HINT:**

Use the table below to help determine the cause of a problem. The likely causes of the problem are indicated in descending order. Check each suspected area in order. Repair or replace faulty parts or perform adjustments as necessary.

AXLE SYSTEM**AXLE SYSTEM PROBLEM SYMPTOMS CHART**

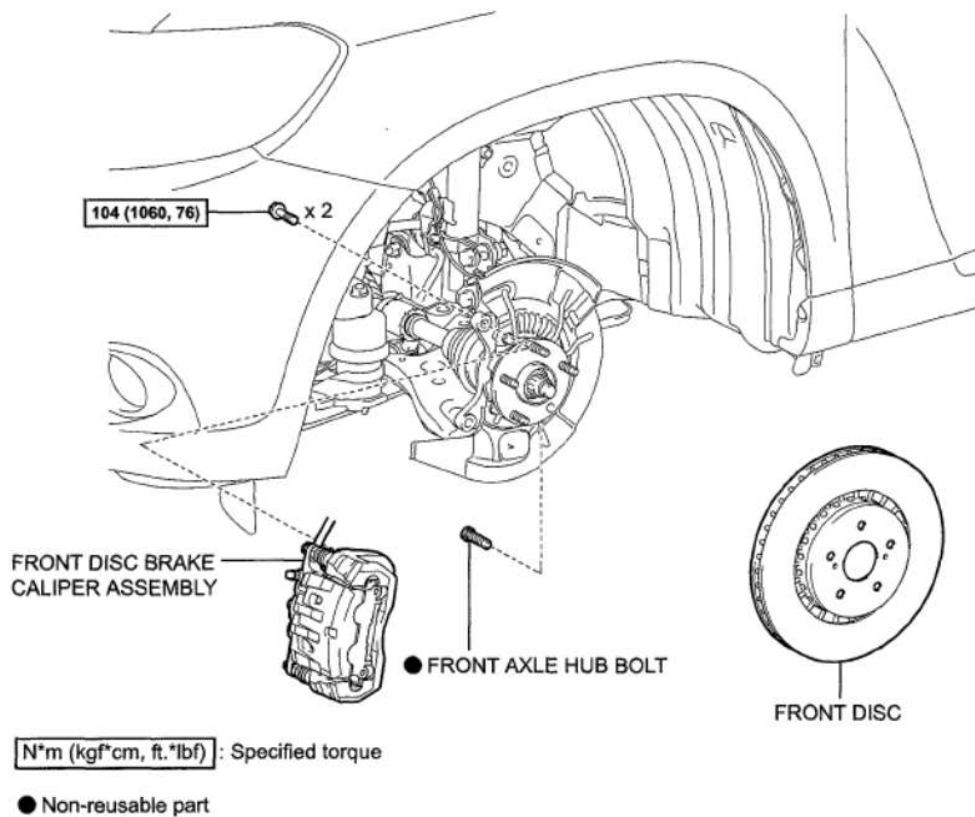
Symptom	Suspected Area	Refer to
Wander or pulls	Tires (worn or improperly inflated)	<u>INSPECTION</u>
	Front wheel alignment (incorrect)	<u>FRONT WHEEL ALIGNMENT</u>
	Rear wheel alignment (incorrect)	<u>REAR WHEEL ALIGNMENT</u>
	Steering intermediate shaft (loose or worn)	<u>REMOVAL</u>
	Front hub bearings (loose or worn)	<u>ON-VEHICLE INSPECTION</u>
	Rear hub bearings (loose or worn) (for 2WD)	<u>ON-VEHICLE INSPECTION</u>
	Rear hub bearings (loose or worn) (for 4WD)	<u>ON-VEHICLE INSPECTION</u>
	Steering gear (broken) (for 1AR-FE)	<u>REMOVAL</u>
	Steering gear (broken) (for 2GR-FE)	<u>REMOVAL</u>
	Suspension parts (worn out)	-
Front wheel shimmy	Tires (worn or improperly inflated)	<u>INSPECTION</u>
	Wheels (out of balance)	<u>INSPECTION</u>
	Shock absorber (worn out)	<u>REMOVAL</u>
	Front wheel alignment (incorrect)	<u>FRONT WHEEL ALIGNMENT</u>
	Lower ball joint (worn)	<u>REMOVAL</u>
	Axle hub bearings (loose or worn)	<u>ON-VEHICLE INSPECTION</u>
	Steering intermediate shaft (loose or worn)	<u>REMOVAL</u>
	Steering gear (broken) (for 1AR-FE)	<u>REMOVAL</u>
	Steering gear (broken) (for 2GR-FE)	<u>REMOVAL</u>
Rear wheel shimmy	Tires (worn or improperly inflated)	<u>INSPECTION</u>
	Wheels (out of balance)	<u>INSPECTION</u>
	Shock absorber (worn out)	<u>REMOVAL</u>
	Axle hub bearings (loose or worn) (for 2WD)	<u>ON-VEHICLE INSPECTION</u>
	Axle hub bearings (loose or worn) (for 4WD)	<u>ON-VEHICLE INSPECTION</u>
	Rear wheel alignment (incorrect)	<u>REAR WHEEL ALIGNMENT</u>

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FRONT AXLE HUB BOLT

COMPONENTS



C166277E02

Fig. 1: Identifying Front Axle Hub Bolt Components With Torque Specification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

1. REMOVE FRONT WHEEL
2. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See **REMOVAL**)
3. REMOVE FRONT DISC (See **INSPECTION**)
4. REMOVE FRONT AXLE HUB BOLT
 - a. Temporarily install 2 nuts and 2 washers to the front axle hub bolt as shown in the illustration.
 - b. Align the front axle hub bolt with steering knuckle cutout A as shown in the illustration.
 - c. Using SST and a brass bar or an equivalent tool to hold the front axle, remove the front axle hub bolt.

SST 09628-10011

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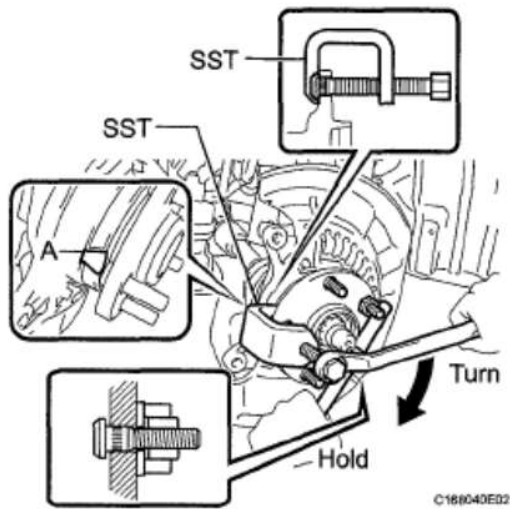


Fig. 2: Removing Front Axle Hub Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL FRONT AXLE HUB BOLT

- Install a washer and nut to a new front axle hub bolt as shown in the illustration.
- Using a brass bar or an equivalent tool to hold the front axle, install the hub bolt by tightening the nut.

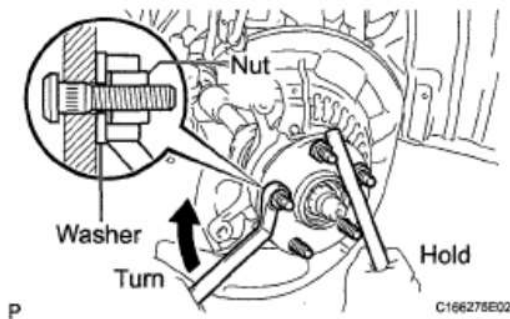


Fig. 3: Tightening Front Axle Hub Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- INSTALL FRONT DISC (See REASSEMBLY)
- INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See STEERING KNUCKLE)
- INSTALL FRONT WHEEL

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

FRONT AXLE HUB

COMPONENTS

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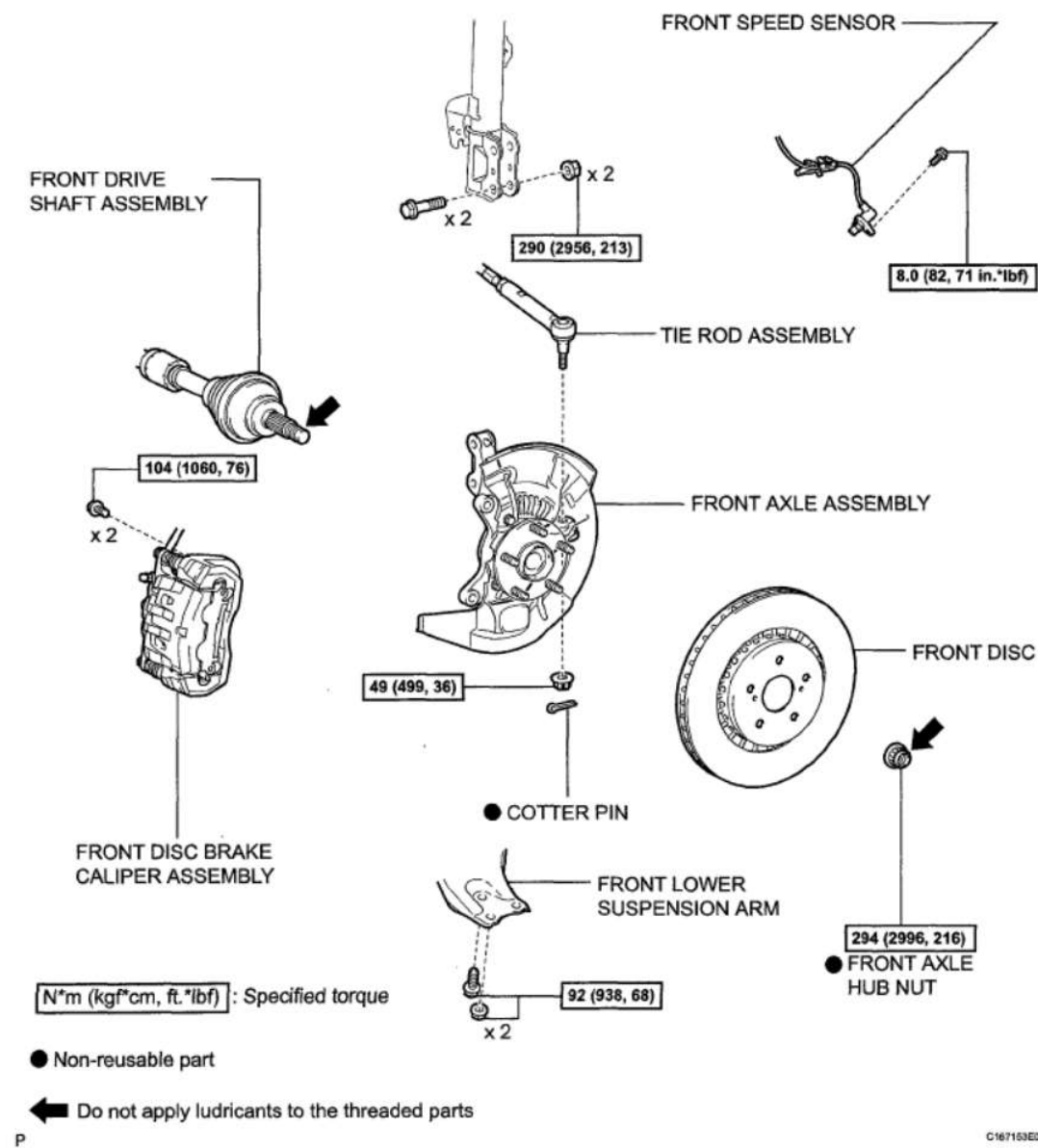
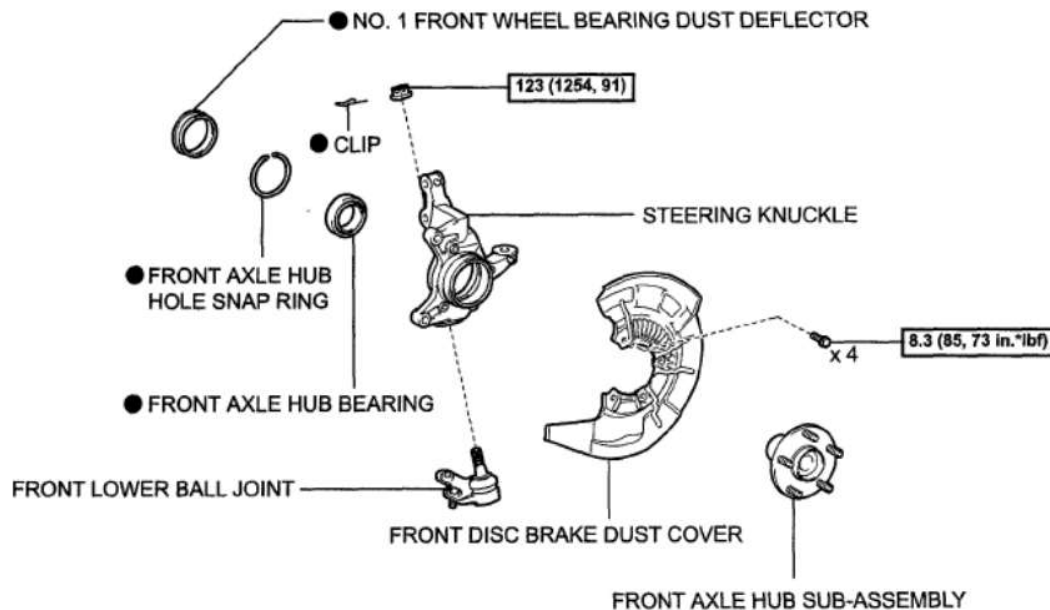


Fig. 4: Identifying Front Axle Hub Components With Torque Specification (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

C196278E05

Fig. 5: Identifying Front Axle Hub Components With Torque Specification (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. REMOVE FRONT WHEEL
2. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See **REMOVAL**)
3. REMOVE FRONT DISC (See **INSPECTION**)
4. INSPECT FRONT AXLE HUB BEARING LOOSENESS
 - a. Using a dial indicator, check for looseness near the center of the front axle hub.

Maximum looseness:

0 mm (0 in.)

NOTE: Ensure that the dial indicator is set perpendicular to the measurement surface.

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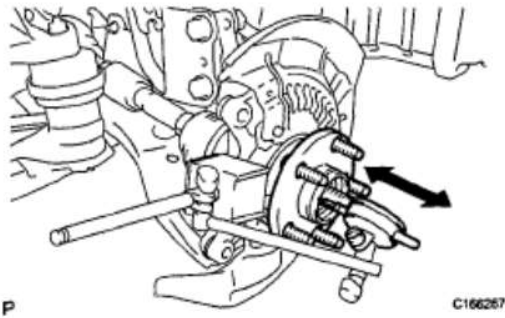


Fig. 6: Checking Front Axle Hub Bearing Looseness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

If the looseness exceeds the maximum, replace the front axle hub bearing.

5. INSPECT FRONT AXLE HUB RUNOUT

- a. Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.

Maximum runout:

0.05 mm (0.0020 in.)

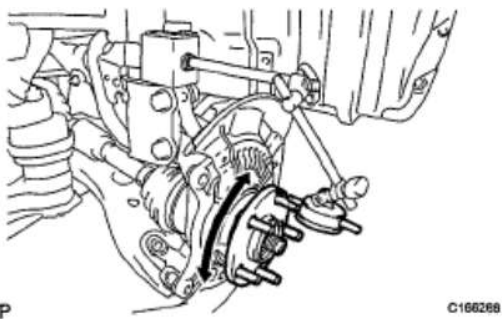


Fig. 7: Checking Runout On Surface Of Axle Hub Outside Hub Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Ensure that the dial indicator is set perpendicular to the measurement surface.

HINT:

If the runout exceeds the maximum, replace the front axle hub.

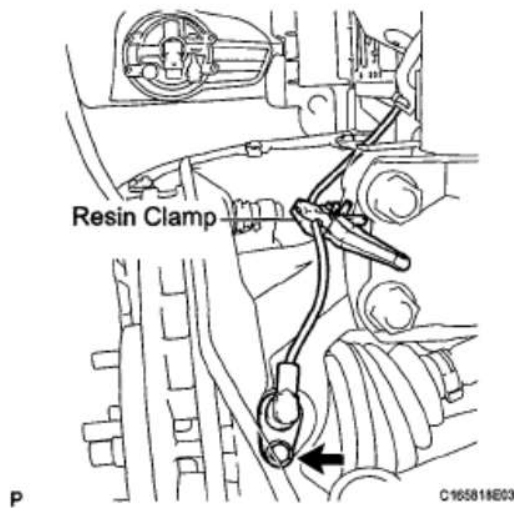
6. **INSTALL FRONT DISC** (See REASSEMBLY)
7. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY** (See STEERING KNUCKLE)

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8. INSTALL FRONT WHEEL**Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)****REMOVAL**

1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT AXLE HUB NUT (for 1AR-FE) (See REMOVAL)**
3. **REMOVE FRONT AXLE HUB NUT (for 2GR-FE) (See REMOVAL)**
4. **SEPARATE FRONT SPEED SENSOR**
 - a. Remove the bolt and resin clamp, and separate the front speed sensor.

**Fig. 8: Locating Front Speed Sensor Bolt With Resin Clamp**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY**
 - a. Remove the 2 bolts and separate the front disc brake caliper assembly.

NOTE: Use wire or an equivalent tool to keep the front disc brake caliper assembly from hanging down by the flexible hose.

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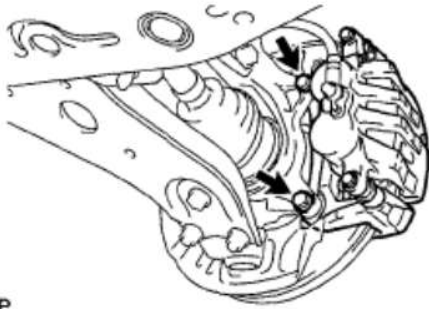


Fig. 9: Locating Front Disc Brake Caliper Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE FRONT DISC** (See INSPECTION)
7. **SEPARATE TIE ROD ASSEMBLY** (for 1 AR-FE) (See REMOVAL)
8. **SEPARATE TIE ROD ASSEMBLY** (for 2GR-FE) (See REMOVAL)
9. **SEPARATE FRONT LOWER SUSPENSION ARM**
 - a. Remove the bolt and 2 nuts, and separate the front lower suspension arm from the front lower ball joint.

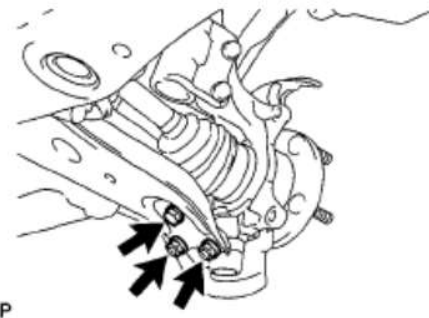


Fig. 10: Locating Front Lower Suspension Arm Bolt And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **SEPARATE FRONT DRIVE SHAFT ASSEMBLY**
 - a. Put matchmarks on the front drive shaft assembly and the front axle hub sub-assembly.

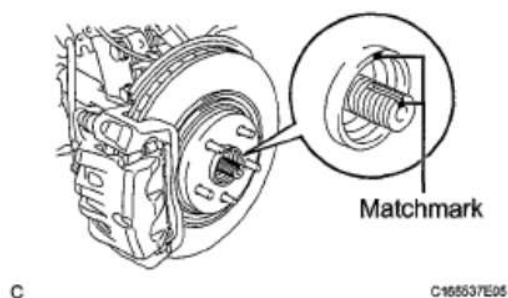


Fig. 11: Identifying Matchmarks On Front Drive Shaft Assembly And Front Axle Hub Sub-

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Assembly

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly.

NOTE: Be careful not to damage the drive shaft boot and speed sensor rotor.

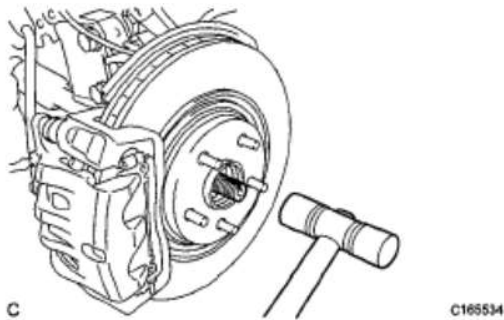


Fig. 12: Separating Front Drive Shaft Assembly From Front Axle Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE FRONT AXLE ASSEMBLY

- a. Remove the 2 bolts, 2 nuts and front axle assembly.

NOTE: When removing the nuts, keep the bolts from rotating.

12. REMOVE FRONT LOWER BALL JOINT (See REMOVAL)

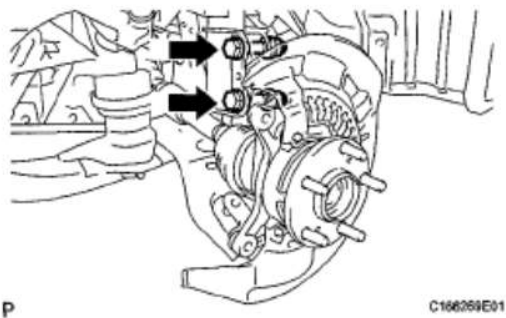


Fig. 13: Locating Front Axle Assembly Bolts And Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. REMOVE NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

- a. Using a screwdriver with its tip wrapped with vinyl tape, remove the No. 1 front wheel bearing dust deflector.

NOTE: Be careful not to damage the steering knuckle.

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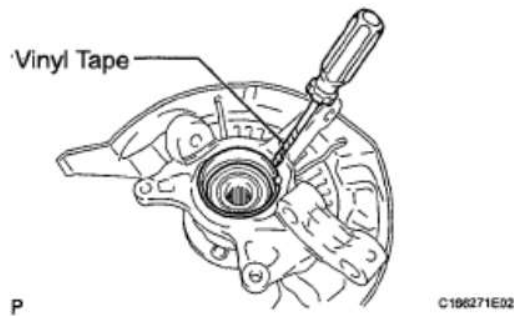


Fig. 14: Removing No. 1 Front Wheel Bearing Dust Deflector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. REMOVE FRONT AXLE HUB HOLE SNAP RING

- a. Using snap ring pliers, remove the front axle hub hole snap ring.

15. REMOVE FRONT AXLE HUB SUB-ASSEMBLY

- a. Hold the front axle assembly between aluminium plates in a vise.

NOTE: Do not overtighten the vise.

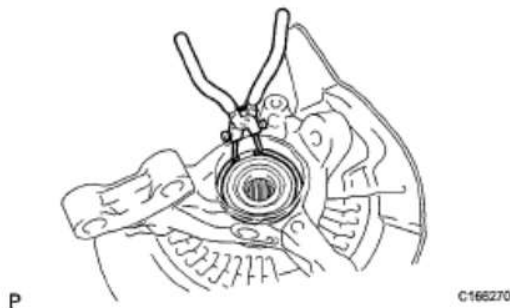


Fig. 15: Removing Front Axle Hub Hole Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using SST, remove the front axle hub sub-assembly.

SST 09520-00031

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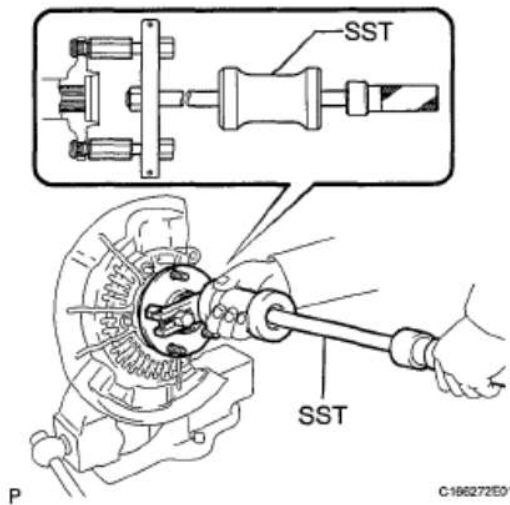


Fig. 16: Removing Front Axle Hub Sub-Assembly Using SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using SST and a press, remove the bearing inner race (outside) from the front axle hub sub-assembly.

SST 09555-55010, 09950-60010 (09951-00430), 09950-70010 (09951-07100)

NOTE: Be careful not to drop the front axle hub sub-assembly.

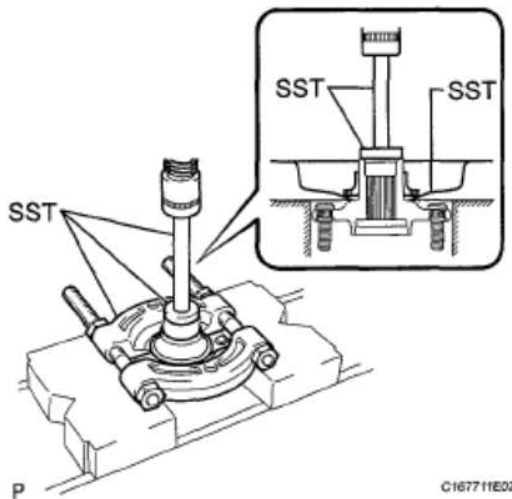


Fig. 17: Removing Bearing Inner Race (Outside) From Front Axle Hub Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. REMOVE FRONT DISC BRAKE DUST COVER

- a. Remove the 4 bolts and front disc brake dust cover from the steering knuckle.

17. REMOVE FRONT AXLE HUB BEARING

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- a. Place the bearing inner race (outside) on the front axle hub bearing.

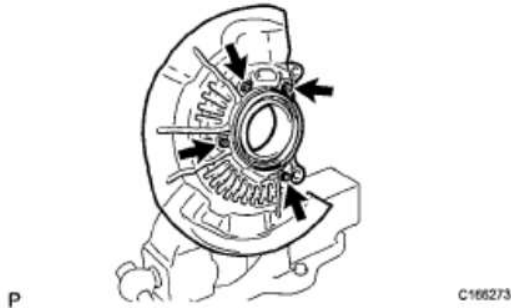


Fig. 18: Locating Front Disc Brake Dust Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using SST, V-blocks and a press, remove the front axle hub bearing from the steering knuckle.

SST 09950-60010 (09951-00430, 09952-06010), 09950-70010 (09951-07100), 09950-60020 (09951-00750)

NOTE: Keep the steering knuckle level.

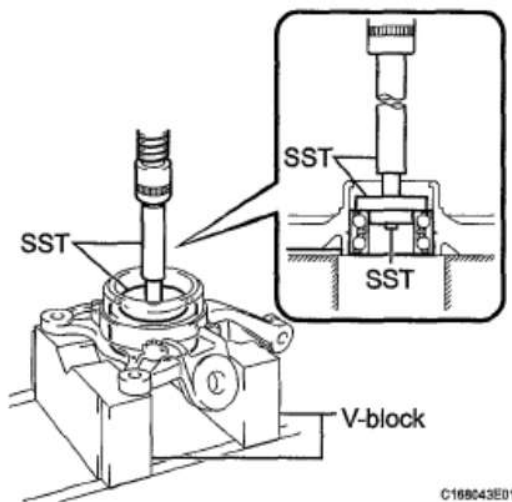


Fig. 19: Positioning Of Front Axle Hub Bearing On SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL FRONT AXLE HUB BEARING

- a. Using SST and a press, install a new front axle hub bearing to the steering knuckle.

SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

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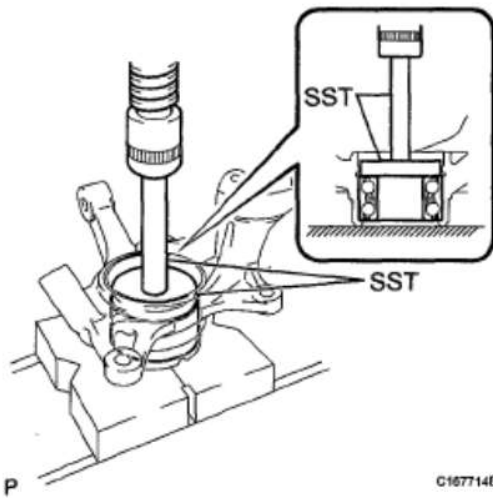


Fig. 20: Positioning Of SST And Press On Front Axle Hub Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL FRONT DISC BRAKE DUST COVER

- Install the front disc brake dust cover to the steering knuckle with the 4 bolts.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

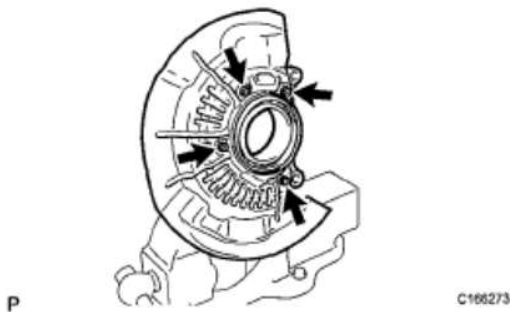


Fig. 21: Locating Front Disc Brake Dust Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL FRONT AXLE HUB SUB-ASSEMBLY

- Using SST and a press, install the front axle hub sub-assembly to the steering knuckle.

SST 09608-32010, 09950-70010 (09951-07100), 09950-60010 (09951-00610)

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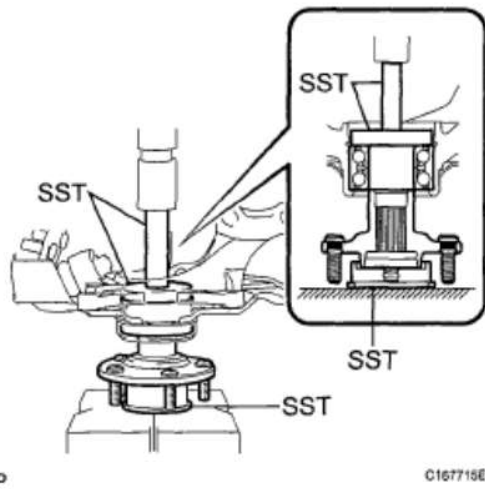


Fig. 22: Installing Front Axle Hub Sub-Assembly To Steering Knuckle
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL FRONT AXLE HUB HOLE SNAP RING

- Using snap ring pliers, install a new front axle hub hole snap ring.

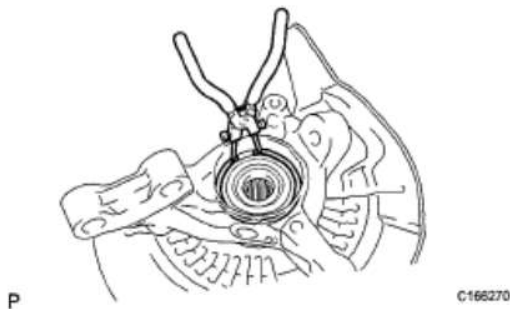


Fig. 23: Installing Front Axle Hub Hole Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

- Using SST and a hammer, install a new No. 1 front wheel bearing dust deflector.

SST 09316-60011 (09316-00011), 09608-32010, 09950-60020 (09951-00810, 09952-06010), 09950-60010 (09951-00500)

HINT:

Align the hole for the speed sensor in the No. 1 front wheel bearing dust deflector with the steering knuckle.

6. INSTALL FRONT LOWER BALL JOINT (See INSTALLATION)

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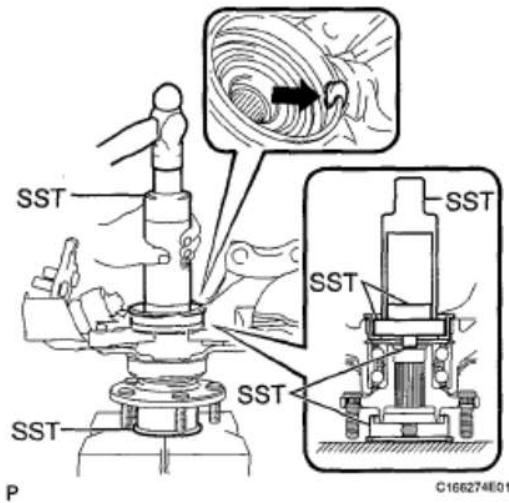


Fig. 24: Installing No. 1 Front Wheel Bearing Dust Deflector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL FRONT AXLE ASSEMBLY

- a. Install the front axle assembly to the front shock absorber with the 2 bolts and 2 nuts.

Torque: 290 N*m (2956 kgf*cm, 213 ft.*lbf)

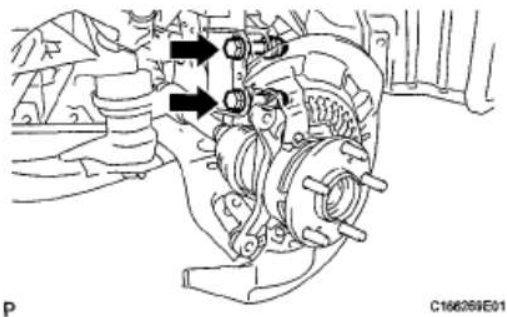


Fig. 25: Locating Front Axle Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSTALL FRONT DRIVE SHAFT ASSEMBLY

- a. Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.

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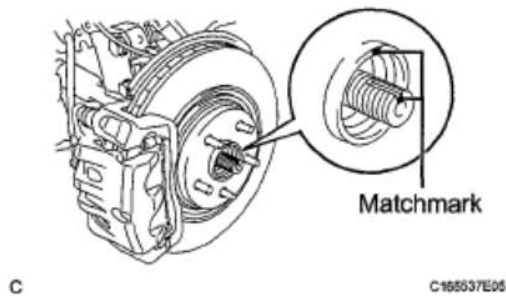


Fig. 26: Identifying Matchmarks On Front Drive Shaft Assembly And Front Axle Hub Sub-Assembly

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL FRONT LOWER SUSPENSION ARM

- Install the front lower suspension arm to the front lower ball joint with the bolt and 2 nuts.

Torque: 92 N*m (938 kgf*cm, 68 ft.*lbf)

- CONNECT TIE ROD ASSEMBLY (for 1AR-FE) (See INSTALLATION)
- CONNECT TIE ROD ASSEMBLY (for 2GR-FE) (See INSTALLATION)
- INSTALL FRONT DISC (See REASSEMBLY)

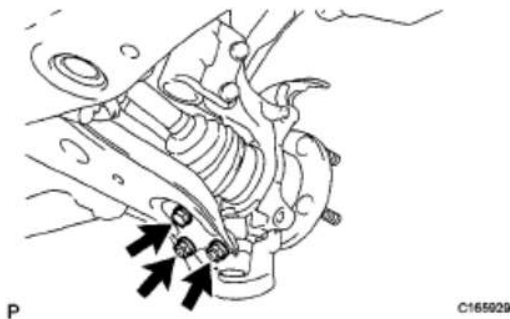


Fig. 27: Locating Front Lower Suspension Arm Bolt And Nuts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY

- Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.

Torque: 104 N*m (1060 kgf*cm, 76 ft.*lbf)

NOTE: Do not twist the brake hose when installing the front disc brake caliper assembly.

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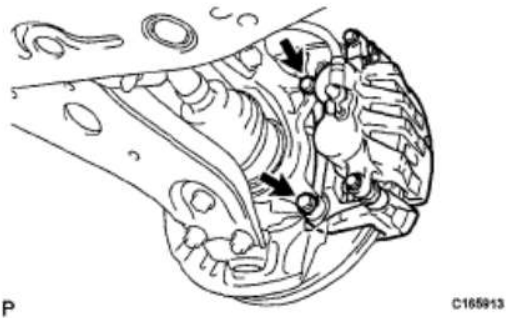


Fig. 28: Locating Front Disc Brake Caliper Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL FRONT AXLE HUB NUT

- a. Clean the threaded parts on the drive shaft and axle hub nut using a non-residue solvent.

NOTE:

- Be sure to perform this work for a new drive shaft.
- Keep the threaded parts free of oil and foreign objects.

- b. Using a socket wrench (30 mm), install a new axle hub nut.

Torque: 294 N*m (2996 kgf*cm, 216 ft.*lbf)

HINT:

- Keep depressing the brake pedal to prevent the drive shaft from rotating.
- Stake the nut after inspecting for looseness and runout in the following steps.

15. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY

- a. Remove the 2 bolts and separate the front disc brake caliper assembly.

NOTE: Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.

16. REMOVE FRONT DISC (See INSPECTION)

17. INSPECT FRONT AXLE HUB BEARING LOOSENESS (See ON-VEHICLE INSPECTION)

18. INSPECT FRONT AXLE HUB RUNOUT (See REMOVAL)

19. INSTALL FRONT DISC (See REASSEMBLY)

20. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY

- a. Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.

Torque: 104 N*m (1060 kgf*cm, 76 ft.*lbf)

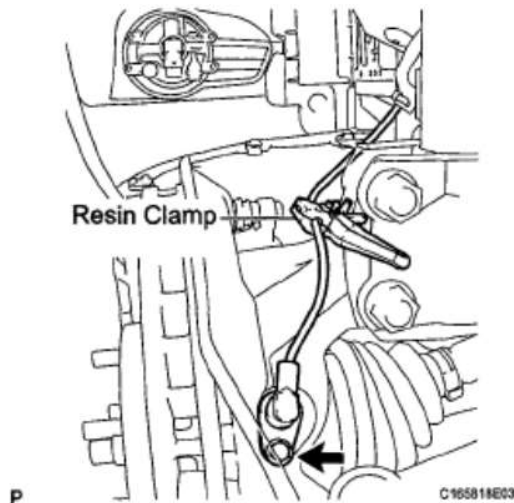
NOTE: Do not twist the brake hose when installing the front disc brake caliper

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assembly.**21. INSTALL FRONT SPEED SENSOR**

- a. Install the resin clamp and front speed sensor with the bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)**Fig. 29: Locating Front Speed Sensor Bolt With Resin Clamp**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Prevent foreign matter from attaching to the sensor tip.
- Firmly insert the sensor body into the knuckle before tightening the bolt.
- After installing the sensor to the knuckle, make sure that there is no clearance between the sensor stay and knuckle. Also make sure that no foreign matter is stuck between the parts.
- To prevent interference between the sensor and magnetic rotor, do not rotate the sensor body during or after the insertion of the sensor body to the knuckle.

22. STAKE FRONT AXLE HUB NUT

- a. Using a chisel and hammer, stake the front axle hub nut.

23. INSTALL FRONT WHEEL**Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)****24. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT****HINT:**

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Inspect and adjust the front wheel alignment (See **FRONT WHEEL ALIGNMENT**).

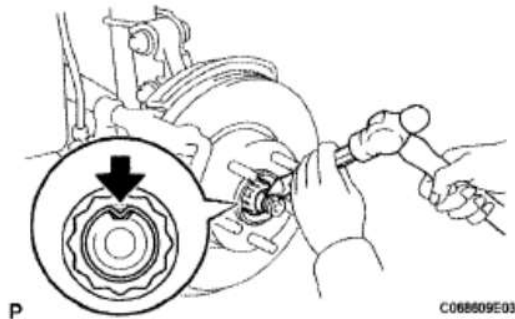


Fig. 30: Staking Axle Hub LH Nut

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. CHECK FOR SPEED SENSOR SIGNAL

HINT:

Check for speed sensor signals (See **TEST MODE PROCEDURE**).

STEERING KNUCKLE

COMPONENTS

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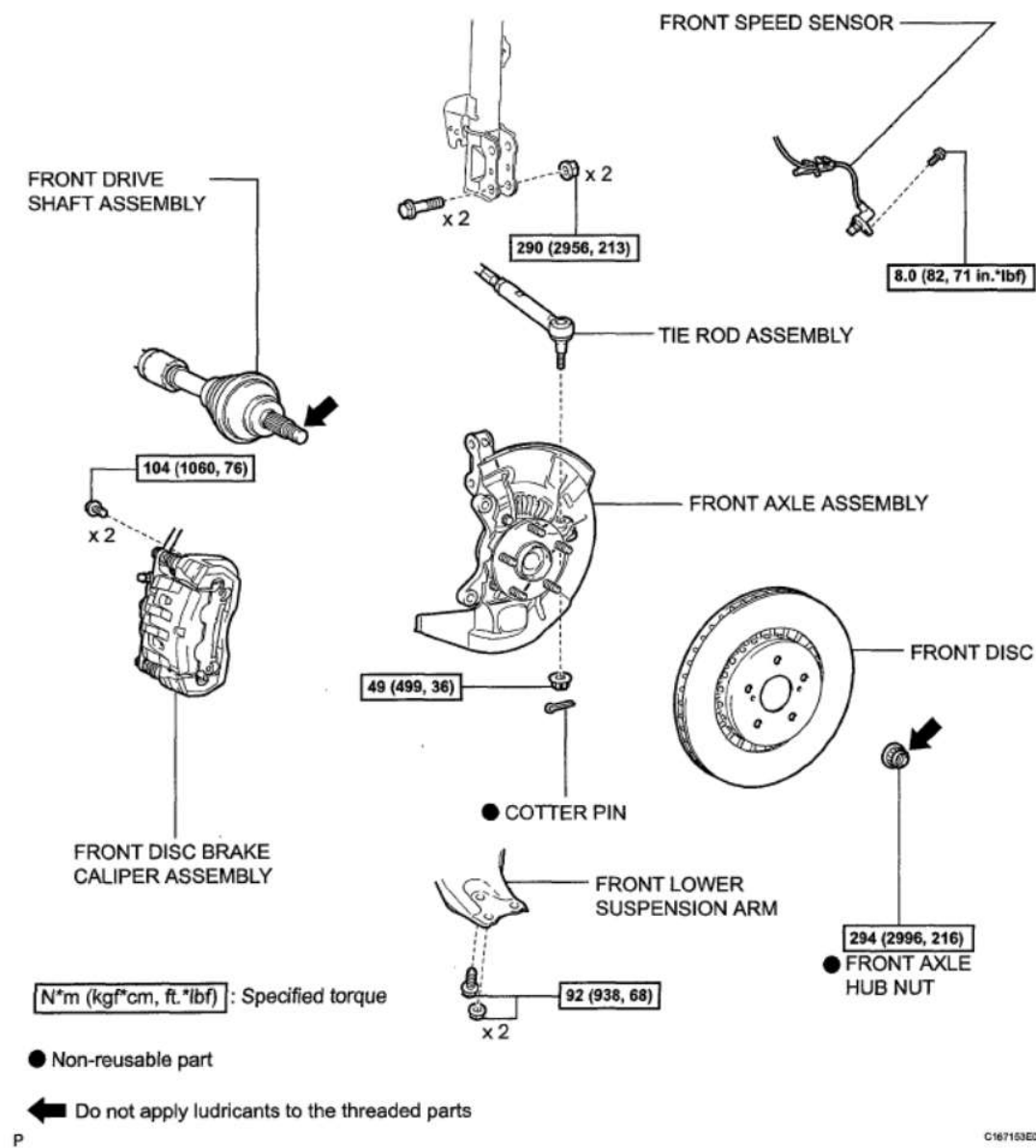
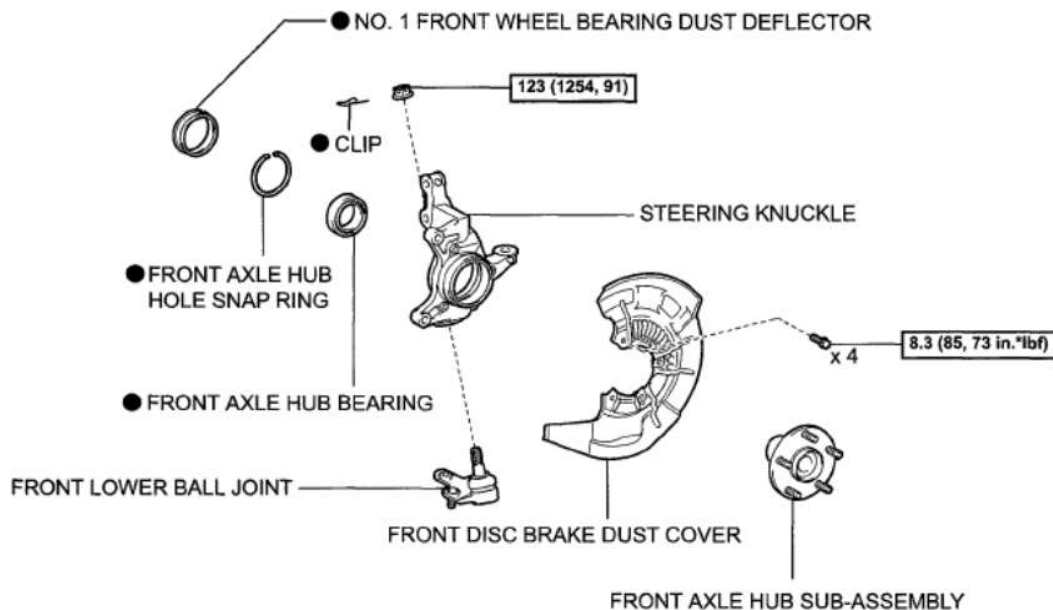


Fig. 31: Identifying Steering Knuckle Components With Torque Specification (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

C166278E04

Fig. 32: Identifying Steering Knuckle Components With Torque Specification (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE FRONT WHEEL
2. REMOVE FRONT AXLE HUB NUT (for 1AR-FE) (See [REMOVAL](#))
3. REMOVE FRONT AXLE HUB NUT (for 2GR-FE) (See [REMOVAL](#))
4. SEPARATE FRONT SPEED SENSOR (See [REMOVAL](#))
5. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See [REMOVAL](#))
6. REMOVE FRONT DISC (See [INSPECTION](#))
7. SEPARATE TIE ROD ASSEMBLY (for 1AR-FE) (See [REMOVAL](#))
8. SEPARATE TIE ROD ASSEMBLY (for 2GR-FE) (See [REMOVAL](#))
9. SEPARATE FRONT LOWER SUSPENSION ARM (See [INSTALLATION](#))
10. SEPARATE FRONT DRIVE SHAFT ASSEMBLY (See [INSTALLATION](#))
11. REMOVE FRONT AXLE ASSEMBLY (See [INSTALLATION](#))
12. REMOVE FRONT LOWER BALL JOINT (See [REMOVAL](#))
13. REMOVE NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR (See [INSTALLATION](#))
14. REMOVE FRONT AXLE HUB HOLE SNAP RING (See [INSTALLATION](#))
15. REMOVE FRONT AXLE HUB SUB-ASSEMBLY (See [INSTALLATION](#))
16. REMOVE FRONT DISC BRAKE DUST COVER (See [INSTALLATION](#))

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17. REMOVE STEERING KNUCKLE

- a. Place the bearing inner race (outside) on the front axle hub bearing.
- b. Using SST, V-blocks and a press, remove the front axle hub bearing from the steering knuckle.

SST 09950-60010 (09951-00430, 09952-06010), 09950-70010 (09951-07100), 09950-60020 (09951-00750)

NOTE: Keep the steering knuckle level.

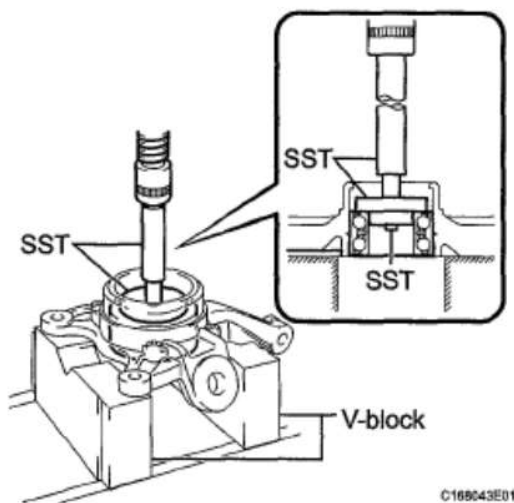


Fig. 33: Positioning Of Front Axle Hub Bearing On SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION**1. INSTALL STEERING KNUCKLE**

- a. Using SST and a press, install a new front axle hub bearing to the steering knuckle.

SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

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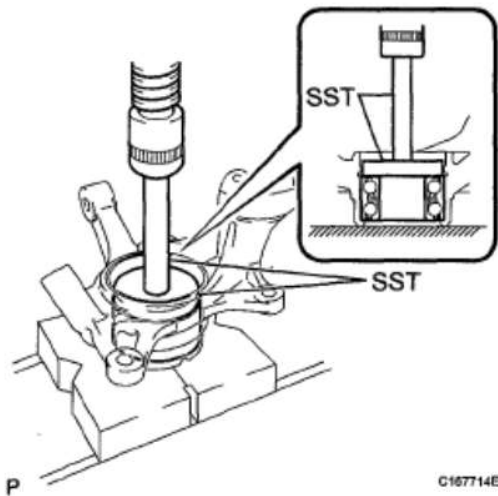


Fig. 34: Positioning Of SST And Press On Front Axle Hub Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL FRONT DISC BRAKE DUST COVER** (See INSTALLATION)
3. **INSTALL FRONT AXLE HUB SUB-ASSEMBLY** (See STEERING KNUCKLE)
4. **INSTALL FRONT AXLE HUB HOLE SNAP RING** (See STEERING KNUCKLE)
5. **INSTALL NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR** (See STEERING KNUCKLE)
6. **INSTALL FRONT LOWER BALL JOINT** (See INSTALLATION)
7. **INSTALL FRONT AXLE ASSEMBLY** (See STEERING KNUCKLE)
8. **INSTALL FRONT DRIVE SHAFT ASSEMBLY** (See STEERING KNUCKLE)
9. **INSTALL FRONT LOWER SUSPENSION ARM** (See STEERING KNUCKLE)
10. **CONNECT TIE ROD ASSEMBLY (for 1AR-FE)** (See INSTALLATION)
11. **CONNECT TIE ROD ASSEMBLY (for 2GR-FE)** (See INSTALLATION)
12. **INSTALL FRONT DISC** (See REASSEMBLY)
13. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY** (See STEERING KNUCKLE)
14. **INSTALL FRONT AXLE HUB NUT** (See STEERING KNUCKLE)
15. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY** (See STEERING KNUCKLE)
16. **REMOVE FRONT DISC** (See INSPECTION)
17. **INSPECT FRONT AXLE HUB BEARING LOOSENESS** (See ON-VEHICLE INSPECTION)
18. **INSPECT FRONT AXLE HUB RUNOUT** (See REMOVAL)
19. **INSTALL FRONT DISC** (See REASSEMBLY)
20. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY** (See STEERING KNUCKLE)
21. **INSTALL FRONT SPEED SENSOR** (See STEERING KNUCKLE)
22. **STAKE FRONT AXLE HUB NUT** (See STEERING KNUCKLE)
23. **INSTALL FRONT WHEEL**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

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24. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT:

Inspect and adjust the front wheel alignment (See FRONT WHEEL ALIGNMENT).

25. CHECK FOR SPEED SENSOR SIGNAL

HINT:

Check for speed sensor signals (See TEST MODE PROCEDURE).

REAR AXLE HUB BOLT

COMPONENTS

for 2WD:

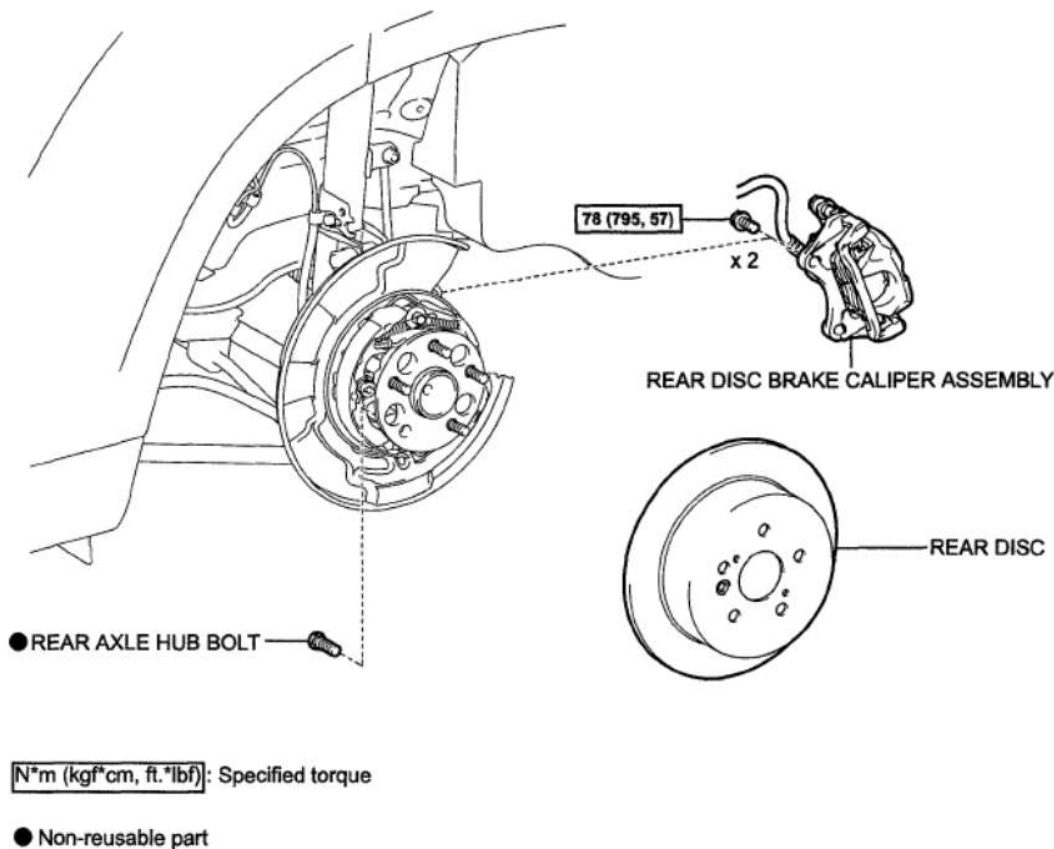


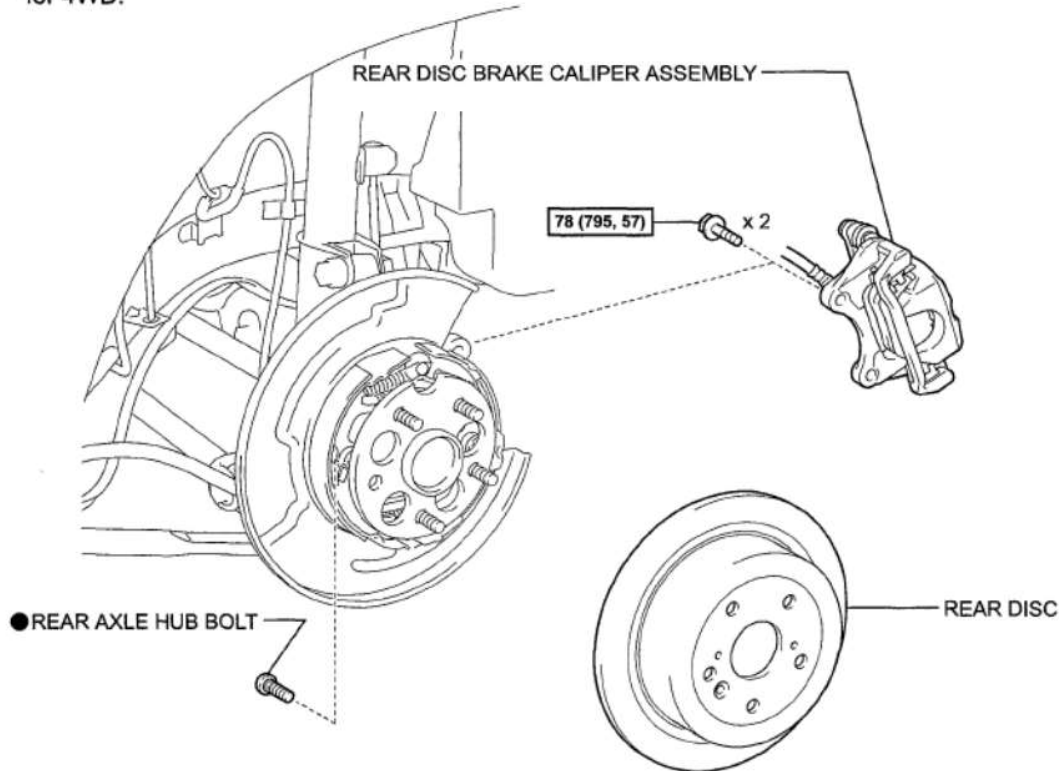
Fig. 35: Identifying Rear Axle Hub Bolt Components With Torque Specification (1 Of 2)

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for 4WD:



N°m (kgf $^{\circ}\text{cm}$, ft. $^{\circ}\text{lbf}$): Specified torque

● Non-reusable part

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Fig. 36: Identifying Rear Axle Hub Bolt Components With Torque Specification (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (for 2WD)**
 - a. Remove the 2 bolts and separate the rear disc brake caliper assembly.

NOTE: Use wire or an equivalent tool to keep the brake caliper from hanging

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down by the flexible hose.

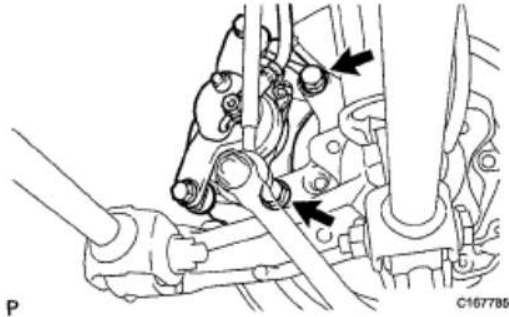


Fig. 37: Locating Rear Disc Brake Caliper Assembly Bolts (For 2WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (for 4WD)**
 - a. Remove the 2 bolts and separate the rear disc brake caliper assembly.

NOTE: Use wire or an equivalent tool to keep the brake m caliper from hanging down by the flexible hose.

4. **REMOVE REAR DISC (See INSPECTION)**

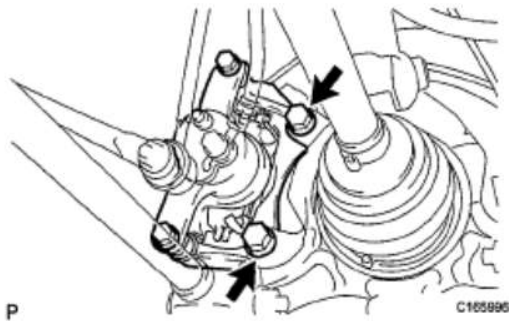


Fig. 38: Locating Rear Disc Brake Caliper Assembly Bolts (For 4WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE REAR AXLE HUB BOLT**
 - a. Temporarily install 2 nuts and 2 washers to the rear axle hub bolt as shown in the illustration.
 - b. Using SST and a brass bar or an equivalent tool to hold the hub and bearing assembly, remove the rear axle hub bolt.

SST 09628-10011

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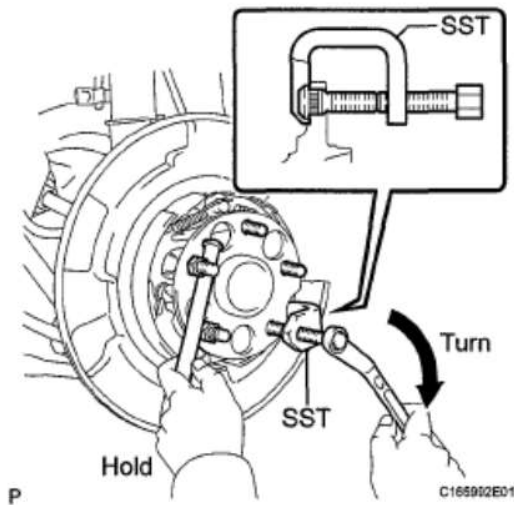


Fig. 39: Removing Rear Axle Hub Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL REAR AXLE HUB BOLT

- Install a washer and nut to a new rear axle hub bolt as shown in the illustration.
- Using a brass bar or an equivalent tool to hold the hub and bearing assembly, install the rear axle hub bolt by tightening the nut.

7. INSTALL REAR DISC (See REASSEMBLY)

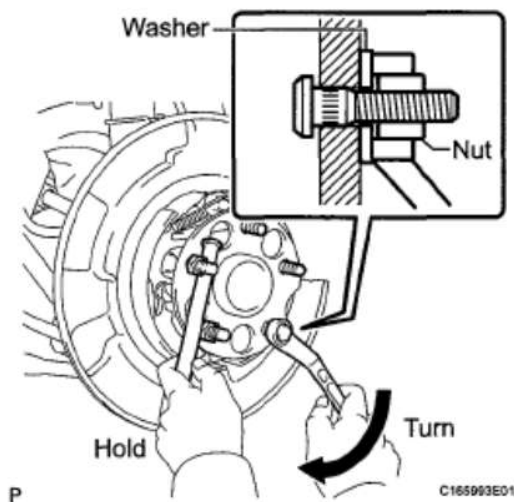


Fig. 40: Installing Rear Axle Hub Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (for 2WD)

- Install the rear disc brake caliper assembly with the 2 bolts.

Torque: 78 N*m (795 kgf*cm, 57 ft.*lbf)

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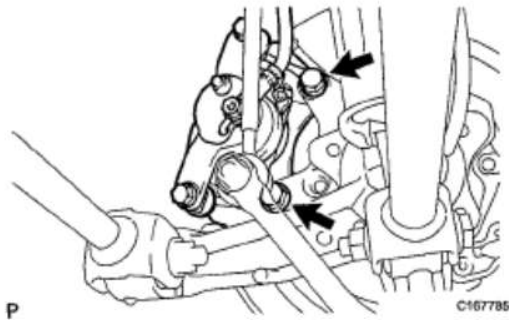


Fig. 41: Locating Rear Disc Brake Caliper Assembly Bolts (For 2WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (for 4WD)**
 - a. Install the rear disc brake caliper assembly with the 2 bolts.

Torque: 78 N*m (795 kgf*cm, 57 ft.*lbf)

10. **INSTALL REAR WHEEL**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

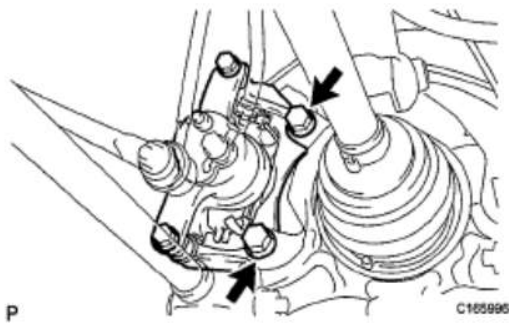


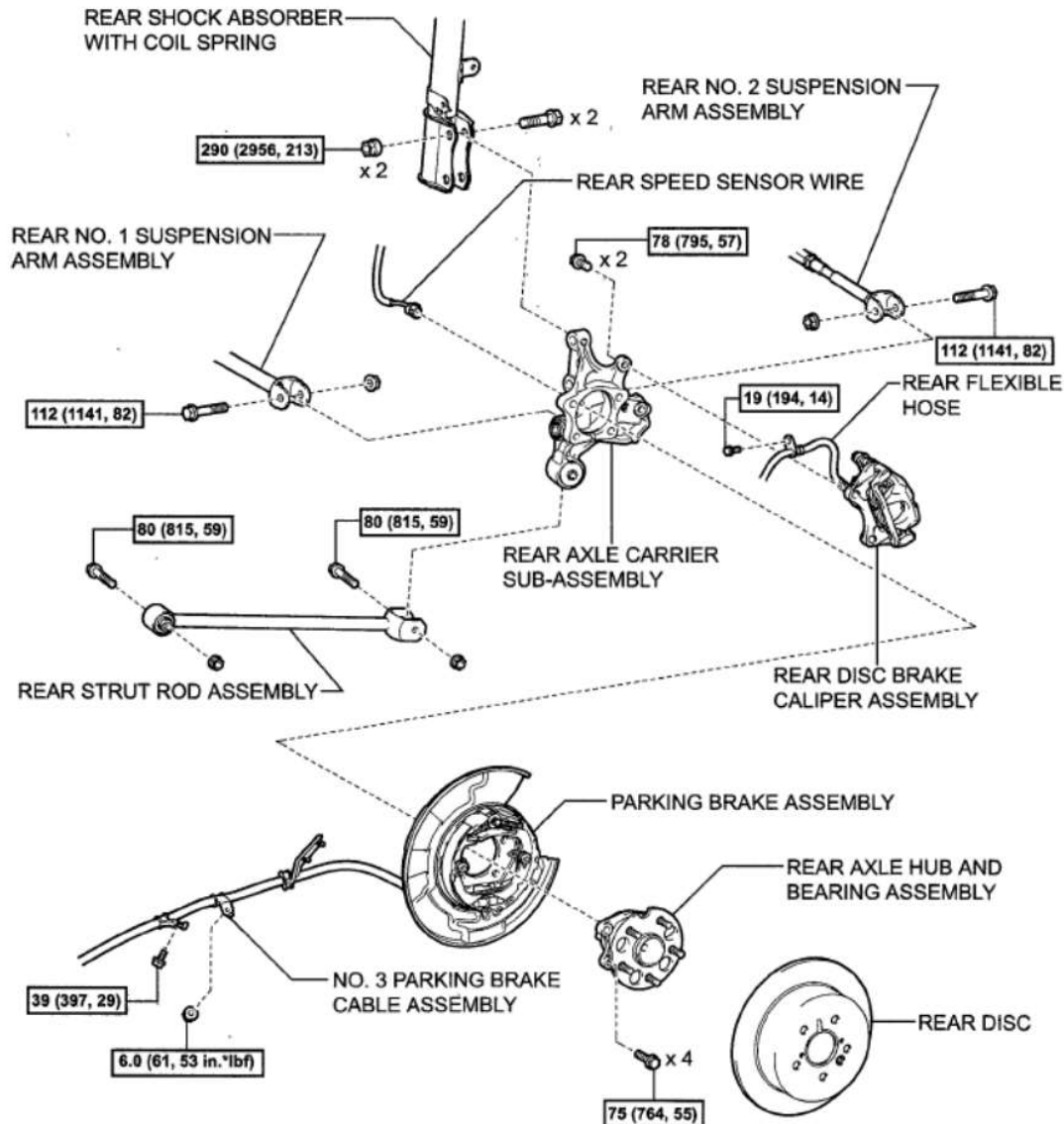
Fig. 42: Locating Rear Disc Brake Caliper Assembly Bolts (For 4WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REAR AXLE HUB (FOR 2WD)

COMPONENTS

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N*m (kgf*cm, ft.*lbf): Specified torque

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Fig. 43: Identifying Rear Axle Hub Components With Torque Specification (For 2WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

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1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR FLEXIBLE HOSE** (See **REMOVAL**)
3. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY** (See **REAR AXLE HUB (FOR 2WD)**)
4. **REMOVE REAR DISC** (See **INSPECTION**)
5. **INSPECT REAR AXLE HUB BEARING LOOSENESS**
 - a. Using a dial indicator, check for looseness near the center of the axle hub.

Maximum looseness:

0 mm (0 in.)

NOTE: **Ensure that the dial indicator is set perpendicular to the measurement surface.**

If the looseness exceeds the maximum, replace the rear axle hub and bearing assembly.

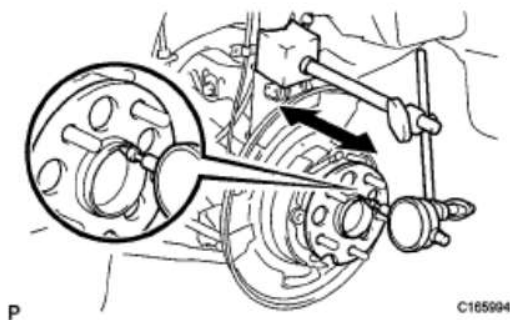


Fig. 44: Inspecting Rear Axle Hub Bearing Looseness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSPECT REAR AXLE HUB RUNOUT**
 - a. Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.

Maximum runout:

0.08 mm (0.0031 in.)

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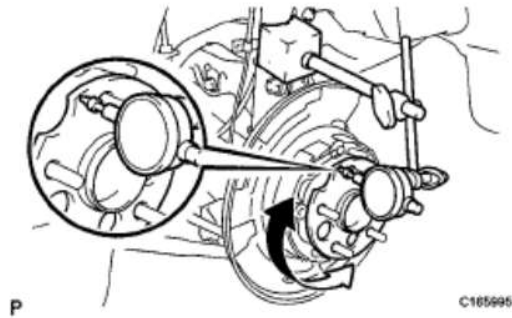


Fig. 45: Inspecting Rear Axle Hub Runout

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Ensure that the dial indicator is set perpendicular to the measurement surface.

If the runout exceeds the maximum, replace the rear axle hub and bearing assembly.

7. **INSTALL REAR DISC** (See REASSEMBLY)
8. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY** (See REAR AXLE HUB (FOR 2WD))
9. **INSTALL REAR FLEXIBLE HOSE** (See DISPOSAL)
10. **INSTALL REAR WHEEL**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

2. **REMOVE REAR WHEEL**
3. **SEPARATE REAR FLEXIBLE HOSE** (See REMOVAL)
4. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY** (See REAR AXLE HUB (FOR 2WD))
5. **REMOVE REAR DISC** (See INSPECTION)
6. **SEPARATE REAR SPEED SENSOR WIRE** (See REMOVAL)
7. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY**
 - a. Remove the 4 bolts and the rear axle hub and bearing assembly.

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NOTE: Use wire or an equivalent tool to keep the parking brake assembly from hanging down by the parking brake cable assembly.

8. **SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY** (See INSTALLATION)
9. **REMOVE REAR STRUT ROD ASSEMBLY** (See INSTALLATION)

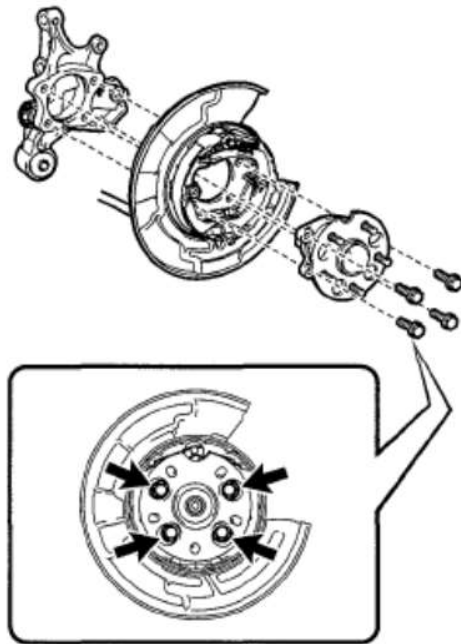


Fig. 46: Locating Rear Axle Hub And Bearing Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **REMOVE REAR AXLE CARRIER SUB-ASSEMBLY**
 - a. Loosen the 2 bolts.

NOTE: Since stopper nuts are used, loosen the bolts.

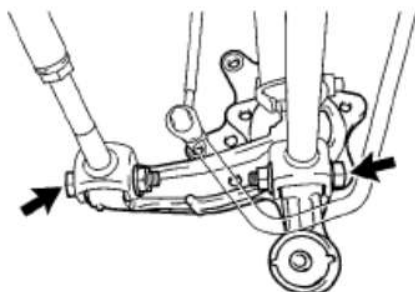


Fig. 47: Locating Rear Axle Carrier Sub-Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- b. Remove the 2 bolts and 2 nuts, and separate the rear axle carrier sub-assembly from the rear shock absorber with coil spring.

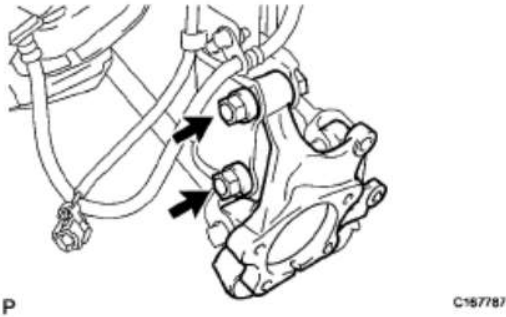


Fig. 48: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 2 bolts, the 2 nuts, and the rear axle carrier sub-assembly.

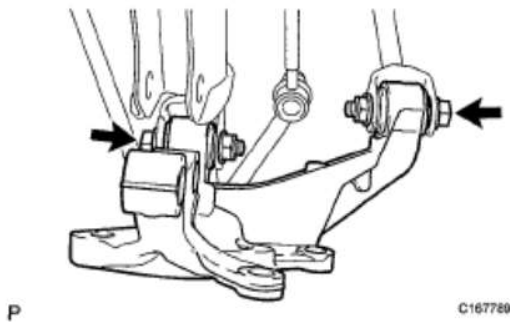


Fig. 49: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION**1. INSTALL REAR AXLE CARRIER SUB-ASSEMBLY**

- a. Temporarily install the rear axle carrier sub-assembly with the 2 bolts and the 2 nuts.

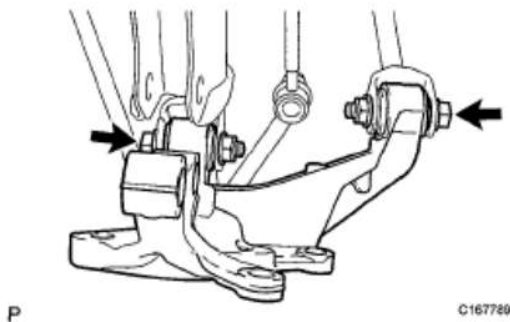


Fig. 50: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts

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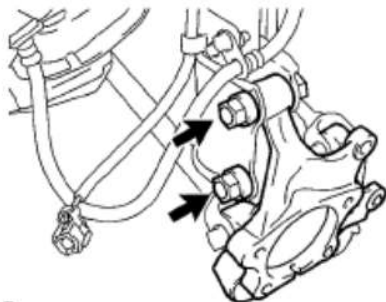
2009 DRIVELINE/AXLES Axle - Highlander

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the rear axle carrier sub-assembly with the 2 bolts and the 2 nuts.

Torque: 290 N*m (2956 kgf*cm, 213 ft.*lbf)

2. TEMPORARILY INSTALL REAR STRUT ROD ASSEMBLY (See INSTALLATION)



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Fig. 51: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY

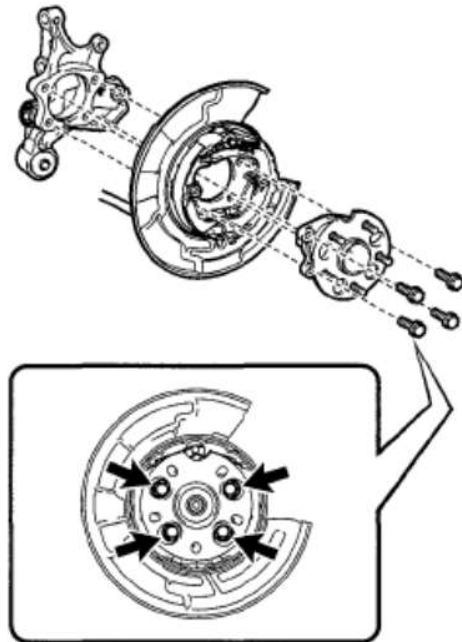
- a. Install the parking brake assembly and the rear axle hub and bearing assembly with the 4 bolts.

Torque: 75 N*m (764 kgf*cm, 55 ft.*lbf)

NOTE: Do not twist the No. 3 parking brake cable assembly when installing it.

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Fig. 52: Locating Rear Axle Hub And Bearing Assembly Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSPECT REAR AXLE HUB BEARING LOOSENESS** (See ON-VEHICLE INSPECTION)
5. **INSPECT REAR AXLE HUB RUNOUT** (See ON-VEHICLE INSPECTION)
6. **INSTALL REAR SPEED SENSOR WIRE** (See INSTALLATION)
7. **INSTALL REAR DISC** (See INSPECTION)
8. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY** (See REAR AXLE HUB (FOR 2WD))
9. **INSTALL REAR FLEXIBLE HOSE** (See DISPOSAL)
10. **STABILIZE SUSPENSION** (See INSTALLATION)
11. **FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM ASSEMBLY**
 - a. Fully tighten the bolt.

Torque: 112 N*m (1141 kgf*cm, 82 ft.*lbf)

NOTE:

- Since a stopper nut is used, fully tighten the bolt.
- The final torque must be applied under standard vehicle height conditions.

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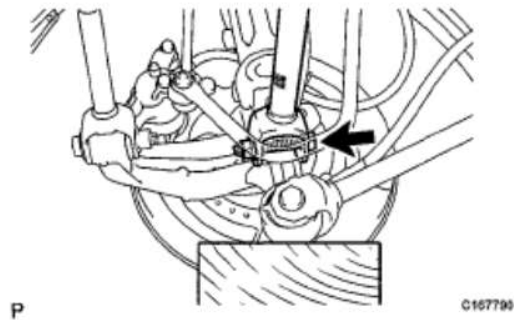


Fig. 53: Locating Rear No. 1 Suspension Arm Assembly Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM ASSEMBLY

- a. Fully tighten the bolt.

Torque: 112 N*m (1141 kgf*cm, 82 ft.*lbf)

NOTE:

- Since a stopper nut is used, fully tighten the bolt.
- The final torque must be applied under standard vehicle height conditions.

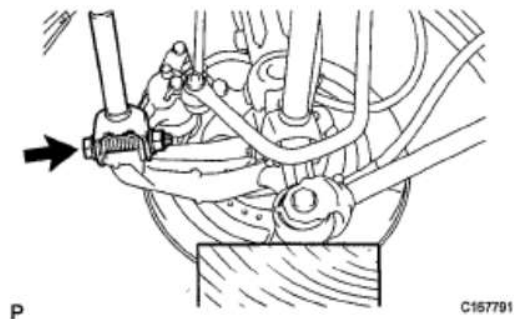


Fig. 54: Locating Rear No. 2 Suspension Arm Assembly Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. FULLY TIGHTEN REAR STRUT ROD ASSEMBLY (See INSTALLATION)
14. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY (See INSTALLATION)
15. INSTALL REAR WHEEL

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

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17. INSPECT AND ADJUST REAR WHEEL ALIGNMENT

HINT:

See REAR WHEEL ALIGNMENT**18. CHECK FOR SPEED SENSOR SIGNAL**

HINT:

See TEST MODE PROCEDURE**REAR AXLE HUB (FOR 4WD)****COMPONENTS**

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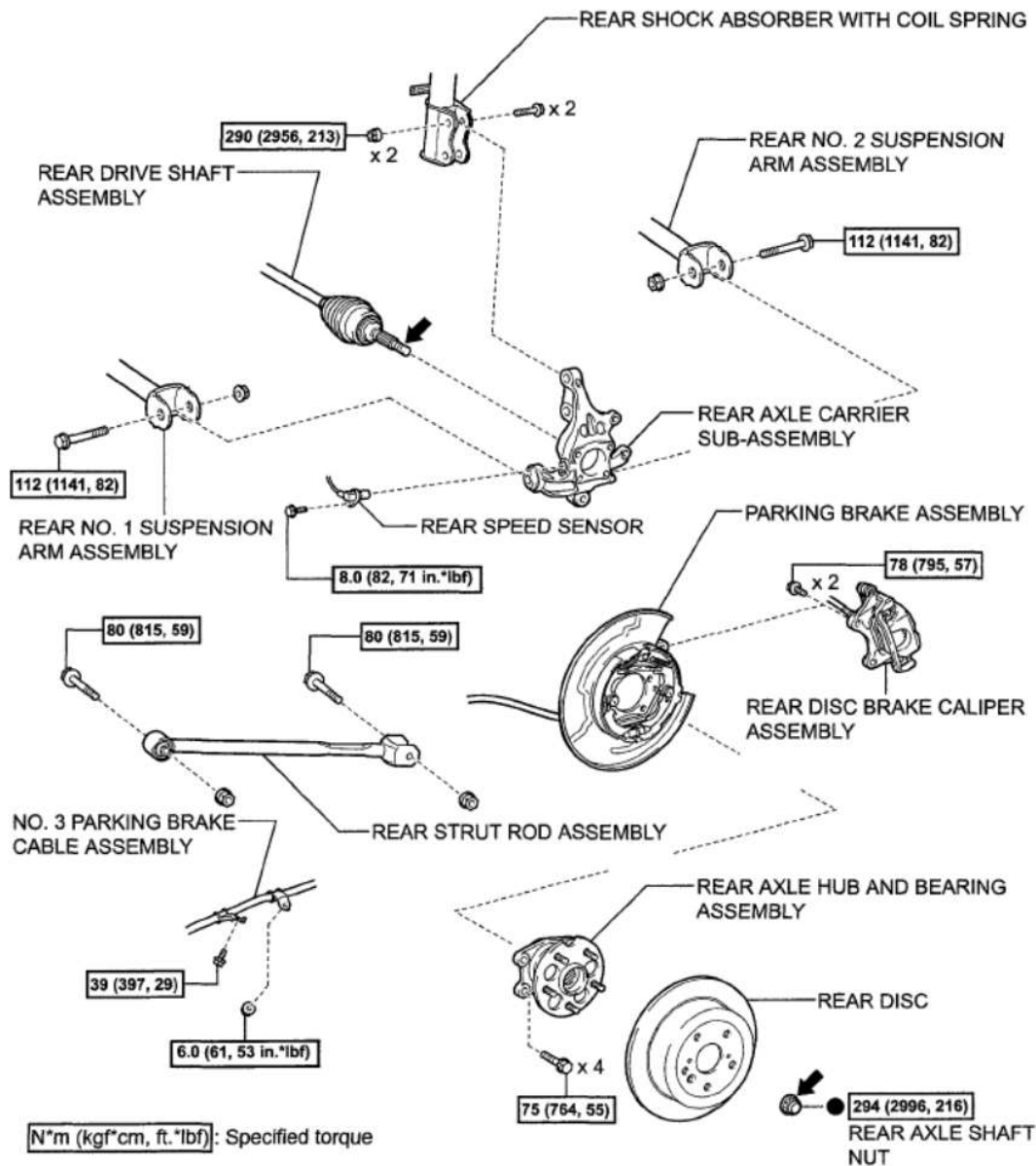


Fig. 55: Identifying Rear Axle Hub Components With Torque Specification (For 4WD)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

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1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY** (See **REAR AXLE HUB (FOR 2WD)**)
3. **REMOVE REAR DISC** (See **INSPECTION**)
4. **INSPECT REAR AXLE HUB BEARING LOOSENESS**
 - a. Using a dial indicator, check for looseness near the center of the rear axle hub and bearing assembly.

Maximum looseness:

0 mm (0 in.)

NOTE: **Ensure that the dial indicator is set perpendicular to the measurement surface.**

HINT:

If the looseness exceeds the maximum, replace the rear axle hub and bearing assembly.

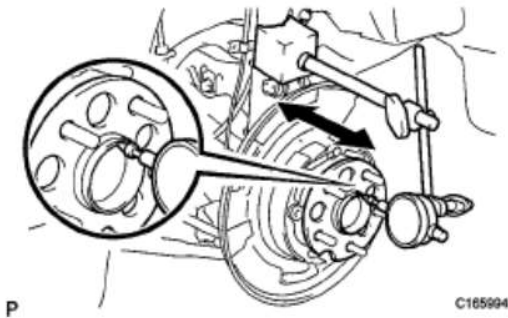


Fig. 56: Inspecting Rear Axle Hub Bearing Looseness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSPECT REAR AXLE HUB RUNOUT**
 - a. Using a dial indicator, check for runout on the surface of the rear axle hub and bearing assembly outside the rear axle hub bolt.

Maximum runout:

0.08 mm (0.0031 in.)

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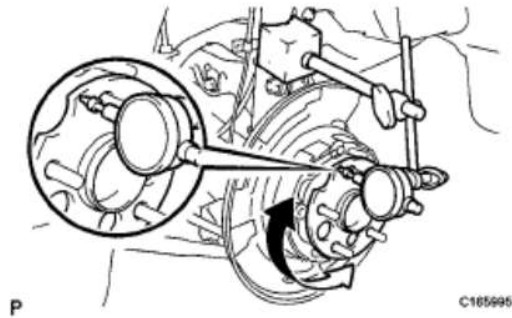


Fig. 57: Inspecting Rear Axle Hub Runout

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Ensure that the dial indicator is set perpendicular to the measurement surface.

HINT:

If the runout exceeds the maximum, replace the rear axle hub and bearing assembly.

6. **INSTALL REAR DISC** (See REASSEMBLY)
7. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY** (See REAR AXLE HUB (FOR 2WD))
8. **INSTALL REAR WHEEL**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR SPEED SENSOR**

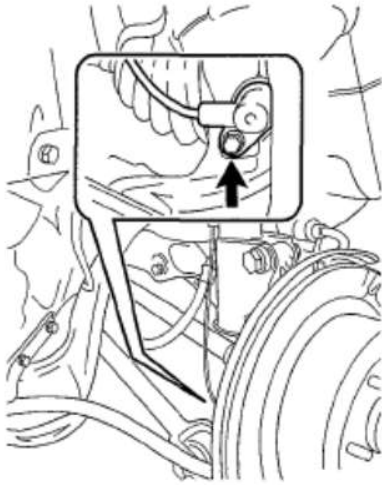
- a. Remove the bolt and separate the rear speed sensor from the rear axle carrier sub-assembly.

NOTE: Keep the sensor tip and rear speed sensor installation hole free from foreign matter.

3. **REMOVE REAR AXLE SHAFT NUT** (See REMOVAL)
4. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY** (See REAR AXLE HUB (FOR 2WD))
5. **REMOVE REAR DISC** (See INSPECTION)

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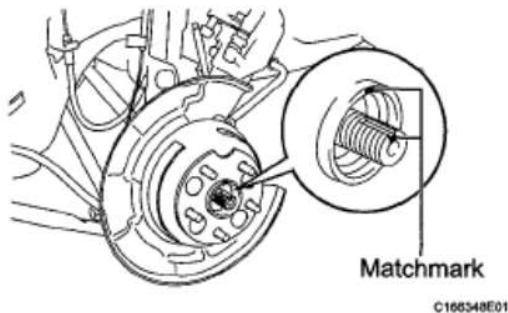
Fig. 58: Locating Rear Speed Sensor Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY

- Put matchmarks on the drive shaft and axle hub.

NOTE: Do not punch the marks.



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Fig. 59: Identifying Matchmarks On Drive Shaft And Axle Hub

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Remove the 4 bolts and the rear axle hub and bearing assembly.

NOTE:

- Do not rotate the drive shaft with the rear axle hub and bearing assembly removed.
- Use wire or an equivalent tool to keep the parking brake assembly from hanging down by the parking brake cable assembly.

7. SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY (See INSTALLATION)

8. REMOVE REAR STRUT ROD ASSEMBLY (See INSTALLATION)

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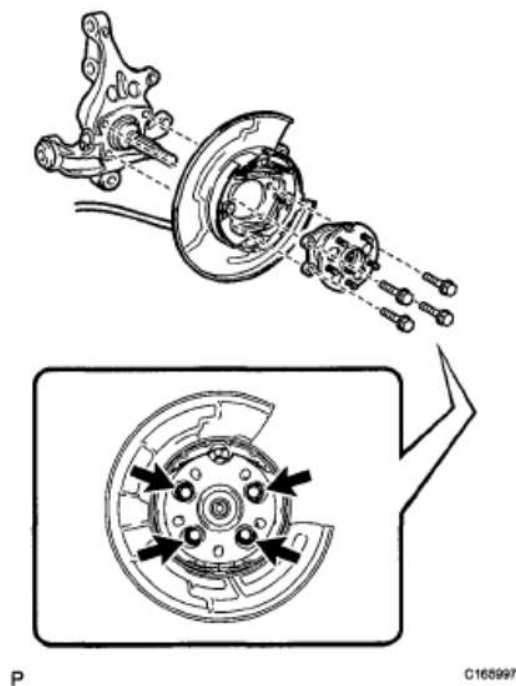


Fig. 60: Locating Rear Axle Hub And Bearing Assembly Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE REAR AXLE CARRIER SUB-ASSEMBLY

- a. Loosen the 2 bolts.

NOTE: Since stopper nuts are used, loosen the bolts.

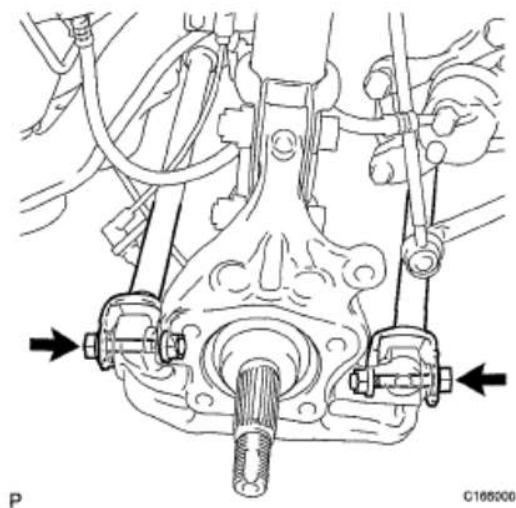


Fig. 61: Locating Rear Axle Carrier Sub-Assembly Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- b. Remove the 2 bolts and 2 nuts, and separate the rear shock absorber with coil spring (lower side) from the rear axle carrier sub-assembly.

NOTE:

- Be careful not to damage the outboard joint boot.
- Be careful not to damage the speed sensor rotor.

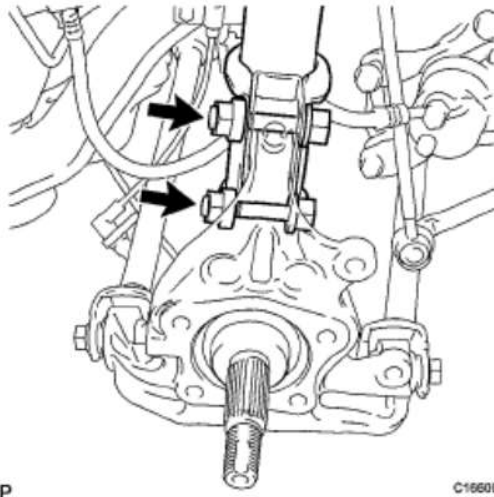


Fig. 62: Locating Rear Shock Absorber Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 2 bolts, the 2 nuts, and the rear axle carrier sub-assembly.

NOTE:

- Be careful not to damage the outboard joint boot.
- Be careful not to damage the speed sensor rotor.

HINT:

Use wire or an equivalent tool to keep the rear drive shaft assembly from hanging down.

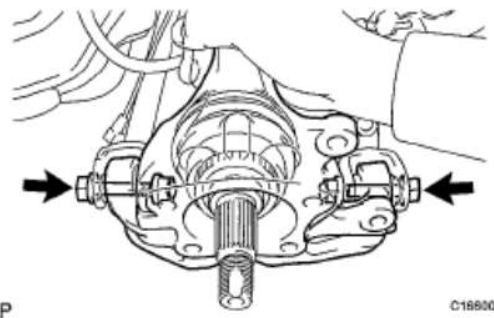


Fig. 63: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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INSTALLATION**1. INSTALL REAR AXLE CARRIER SUB-ASSEMBLY**

- a. Temporarily install the the rear axle carrier sub-assembly with the 2 bolts and the 2 nuts.

NOTE:

- Be careful not to damage the outboard joint boot.
- Be careful not to damage the speed sensor rotor.

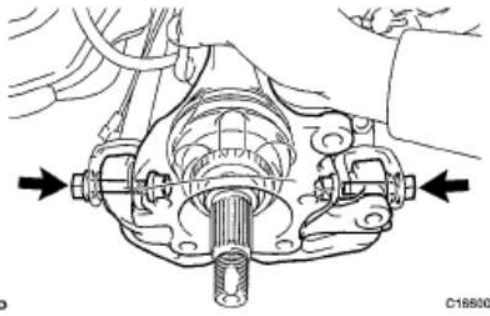


Fig. 64: Locating Rear Axle Carrier Sub-Assembly Bolts And Nuts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Prevent foreign matter from adhering to the speed sensor rotor.

- b. Install the rear axle carrier sub-assembly with the 2 bolts and the 2 nuts.

Torque: 290 N*m (2956 kgf*cm, 213 ft.*lbf)

NOTE:

- Be careful not to damage the outboard joint boot.
- Be careful not to damage the speed sensor rotor.
- Prevent foreign matter from adhering to the speed sensor rotor.
- Do not rotate the drive shaft with the rear axle hub and bearing assembly removed.

HINT:

Insert the bolts from the rear side.

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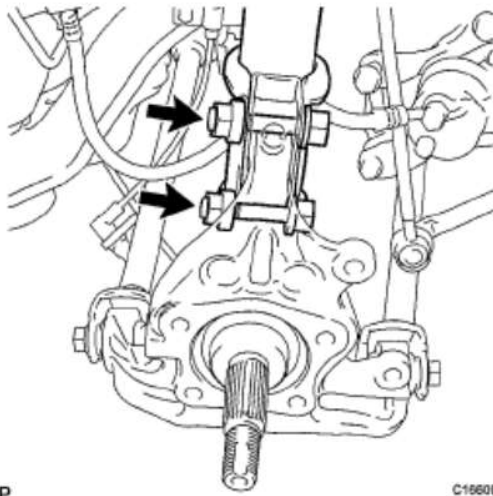


Fig. 65: Locating Rear Shock Absorber Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. TEMPORARILY INSTALL REAR STRUT ROD ASSEMBLY (See INSTALLATION)
3. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY
 - a. Align the matchmarks on the drive shaft and rear axle hub.

NOTE: Do not rotate the drive shaft.

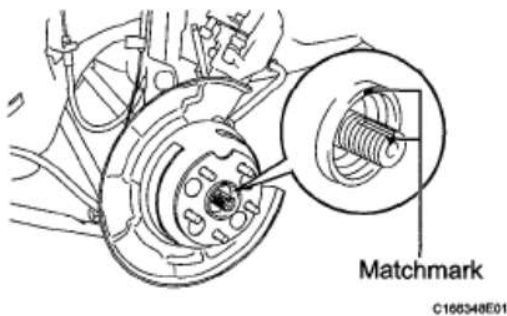


Fig. 66: Identifying Matchmarks On Drive Shaft And Axle Hub
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the parking brake assembly and the rear axle hub and bearing assembly with the 4 bolts.

Torque: 75 N*m (764 kgf*cm, 55 ft.*lbf)

NOTE: Do not twist the No. 3 parking brake cable assembly when installing it.

4. INSTALL REAR DISC (See REASSEMBLY)
5. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See REAR AXLE HUB (FOR 2WD))

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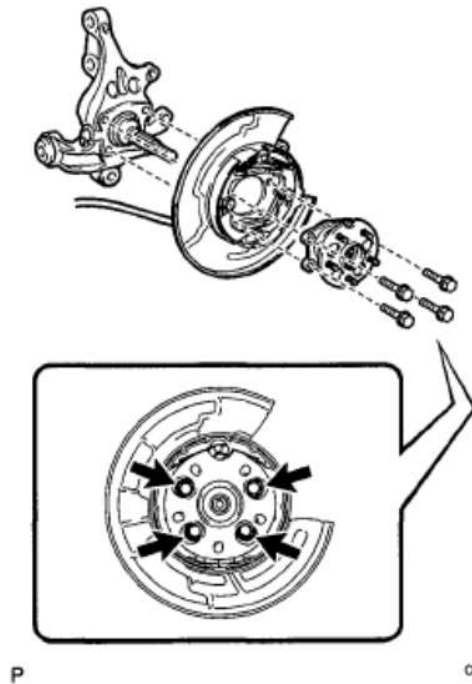


Fig. 67: Locating Rear Axle Hub And Bearing Assembly Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. TEMPORARILY INSTALL REAR AXLE SHAFT NUT

- a. Clean the threaded parts on the rear drive shaft assembly and rear axle shaft nut using a non-residue solvent.

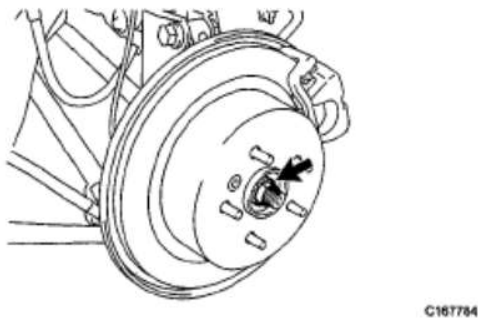


Fig. 68: Locating Rear Axle Shaft Nut
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Be sure to perform this work for a new rear drive shaft assembly.
- Keep the threaded parts free of oil and foreign objects.

- b. While applying the brakes, temporarily install a new rear axle shaft nut.

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Torque: 294 N*m (2996 kgf*cm, 216 ft.*lbf)

NOTE: Stake the nut after inspecting for looseness and runout in the following steps.

7. INSTALL REAR SPEED SENSOR

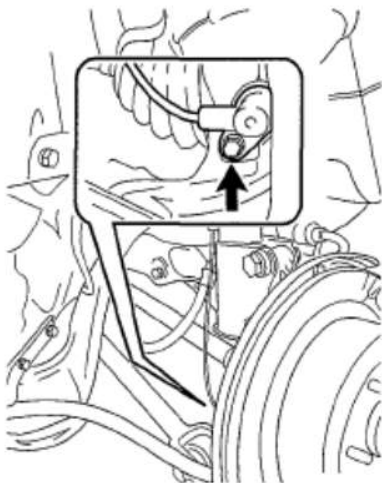
- a. Install the rear speed sensor to the rear axle carrier sub-assembly with the bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NOTE:

- Keep the rear speed sensor tip and sensor installation hole free from foreign matter.
- Do not twist the rear speed sensor wire when installing.

8. STABILIZE SUSPENSION (See INSTALLATION)



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Fig. 69: Locating Rear Speed Sensor Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM ASSEMBLY

- a. Fully tighten the rear No. 2 suspension arm assembly with the bolt and nut.

Torque: 112 N*m (1141 kgf*cm, 82 ft.*lbf)

NOTE:

- Since a stopper nut is used, tighten the bolt.
- The final torque must be applied under standard vehicle height conditions.

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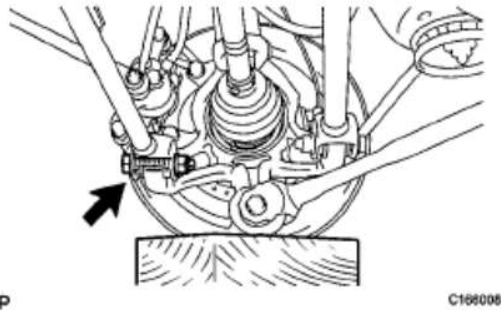


Fig. 70: Locating Rear No. 2 Suspension Arm Assembly Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM ASSEMBLY

- a. Fully tighten the rear No. 1 suspension arm assembly with the bolt and nut.

Torque: 112 N*m (1141 kgf*cm, 82 ft.*lbf)

NOTE:

- Since a stopper nut is used, tighten the bolt.
- The final torque must be applied under standard vehicle height conditions.

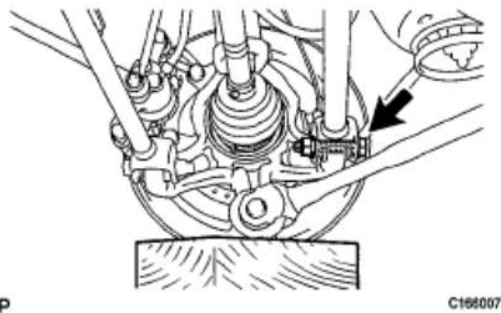


Fig. 71: Locating Rear No. 1 Suspension Arm Assembly Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. FULLY TIGHTEN REAR STRUT ROD ASSEMBLY (See INSTALLATION)
12. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY (See INSTALLATION)
13. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See REAR AXLE HUB (FOR 2WD))
14. REMOVE REAR DISC (See INSPECTION)
15. INSPECT REAR AXLE HUB BEARING LOOSENESS (See ON-VEHICLE INSPECTION)
16. INSPECT REAR AXLE HUB RUNOUT (See ON-VEHICLE INSPECTION)
17. INSTALL REAR DISC (See REASSEMBLY)
18. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See REAR AXLE HUB (FOR 2WD))
19. INSTALL REAR AXLE SHAFT NUT

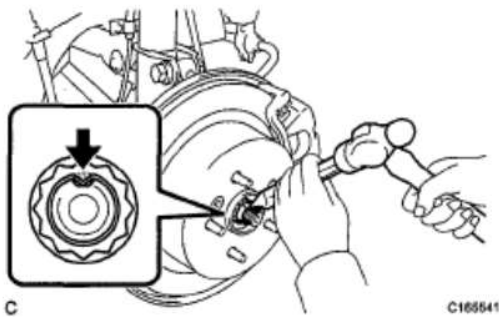
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- a. Using a chisel and a hammer, stake the rear axle shaft nut.

20. INSTALL REAR WHEEL**Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)****21. INSPECT AND ADJUST REAR WHEEL ALIGNMENT**

HINT:

See **REAR WHEEL ALIGNMENT****Fig. 72: Staking Rear Axle Shaft Nut**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. CHECK FOR SPEED SENSOR SIGNAL

HINT:

See **TEST MODE PROCEDURE**