

2002-03 SUSPENSION

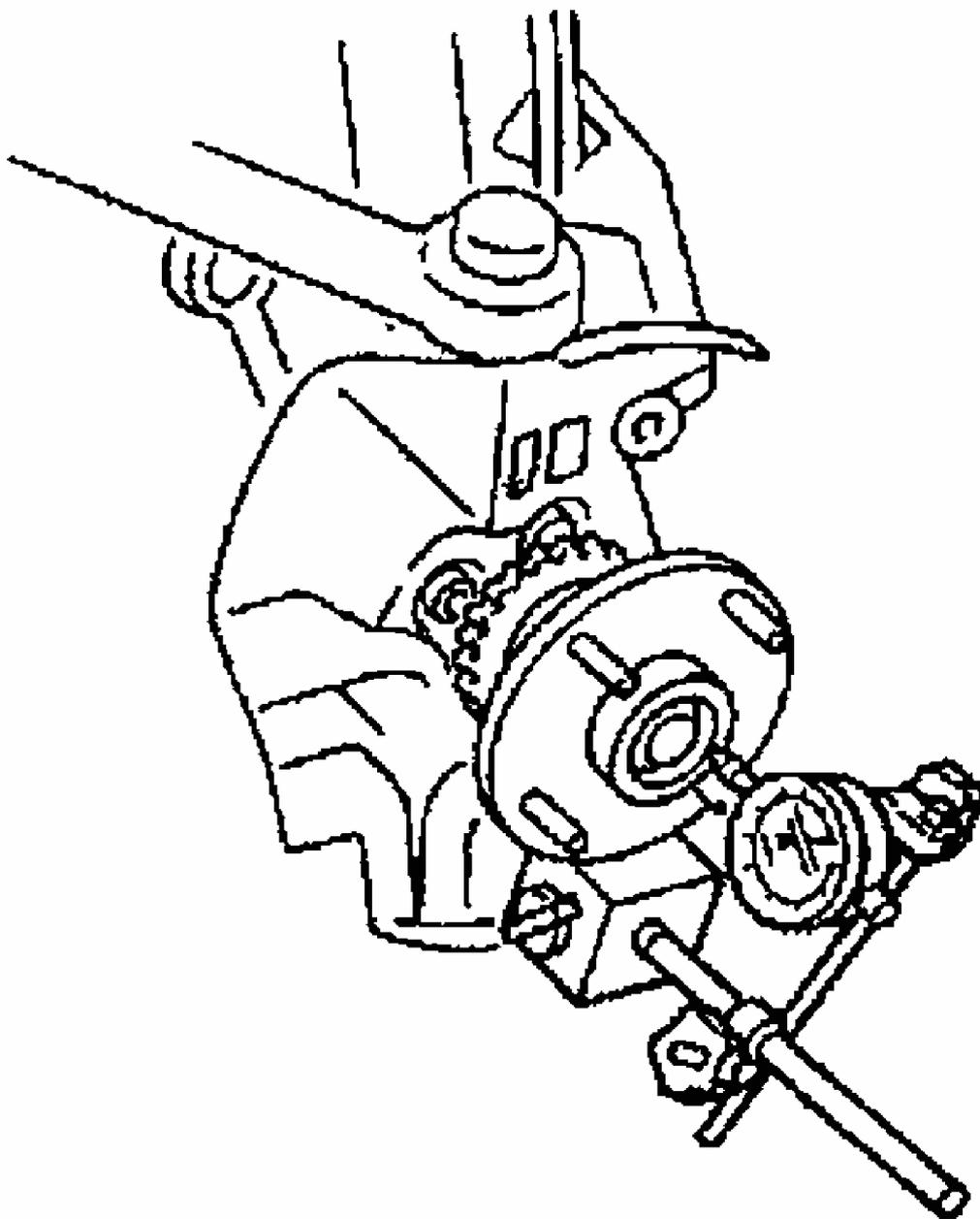
Front Suspension - MX-5 Miata

WHEEL HUB, STEERING KNUCKLE PRE-INSPECTION

WHEEL BEARING PLAY

1. Remove the brake caliper component and disc plate.
2. Position a dial indicator against the wheel hub.
3. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
4. If the bearing play exceeds the specification, inspect and tighten the locknut to the specified torque and retest.
 - Replace the wheel bearing as necessary.

Maximum wheel bearing play 0.05 mm {0.002 in}



G01174210

Fig. 1: Inspecting Wheel Bearing Play
Courtesy of MAZDA MOTORS CORP.

Fig. 2: Front Suspension Location Index
Courtesy of MAZDA MOTORS CORP.

FRONT STRUT BAR REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

Fig. 3: Front Strut Bar Removal & Installation
Courtesy of MAZDA MOTORS CORP.

**FRONT SHOCK ABSORBER AND COIL SPRING
REMOVAL/INSTALLATION**

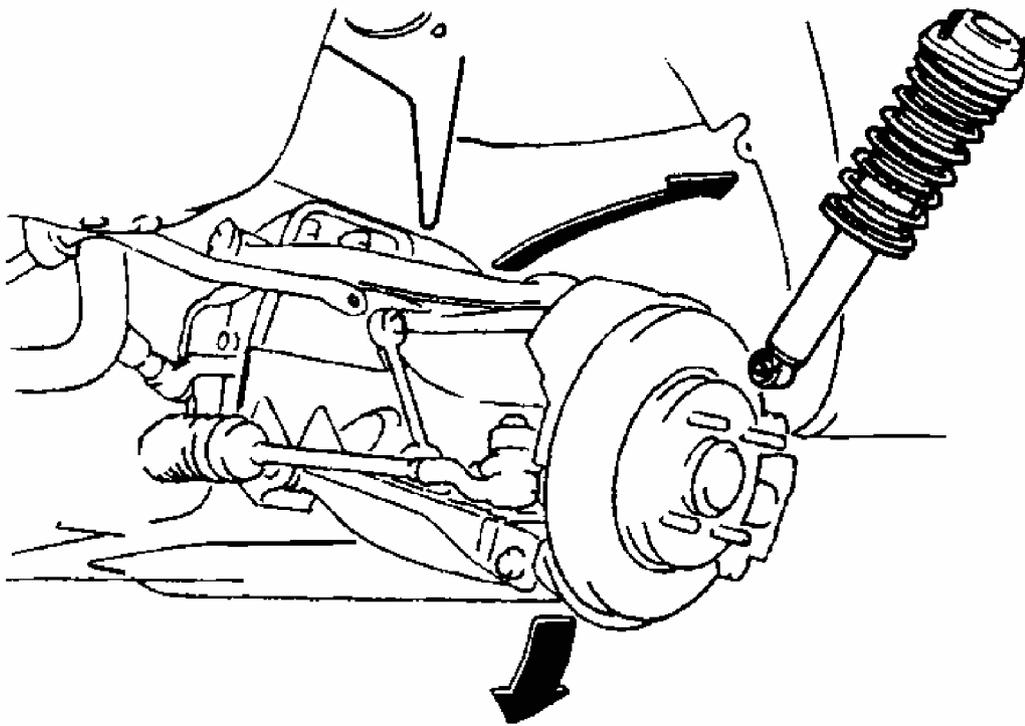
CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect the front wheel alignment. If not as specified, adjust the front wheel alignment. See **WHEEL ALIGNMENT** .

Fig. 4: Removing Front Shock Absorber
Courtesy of MAZDA MOTORS CORP.

FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL NOTE

1. Disconnect the lower arm ball joint. See **LOWER ARM BALL JOINT REMOVAL NOTE** .
2. Loosen the lower arm bolts.
3. Lower the lower arm to remove the shock absorber.



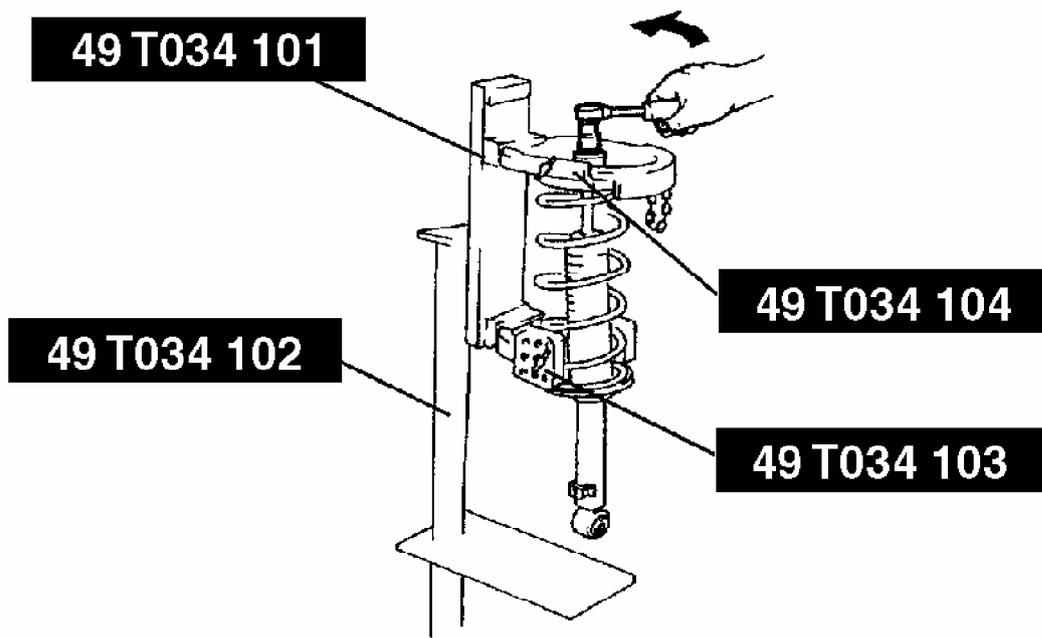
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Fig. 5: Removing Front Shock Absorber
Courtesy of MAZDA MOTORS CORP.

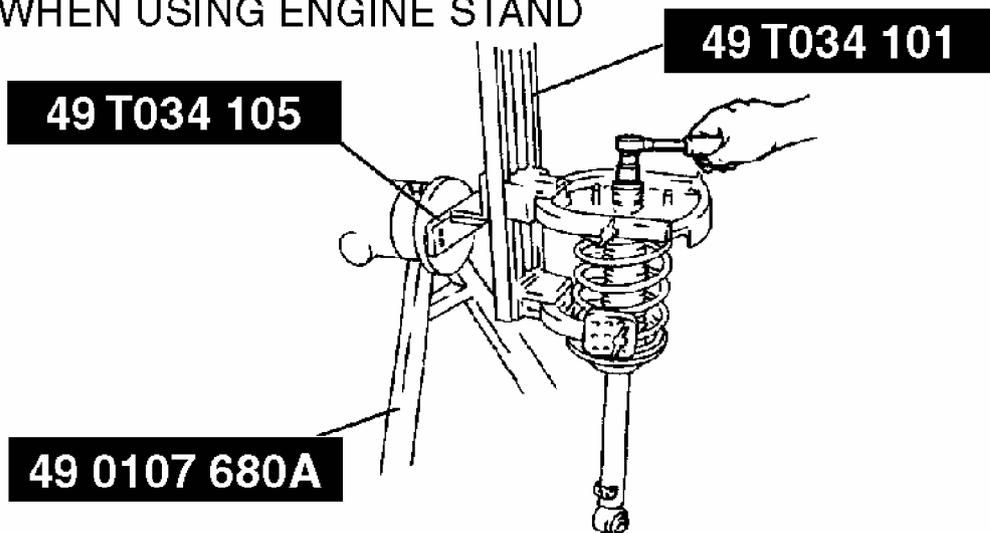
CAUTION: Do not lower the arms excessively, doing so may damage the brake hose.

PISTON ROD NUT REMOVAL NOTE

1. Loosen the piston rod nut several turns, but do not remove the nut.
2. Assemble the SSTs.



WHEN USING ENGINE STAND



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Fig. 6: Removing Shock Absorber Piston Rod Nut
 Courtesy of MAZDA MOTORS CORP.

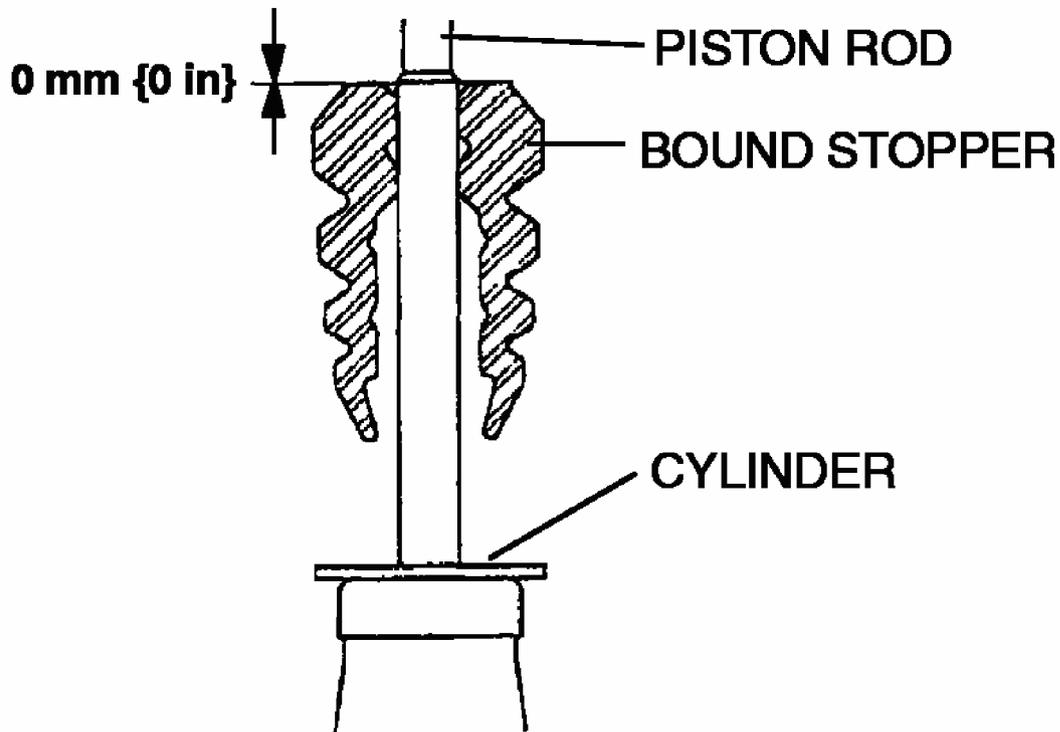
3. Secure the shock absorber in the SSTs.
4. Compress the coil spring using the SSTs and remove the nut.

WARNING: Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the

shock absorber in the SSTs before removing the coil spring nut.

BOUND STOPPER INSTALLATION NOTE

1. Install the bound stopper to the piston rod as shown.



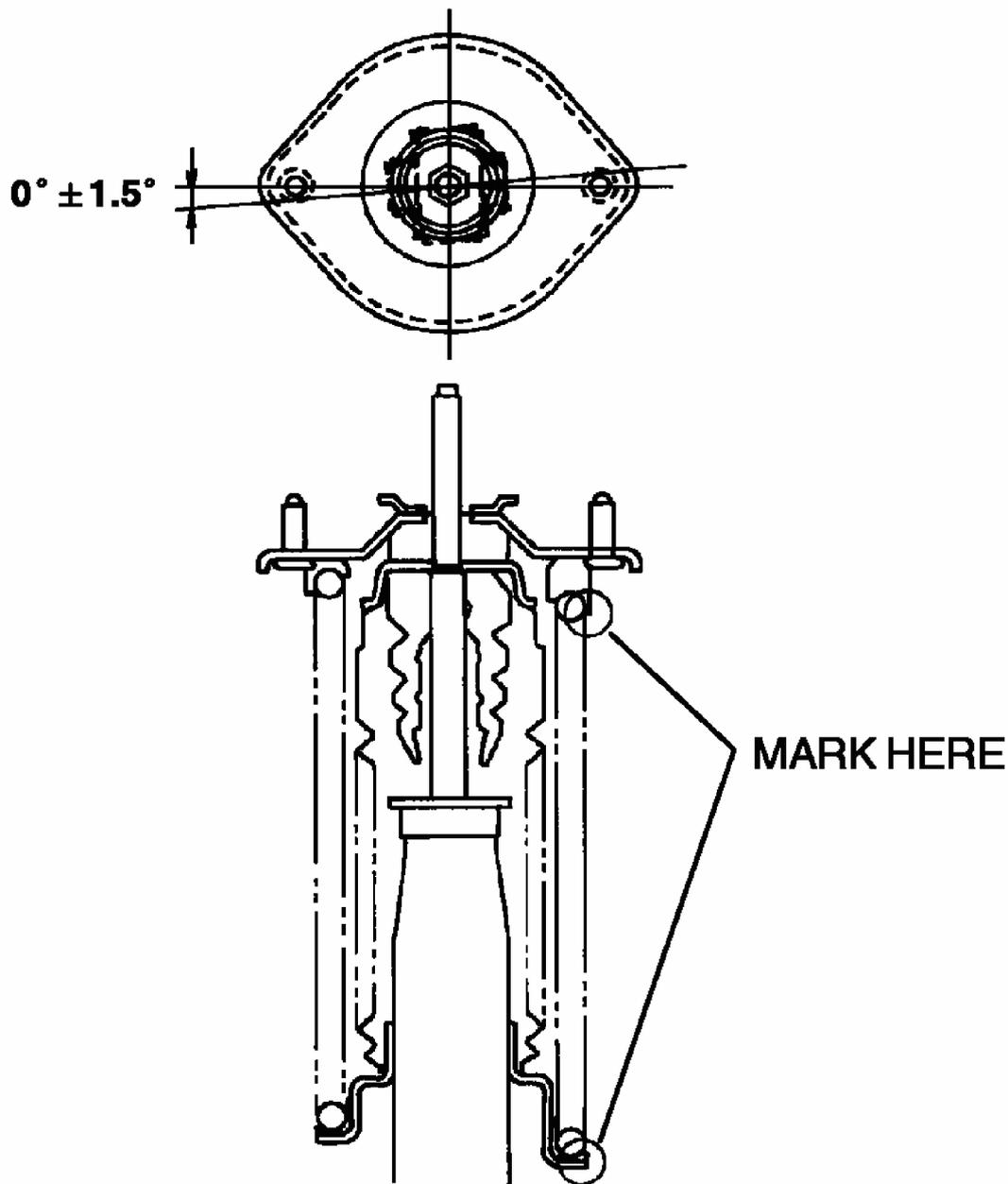
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Fig. 7: Installing Bound Stopper
Courtesy of MAZDA MOTORS CORP.

2. Verify that the lower end of the bound stopper does not contact the cylinder.

COIL SPRING INSTALLATION NOTE

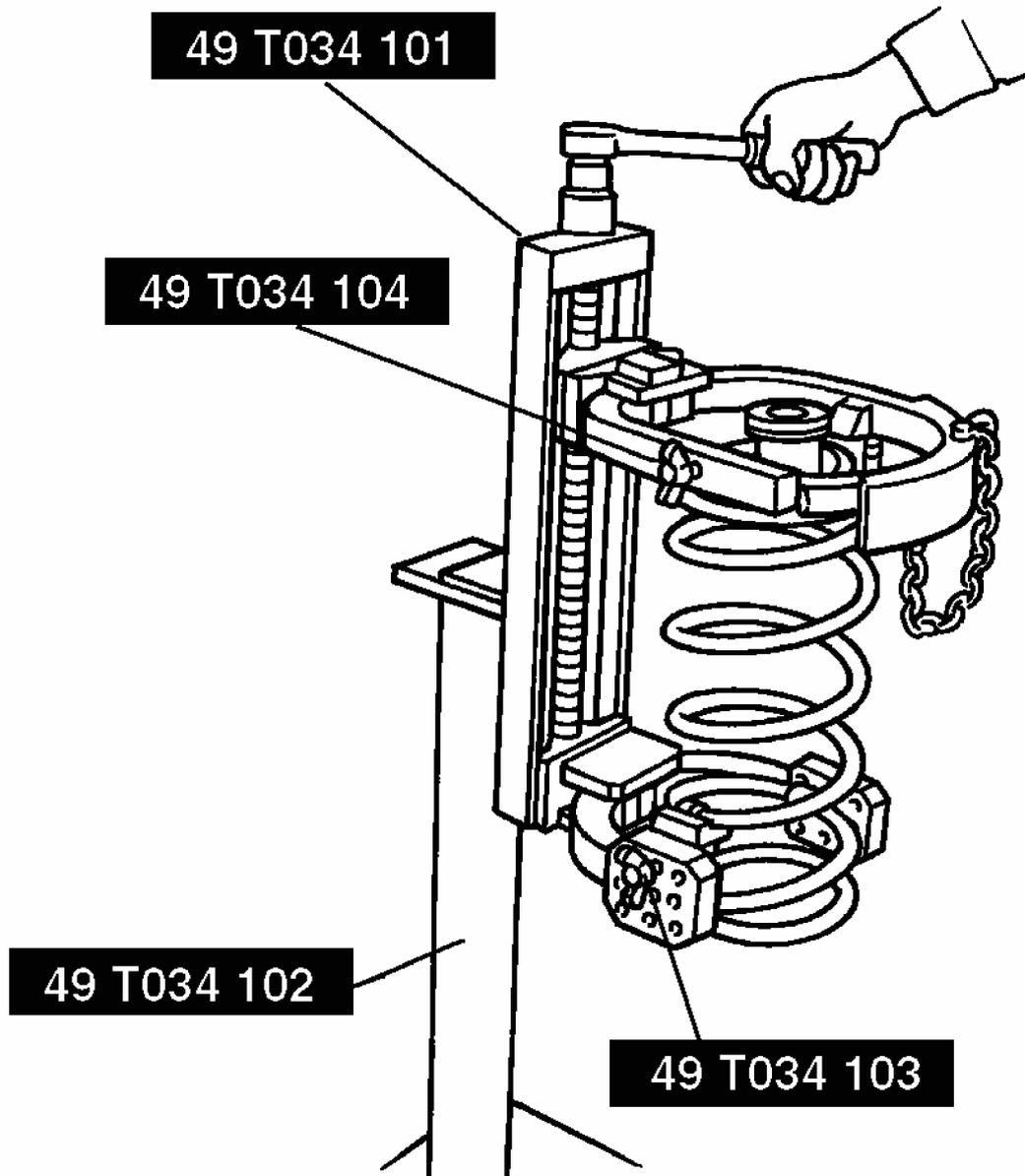
1. Temporarily install the upper spring seat, upper spring seat rubber and coil spring on the shock absorber as shown.



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Fig. 8: Installing Upper Spring Seat
Courtesy of MAZDA MOTORS CORP.

2. Mark the upper spring seat, shock absorber and coil spring for proper reassembly.
3. Align the marks of the upper spring seat and coil spring. Protect the upper spring seat and the coil spring with a piece of cloth, then assemble the SSTs.
4. Compress the spring using the SSTs.



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Fig. 9: Compressing Spring
Courtesy of MAZDA MOTORS CORP.

5. Install the shock absorber, making sure that the marks on the shock absorber and coil spring are aligned.
6. Tighten the nut several turns.
7. Remove the SSTs.
8. Secure the shock absorber in a vise.

CAUTION: Using an air tool will damage the piston rod thread. Do not use an air tool.

9. Apply an antirust penetrating oil lubricant to the piston rod thread and tighten the lower piston rod nut so that the exposed thread of the piston rod is 0.62-0.69" (15.7-17.7 mm).
10. Tighten the upper nut to the specified torque. Tightening torque 16-23 N.m (1.6-2.4 kgf.m, 12-17 ft.lbf).

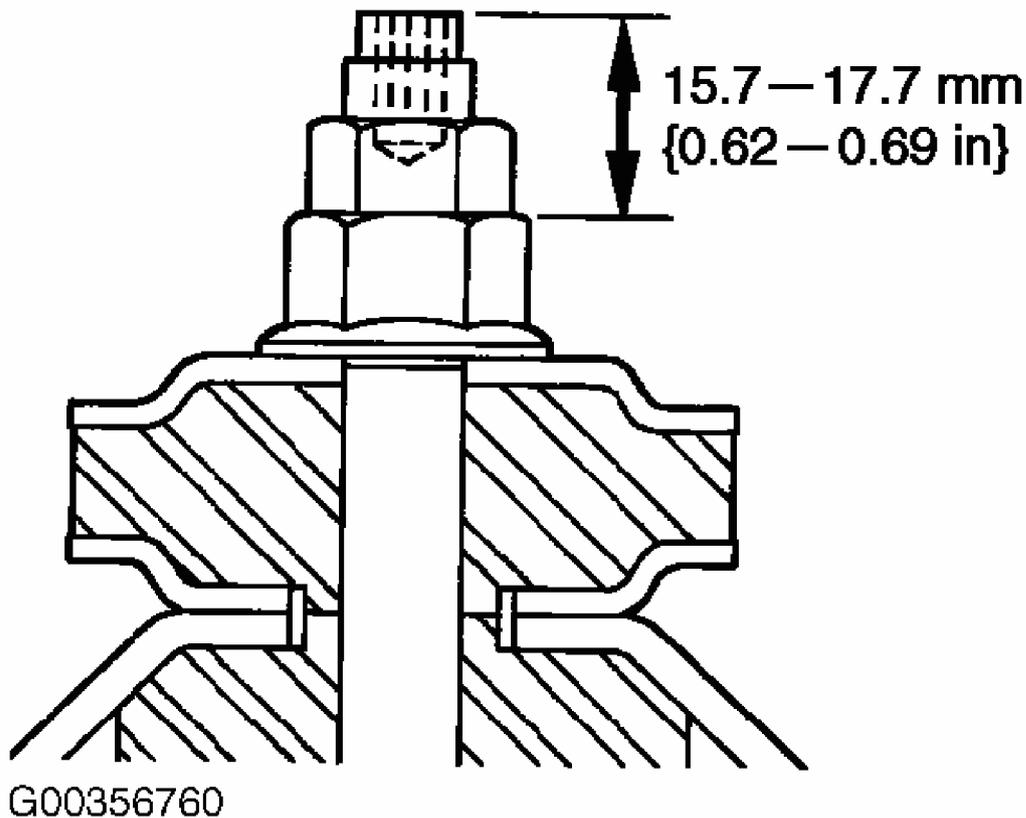


Fig. 10: Tightening Coil Spring Nut
Courtesy of MAZDA MOTORS CORP.

FRONT SHOCK ABSORBER

FRONT SHOCK ABSORBER INSPECTION

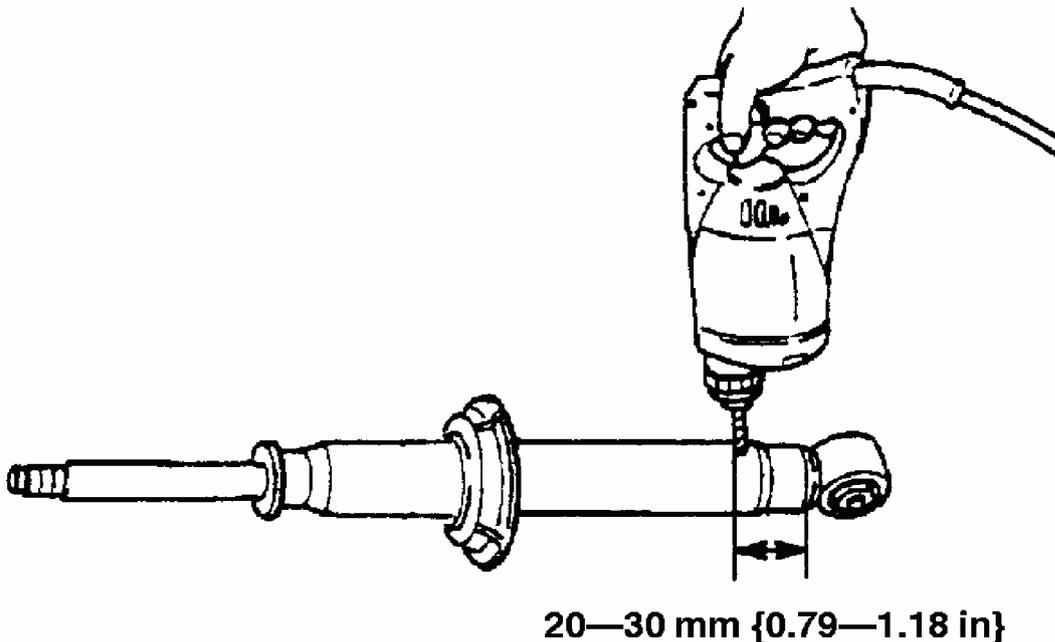
Inspect the following and replace as necessary.

- Inspect for damage and oil leakage.
- Inspect the rubber bushing for deterioration and wear.
- Compress and extend the shock piston at least 3 times. Verify that the operational force does not change and that there is no unusual noise.
 - Compress the shock absorber piston and release it.
 - Verify that the piston extends fully at a normal speed.

FRONT SHOCK ABSORBER DISPOSAL

Showa Shock Absorber

1. Clamp a shock absorber flat or with the piston downwards.
2. Drill a 0.08-0.11" (2-3 mm) hole at a point 0.79-1.18" (20-30 mm) from the bottom of the tube, so that the gas can escape.



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Fig. 11: Drilling Shock Absorber
Courtesy of MAZDA MOTORS CORP.

WARNING: Whenever drilling into a shock absorber, wear protective eye wear. The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling.

3. Turn the hole downwards.
4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of the waste oil according to local waste disposal laws.

NOTE: Shock absorber gas is nitrogen gas.

NOTE: Shock absorber oil is mineral oil.

Bilstein Shock Absorber

WARNING: Whenever drilling into a shock absorber, wear protective eye wear. The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling.

1. Clamp a shock absorber on a flat surface or with the piston pointing downwards.
2. Drill a 0.08-0.12" (2-3 mm) hole at a point 0.4-0.8" (10-20 mm) shown in the figure, so that the gas can escape.

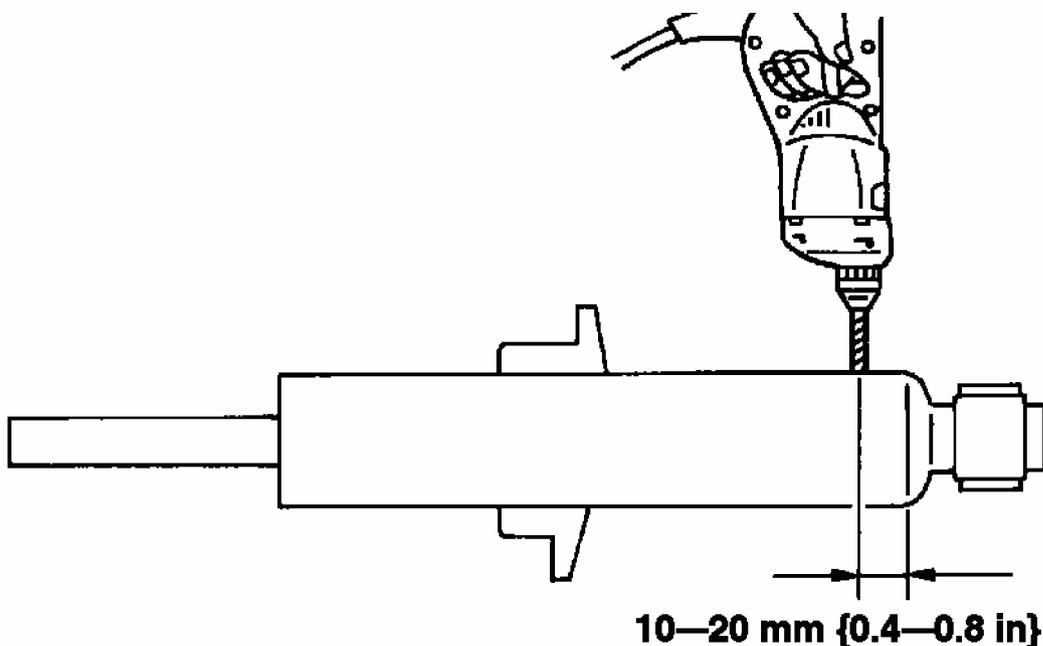
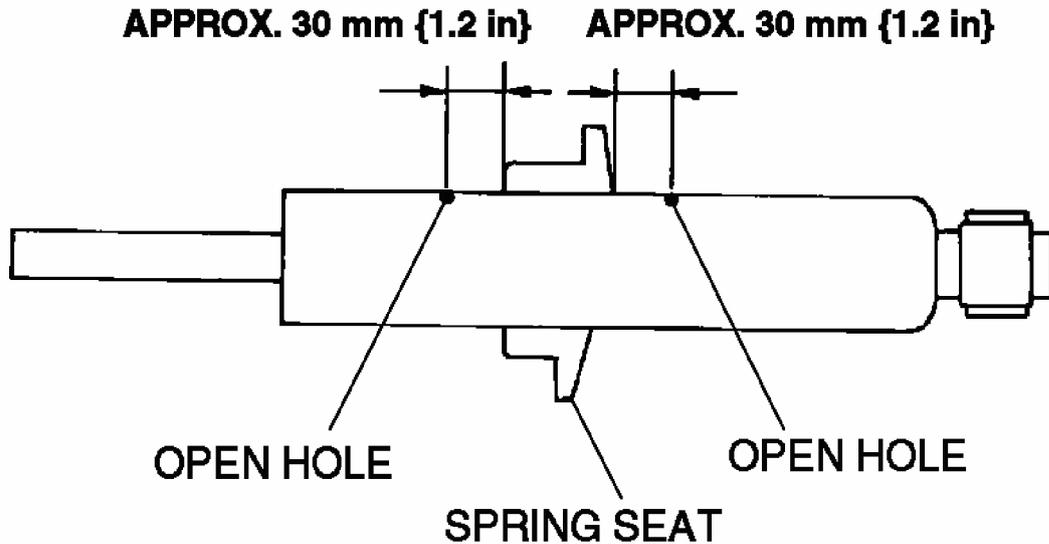


Fig. 12: Drilling Shock Absorber
 Courtesy of MAZDA MOTORS CORP.

3. Drill two 0.08-0.12" (2-3 mm) holes at points as shown in the figure, so that the oil can escape.



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Fig. 13: Locating Drill Points
 Courtesy of MAZDA MOTORS CORP.

4. Turn the hole downwards.
5. The oil can be collected by moving the piston rod several times up and down and drain the oil through the hole.
6. Dispose of waste oil according to the waste disposal law.

NOTE: Shock absorber gas is nitrogen gas.

NOTE: Shock absorber oil is mineral oil.

FRONT LOWER ARM REMOVAL/INSTALLATION

CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before

performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect the front wheel alignment. If not as specified, adjust the front wheel alignment. See **WHEEL ALIGNMENT** .

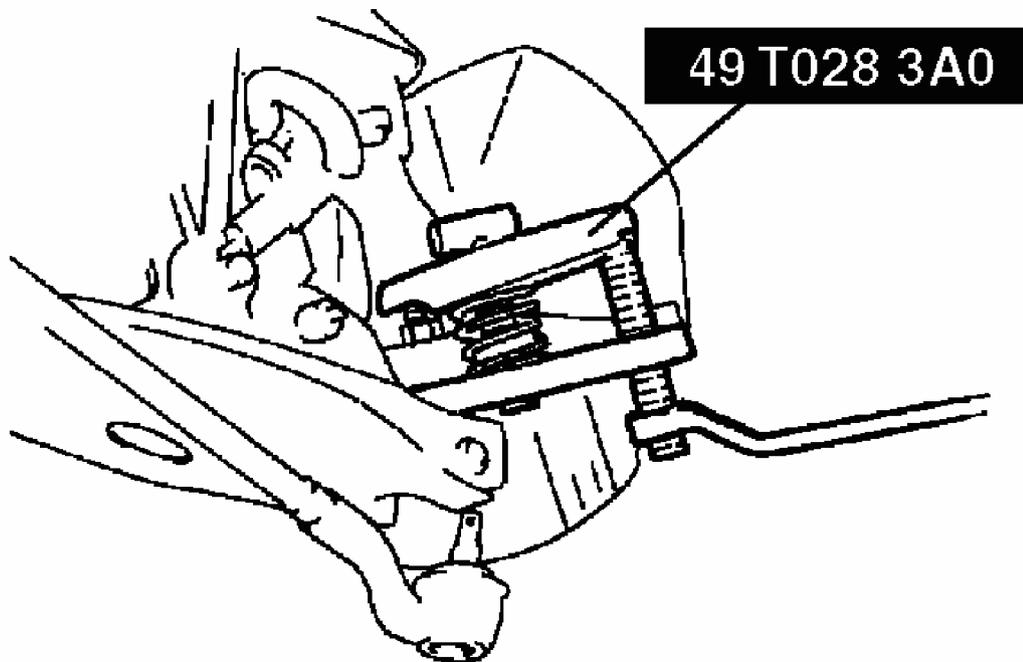
2003 Mazda MX-5 Miata

2002-03 SUSPENSION Front Suspension - MX-5 Miata

Fig. 14: Removing Front Lower Arm
Courtesy of MAZDA MOTORS CORP.

LOWER ARM BALL JOINT REMOVAL NOTE

Separate the ball joint from the knuckle using the SST.

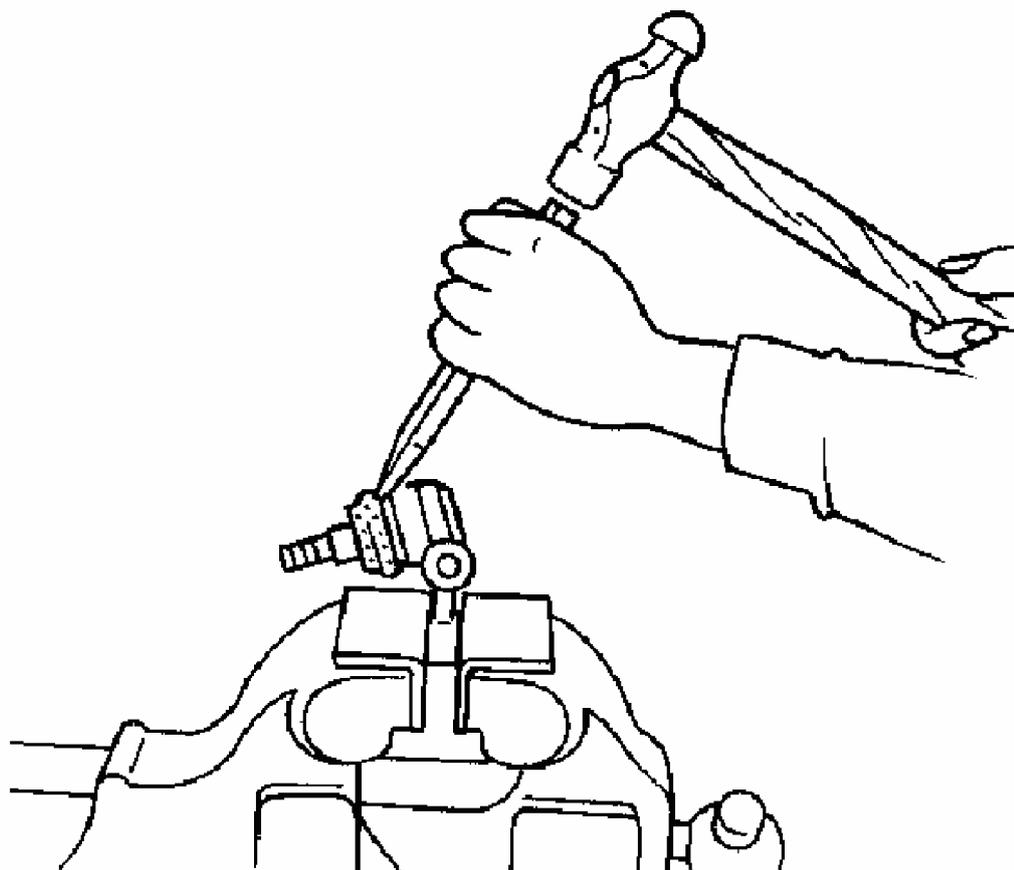


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Fig. 15: Removing Lower Arm Ball Joint
Courtesy of MAZDA MOTORS CORP.

DUST BOOT REMOVAL NOTE

Remove the dust boot using a chisel, being careful not to damage the ball joint and the arm.

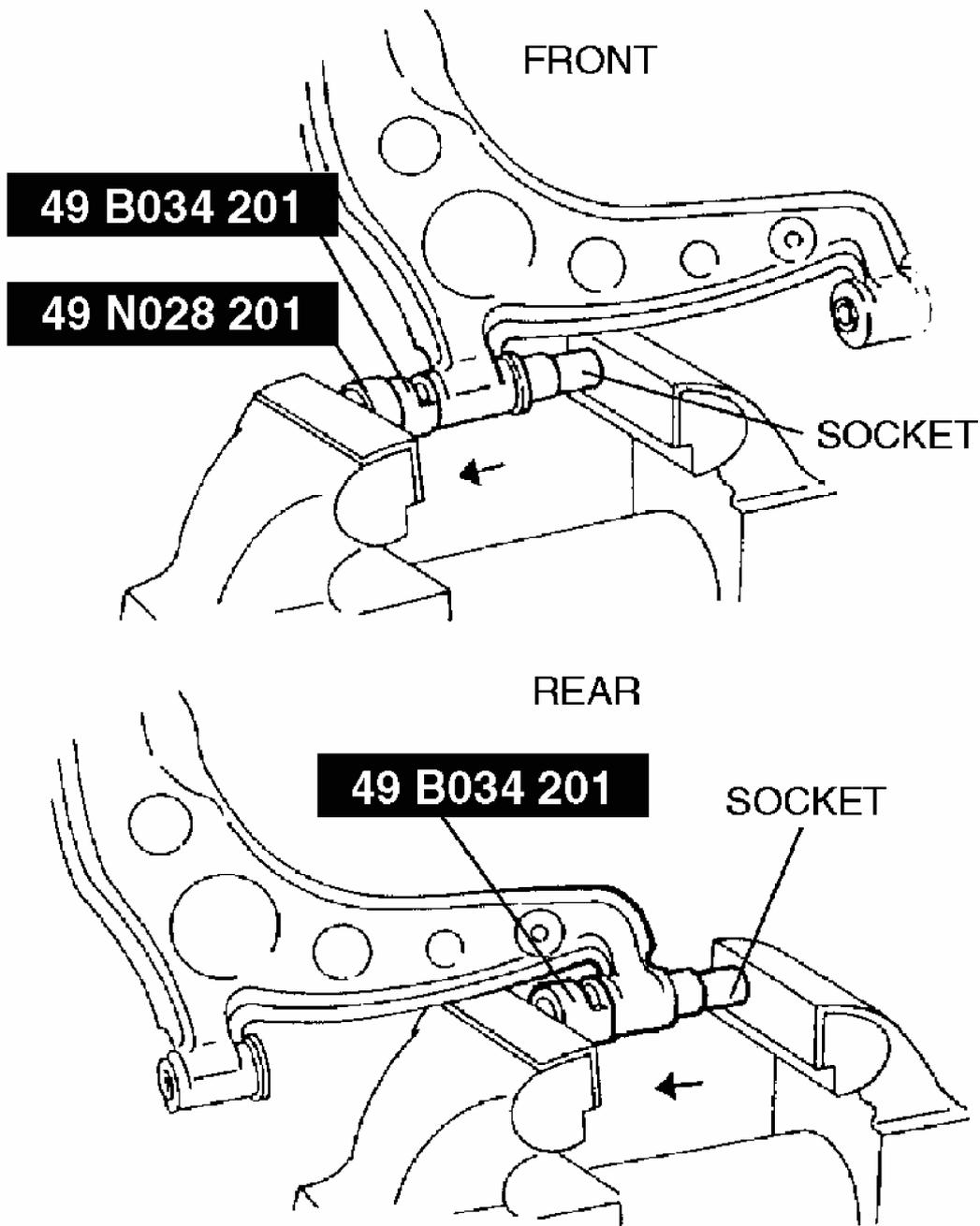


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Fig. 16: Removing Dust Boot
Courtesy of MAZDA MOTORS CORP.

LOWER ARM BUSHING (FRONT & REAR) REMOVAL NOTE

Press the lower arm bushing out using the SSTs and a socket as shown.



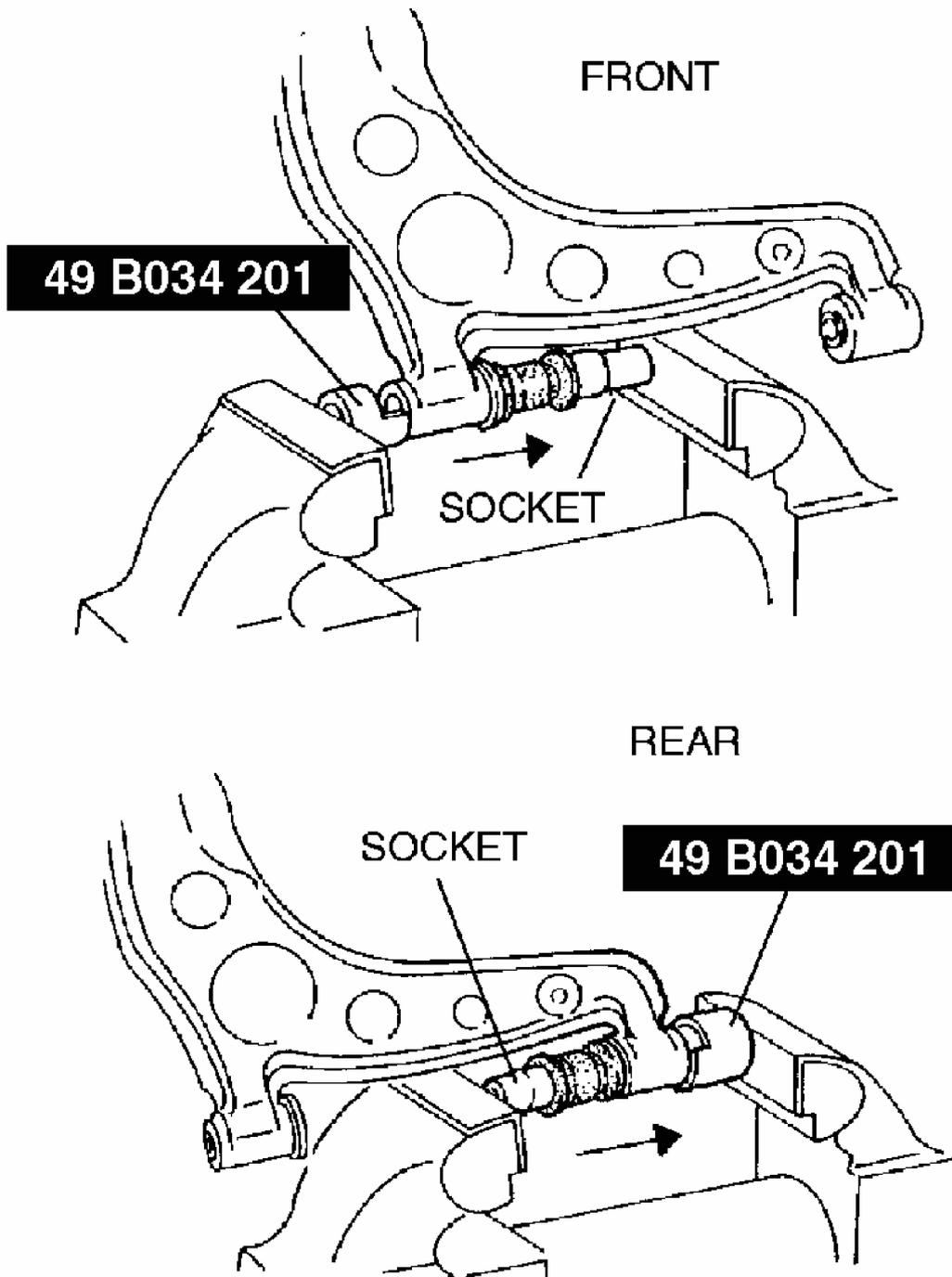
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Fig. 17: Removing Lower Arm Bushing
Courtesy of MAZDA MOTORS CORP.

LOWER ARM BUSHING (FRONT & REAR) INSTALLATION NOTE

1. Apply soapy water to the lower arm bushing.

2. Press the bushing in using the SST and a socket in the direction of the arrow.



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Fig. 18: Installing Lower Arm Bushing
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Wipe the grease off the ball joint.
2. Fill the inside of the new dust boot with grease.
3. Press the dust boot onto the ball joint using the SST.

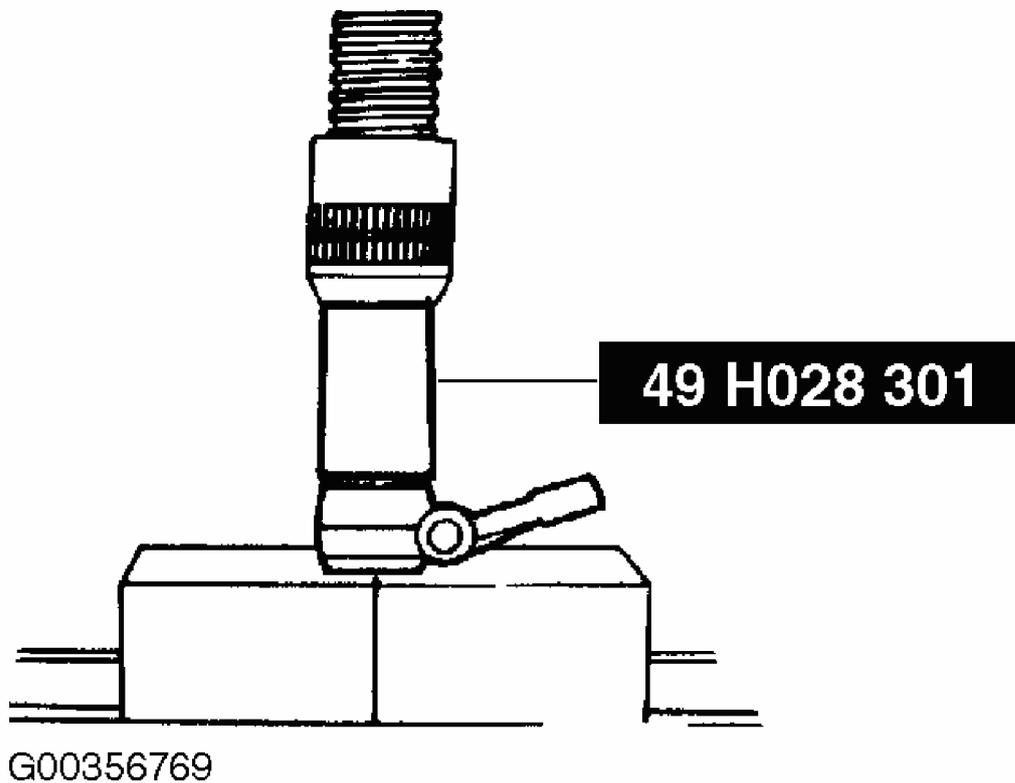


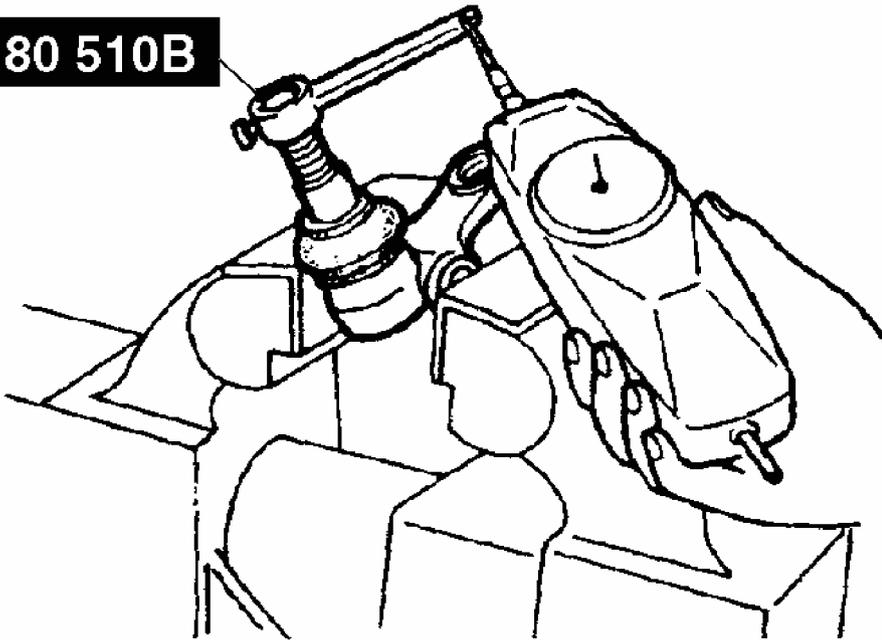
Fig. 19: Installing Dust Boot
Courtesy of MAZDA MOTORS CORP.

4. Wipe away the excess grease.

FRONT LOWER ARM INSPECTION

1. Shake the ball joint stud 5 times.
2. Connect the SST to the ball stud, and measure the rotation torque using a pull scale.
 - Replace if it is not within the specification.
 - Rotation torque 0.4-1.9 N.m (3.5-19.5 kgf.cm, 3.1-16.9 inch lbf).
 - Pull scale reading 3.5-19.1 N.m (0.35-1.95 kgf, 0.78-4.29 lbf).

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Fig. 20: Identifying Rotation Torque
Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM REMOVAL/INSTALLATION

CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect the front wheel alignment. If not as specified, adjust the front wheel alignment. See WHEEL ALIGNMENT .

2003 Mazda MX-5 Miata

2002-03 SUSPENSION Front Suspension - MX-5 Miata

Fig. 21: Removing Front Upper Arm
Courtesy of MAZDA MOTORS CORP.

UPPER ARM BALL JOINT REMOVAL NOTE

Separate the upper arm ball joint from the knuckle using the SST.

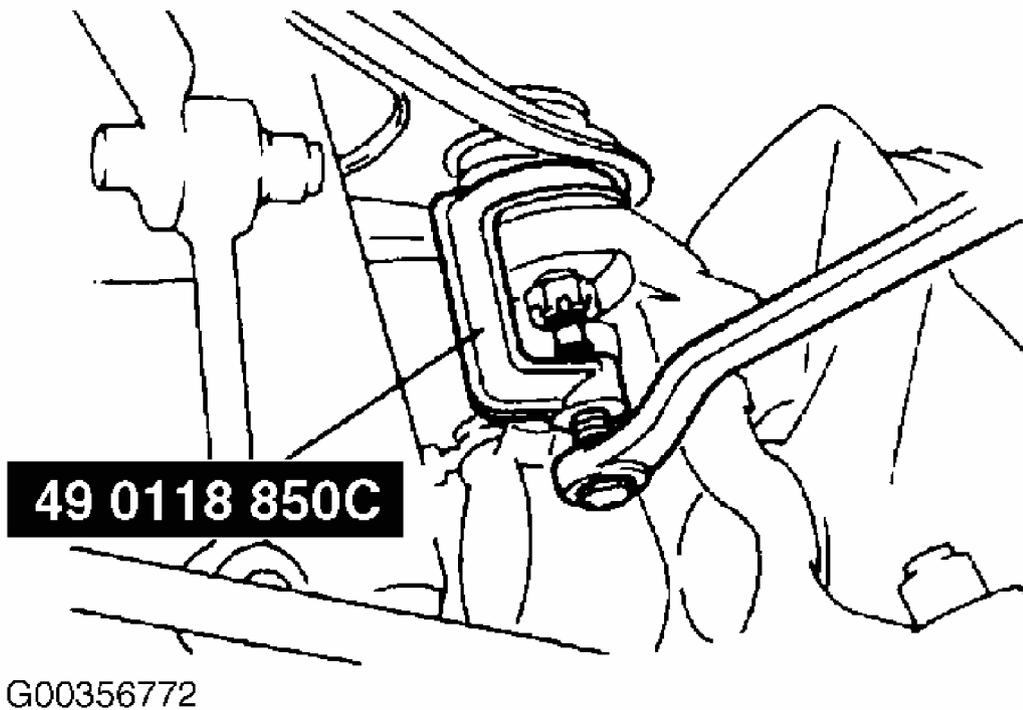
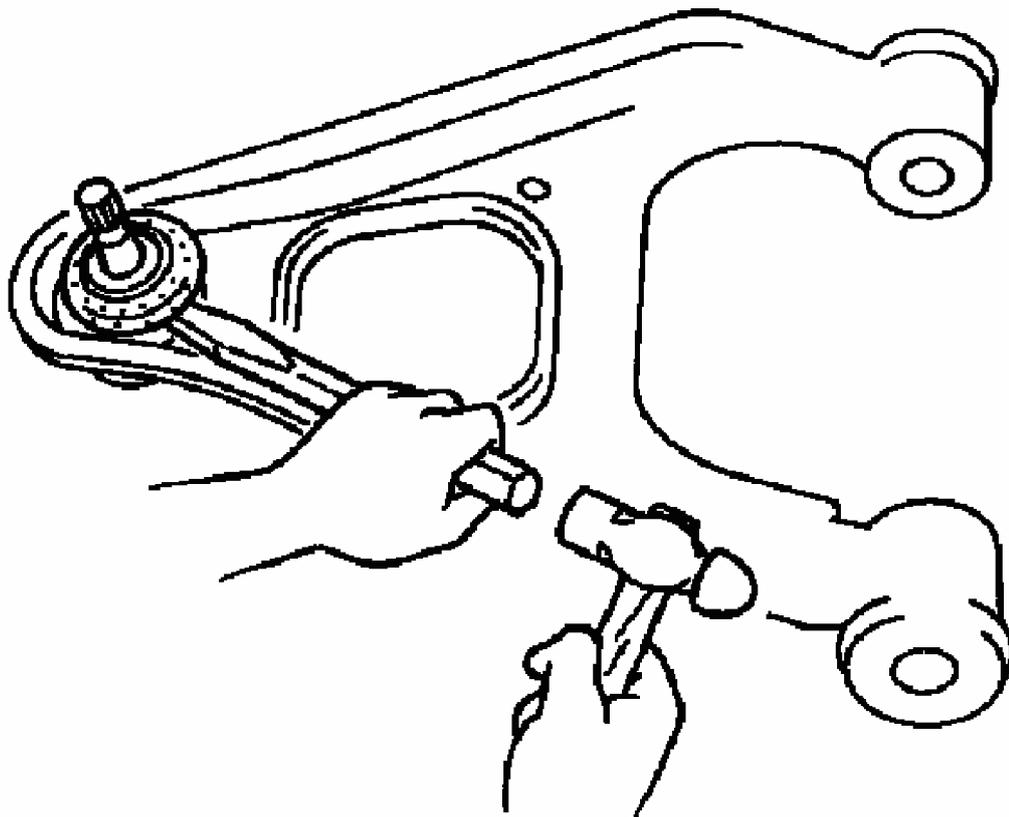


Fig. 22: Removing Upper Arm Ball Joint
Courtesy of MAZDA MOTORS CORP.

DUST BOOT REMOVAL NOTE

Remove the dust boot using a chisel, being careful not to damage the ball joint and the arm.



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Fig. 23: Removing Dust Boot
Courtesy of MAZDA MOTORS CORP.

UPPER ARM BUSHING (FRONT & REAR) REMOVAL NOTE

Press the upper arm bushing out using the SST and a socket as shown.

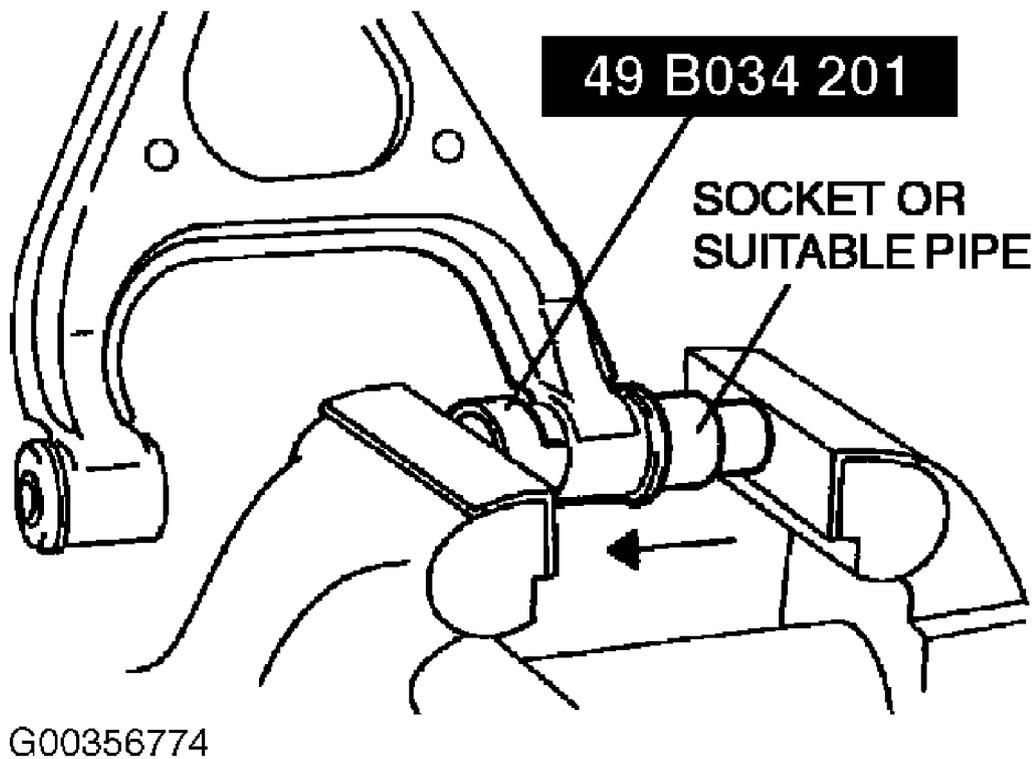


Fig. 24: Removing Upper Arm Bushing
Courtesy of MAZDA MOTORS CORP.

UPPER ARM BUSHING (FRONT & REAR) INSTALLATION NOTE

1. Apply soapy water to the upper arm bushing.
2. Press the bushing in using the SST and a socket in the direction of the arrow.

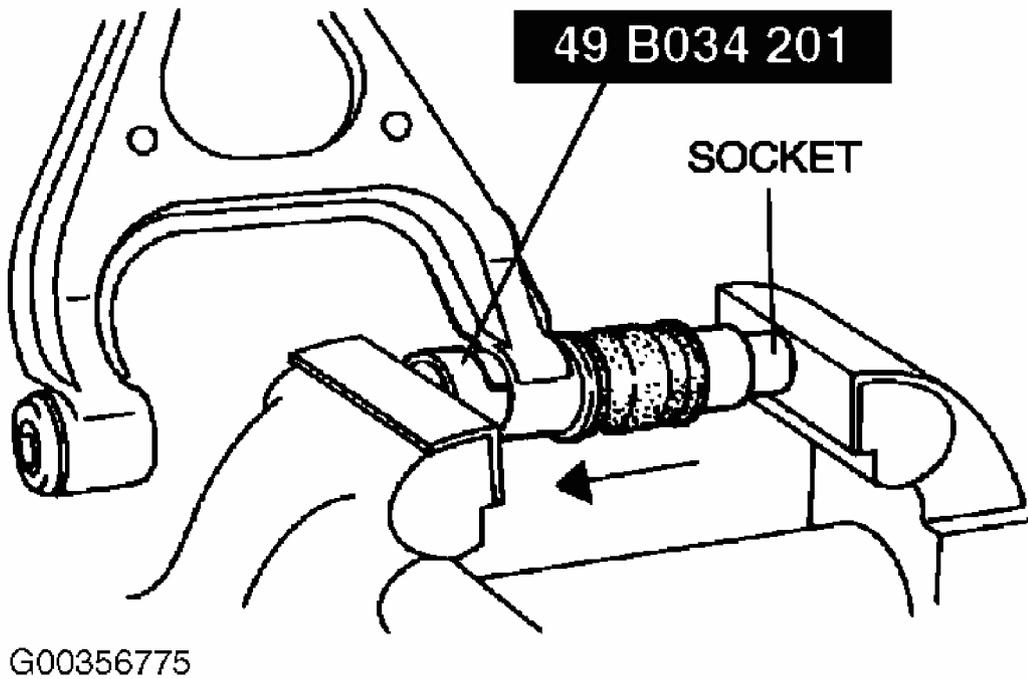


Fig. 25: Installing Upper Arm Bushing
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Fill the inside of the new dust boot with grease.
2. Press the dust boot on using a 1.18" (30 mm) socket until the dust boot contacts the seat.

CAUTION: Install the dust boot squarely and do not press excessively. The inner metal ring will be deformed if not done correctly.

3. Verify that the clearance between the boot and the seat is less than 0.04" (1 mm).

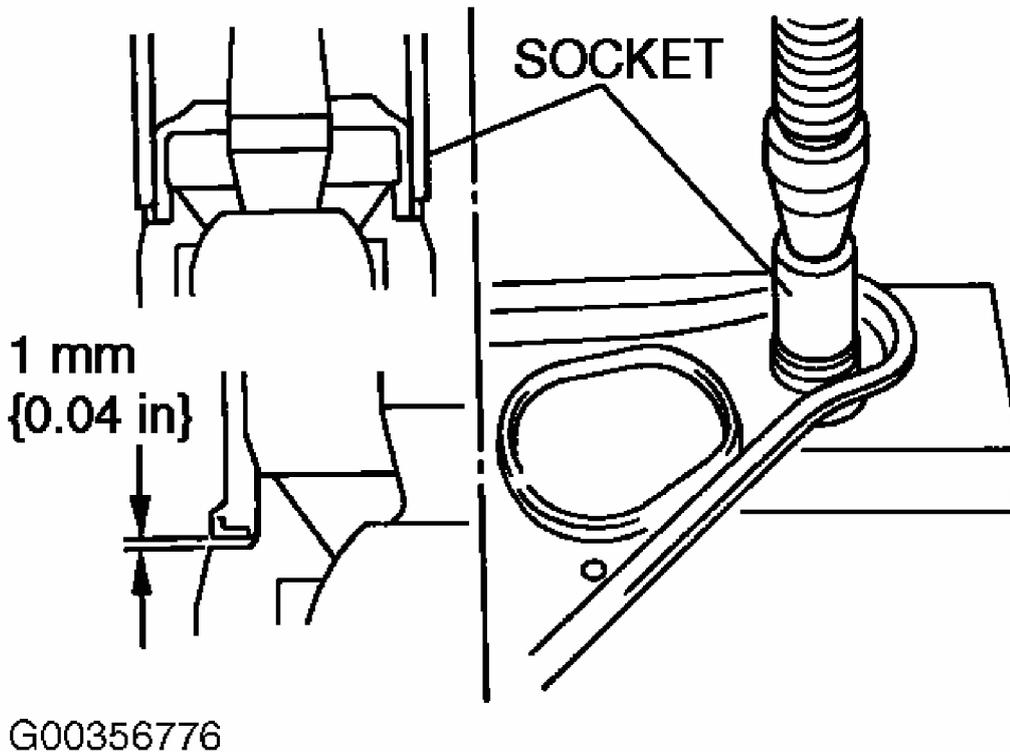


Fig. 26: Installing Dust Boot
Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM INSPECTION

1. Shake the ball joint stud 5 times.
2. Connect the SST to the ball stud, and measure the rotation torque using a pull scale. Replace if it is not within the specification. See **Fig. 20**.
3. Rotation torque 0.3-2.2 N.m (2.8-23.4 kgf. cm, 2.5-20.3 in. lbf).
4. Pull scale reading 3.0-22.5 N (0.3-2.3 kgf, 0.7-5.0 lbf).

FRONT STABILIZER REMOVAL/INSTALLATION

CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while

servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

Fig. 27: Removing Front Stabilizer
Courtesy of MAZDA MOTORS CORP.

STABILIZER BUSHING INSTALLATION NOTE

Align the bushing with the positioning bushing on the stabilizer.

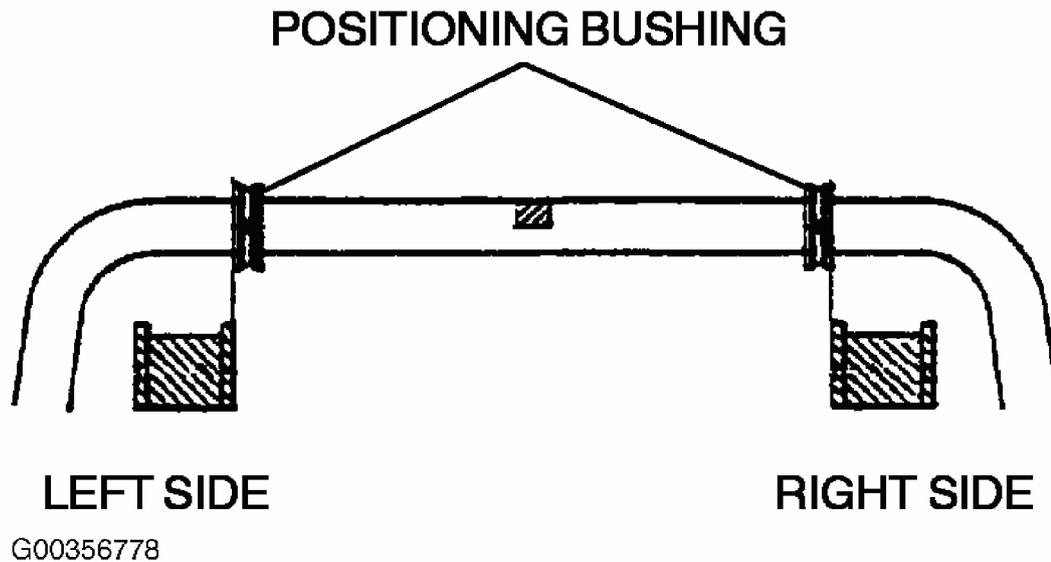
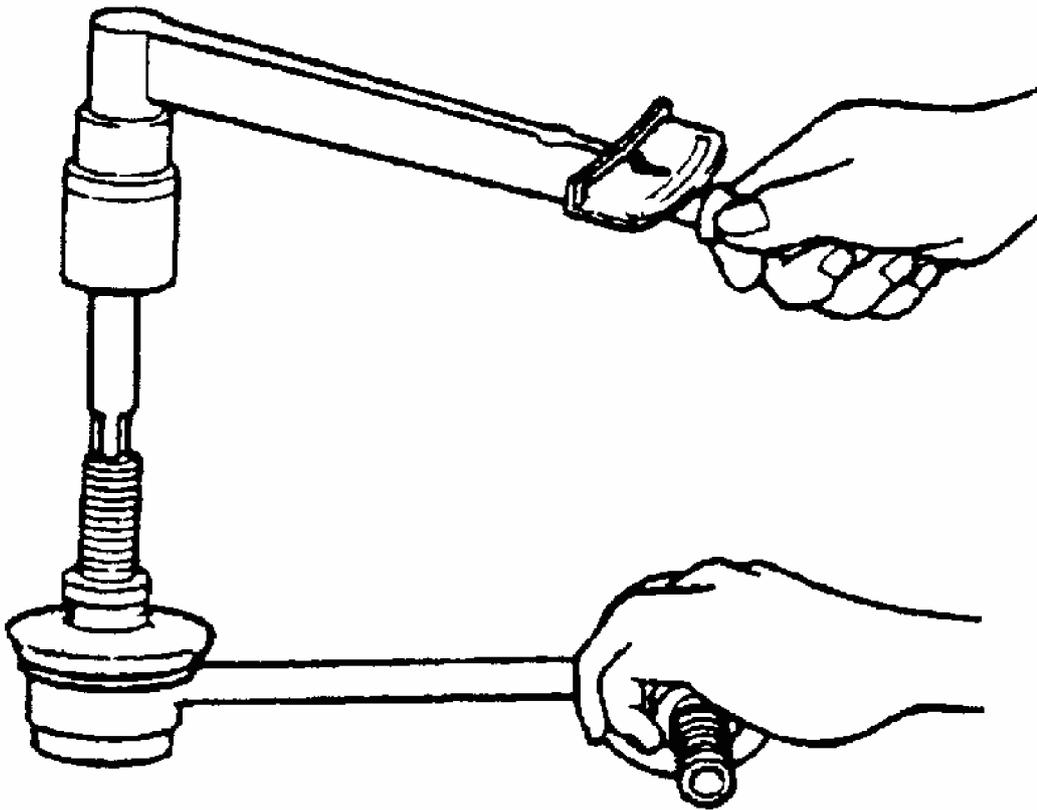


Fig. 28: Aligning Stabilizer Bushings
Courtesy of MAZDA MOTORS CORP.

STABILIZER CONTROL LINK INSPECTION (FRONT/REAR)

1. Remove the stabilizer control link from the vehicle.
2. Inspect for bending and damage.
3. Measure the ball joint starting torque.
 - Rock the ball joint stud side to side 10 times.
 - Rotate the ball joint stud 10 times.
 - Measure the starting torque using a suitable Allen socket and a torque wrench.
 - Replace if it is not within the specification.
 - Starting torque 0.2-2.7 N.m {1.4-27 kgf cm, 1.3-23.4 inch lbf}.



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Fig. 29: Inspecting Stabilizer Control Link
Courtesy of MAZDA MOTORS CORP.

FRONT CROSSMEMBER REMOVAL/INSTALLATION

CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Support the engine with a hoist or baby crane.
2. Remove the steering gear and linkage. See **STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION** .
3. Remove the steering knuckles. See **WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION** .

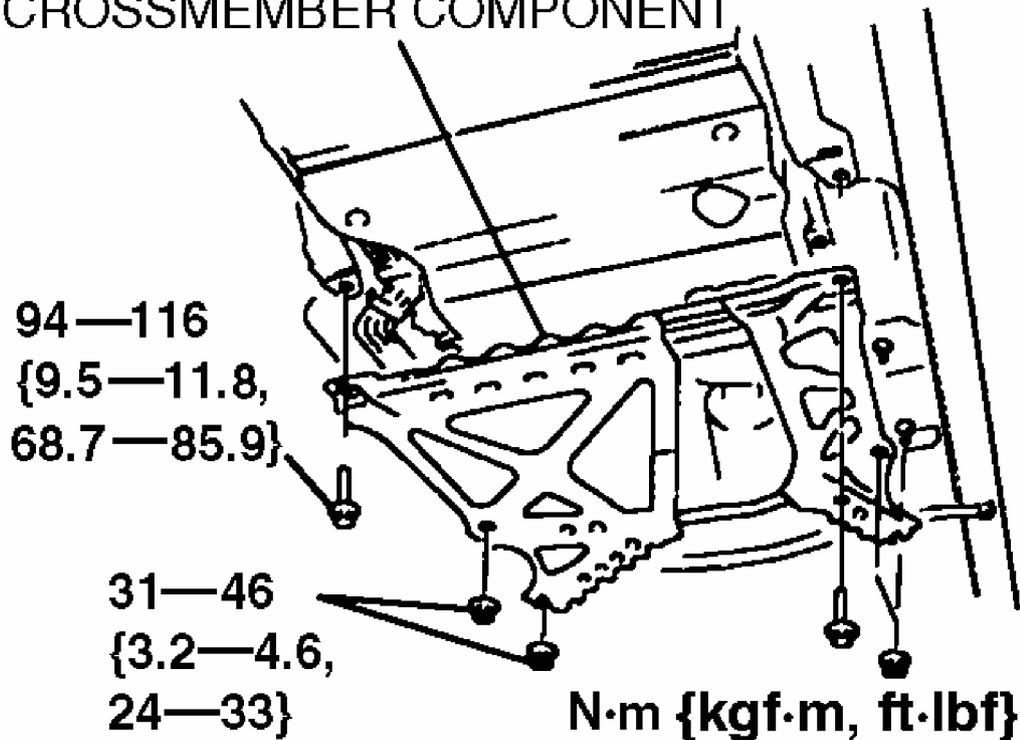
4. Remove the front stabilizer. See **FRONT STABILIZER REMOVAL/INSTALLATION** .
5. Remove the front lower arms. See **FRONT LOWER ARM REMOVAL/INSTALLATION** .
6. Remove the front upper arms. See **FRONT UPPER ARM REMOVAL/INSTALLATION** .
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Inspect the front wheel alignment. If not as specified, adjust the front wheel alignment. See **WHEEL ALIGNMENT** .

Fig. 30: Removing Front Crossmember
Courtesy of MAZDA MOTORS CORP.

CROSSMEMBER COMPONENT REMOVAL/INSTALLATION

1. Remove the crossmember component.
2. Install in the reverse order of removal.

CROSSMEMBER COMPONENT



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Fig. 31: Removing Crossmember Component
Courtesy of MAZDA MOTORS CORP.

STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION

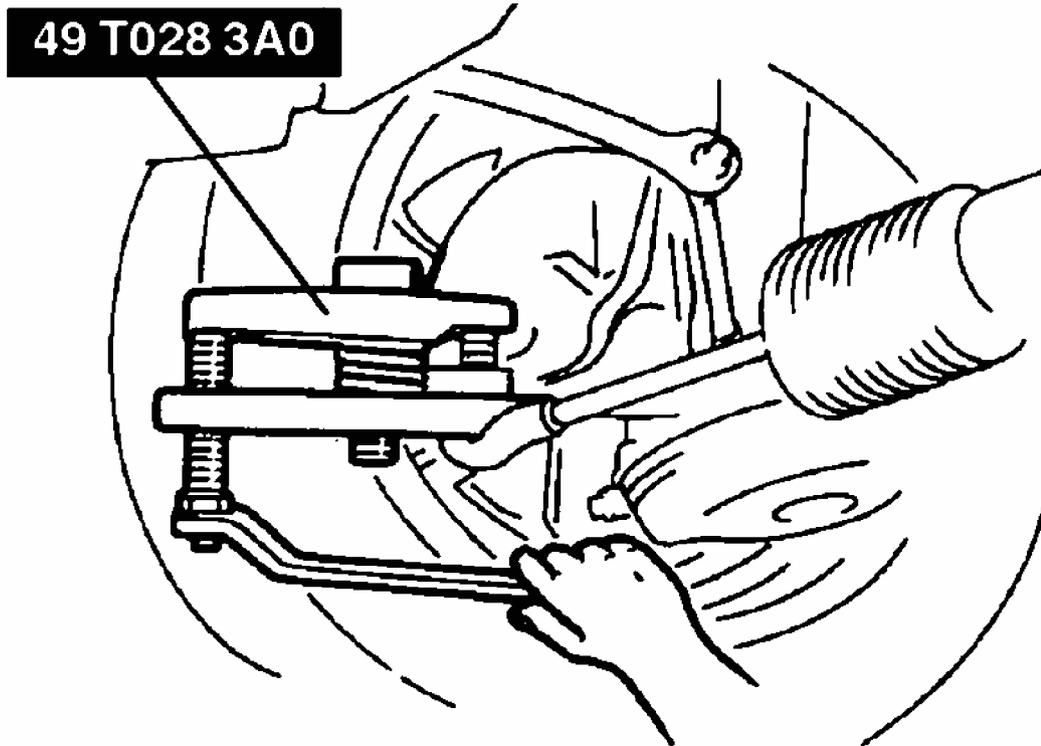
CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. With the wheels in the straight-ahead position, remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the total toe-in.

Fig. 32: Removing Steering Gear & Linkage
Courtesy of MAZDA MOTORS CORP.

TIE-ROD END BALL JOINT REMOVAL NOTE

Separate the tie-rod end ball joint from the knuckle using the SST.



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Fig. 33: Separating Tie-Rod End
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION

CAUTION: Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, adjust the total toe-in. See **TOTAL TOE-IN ADJUSTMENT** .

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Fig. 34: Removing Wheel Hub & Steering Knuckle
Courtesy of MAZDA MOTORS CORP.

TOTAL TOE-IN ADJUSTMENT

**CAUTION: Adjust the toe-in before adjusting the
camber.**

1. Loosen the front and/or rear cam nuts.

2. Turn the front and/or rear adjusting cam bolts equally to provide the correct toe-in.

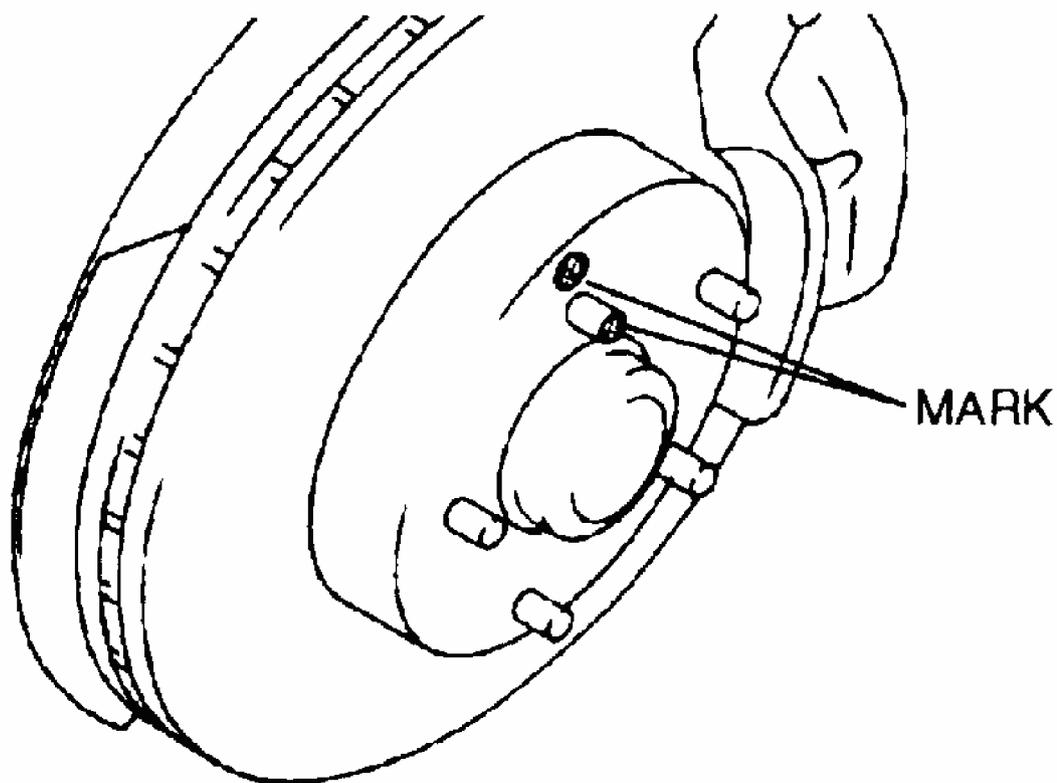
Fig. 35: Adjusting Total Toe-In
Courtesy of MAZDA MOTORS CORP.

NOTE: Turning the front cam one graduation changes the toe-in about 0.1" (2.3 mm) and the camber about 13'. Turning the rear cam one graduation changes the toe-in about 0.1" (2.3 mm) and the camber about 8'.

3. Adjust the camber.

DISC PLATE REMOVAL NOTE

Mark the wheel hub bolt and disc plate before removal for reference during installation.



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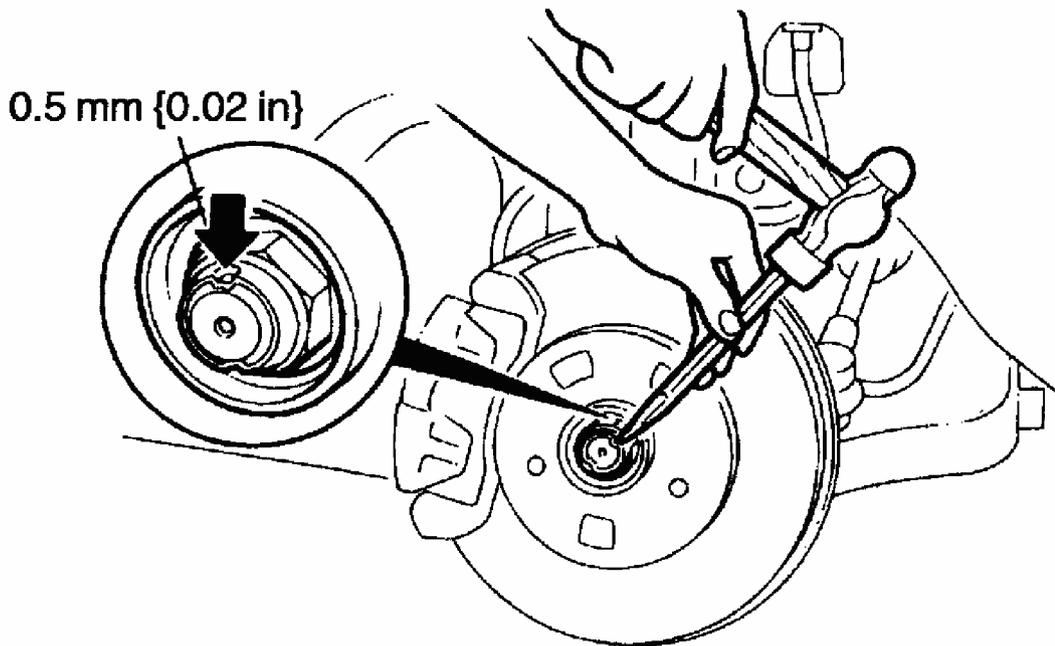
Fig. 36: Identifying Marking On Wheel Hub
Courtesy of MAZDA MOTORS CORP.

DISC PLATE INSTALLATION NOTE

1. Remove any rust or grime on the contact face of the disc plate and wheel hub.
2. Install the disc plate and align the marks made before removal.

LOCKNUT INSTALLATION NOTE

Install a new locknut and stake it as shown.



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Fig. 37: Installing Lock Nut
Courtesy of MAZDA MOTORS CORP.

TIE-ROD END BALL JOINT REMOVAL NOTE

See TIE-ROD END BALL JOINT REMOVAL NOTE .

LOWER ARM BALL JOINT REMOVAL NOTE

See LOWER ARM BALL JOINT REMOVAL NOTE .

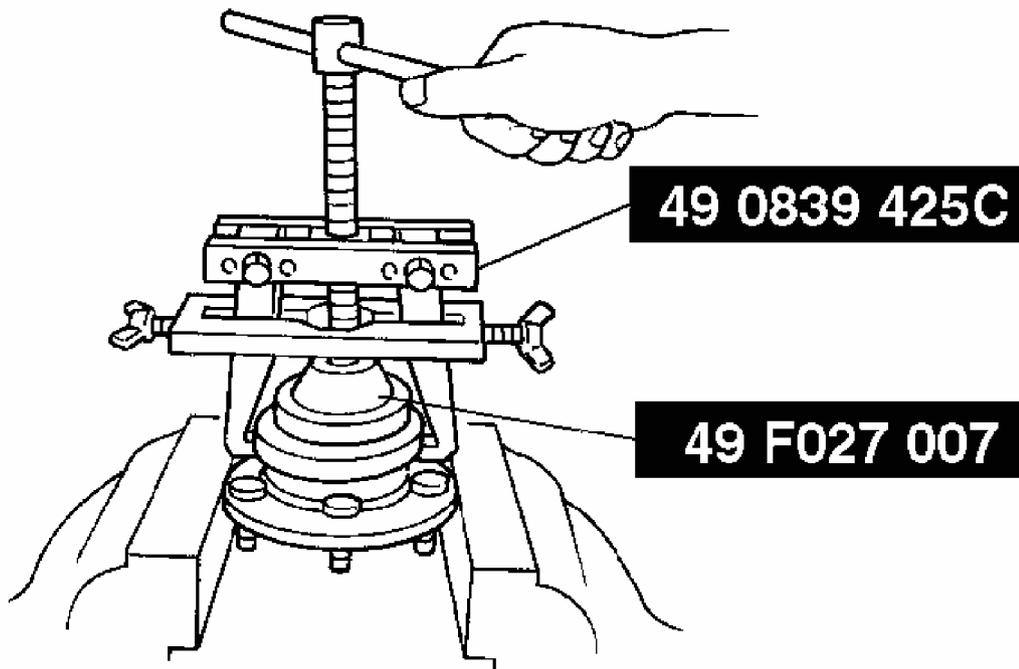
UPPER ARM BALL JOINT REMOVAL NOTE

See UPPER ARM BALL JOINT REMOVAL NOTE .

ABS SENSOR ROTOR REMOVAL NOTE

NOTE: The sensor rotor does not need to be removed unless replacing it.

Secure the front wheel hub in a vise and remove the sensor rotor using the SSTs.



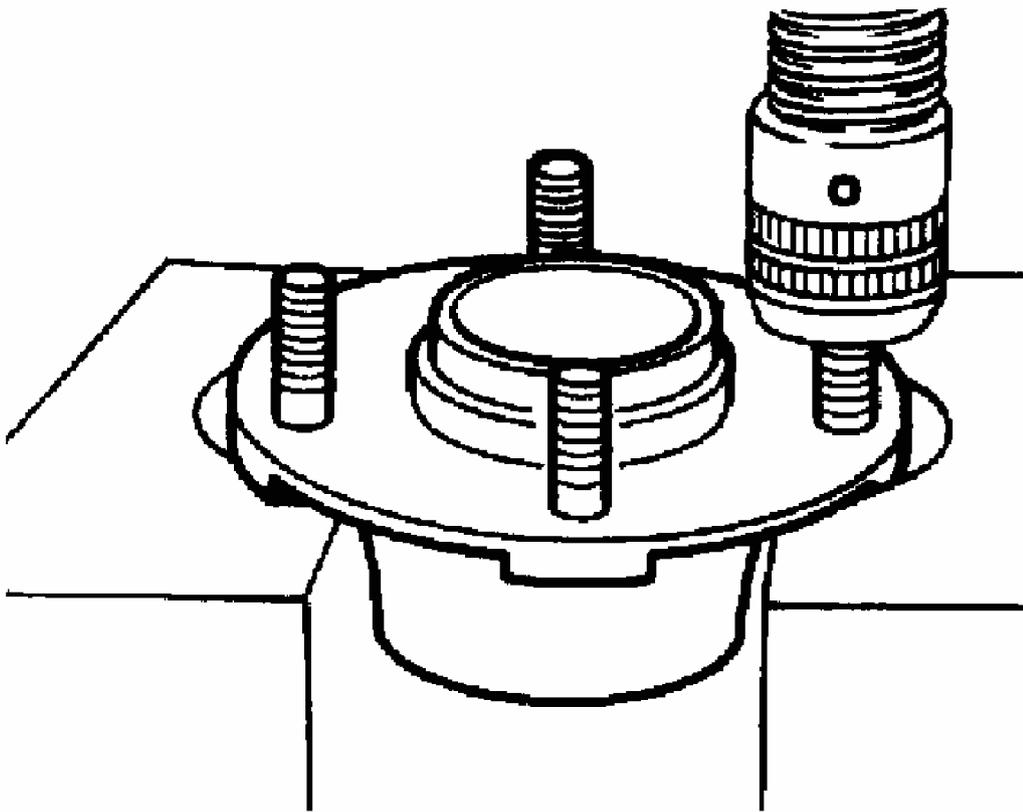
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Fig. 38: Removing ABS Sensor Rotor
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT REMOVAL NOTE

NOTE: The hub bolts do not need to be removed unless they are being replaced.

Remove the hub bolts using a press.

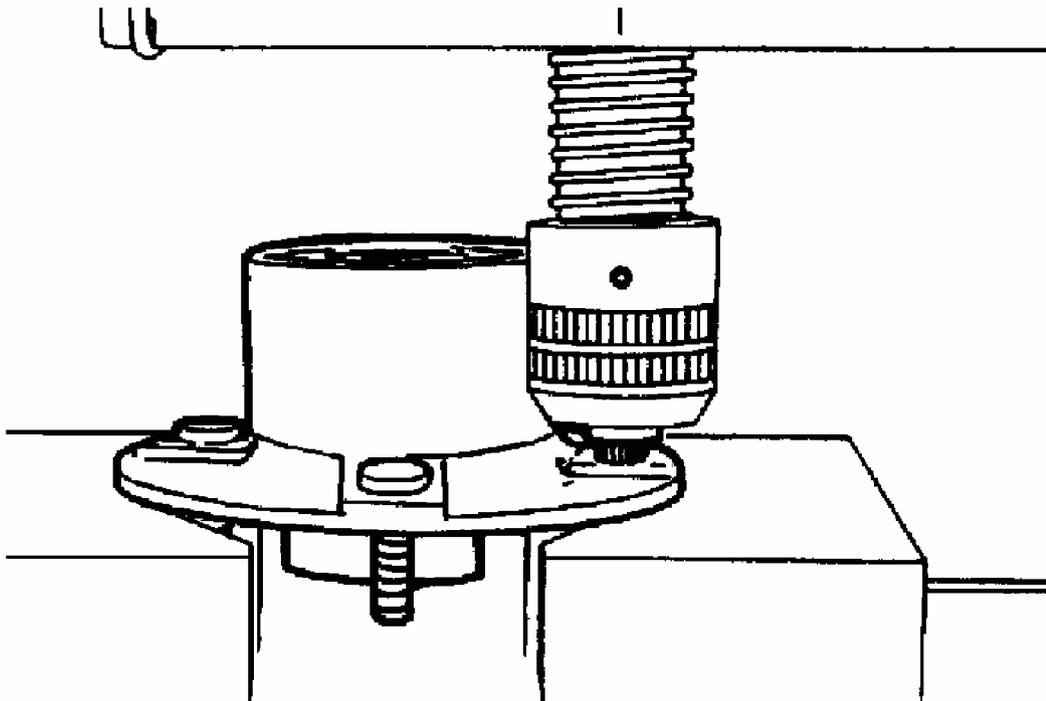


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Fig. 39: Removing Hub Bolts
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT INSTALLATION NOTE

Install the new hub bolts using a press.



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Fig. 40: Installing Hub Bolts
Courtesy of MAZDA MOTORS CORP.

ABS SENSOR ROTOR INSTALLATION NOTE

Install a new sensor rotor using the SST and a press.

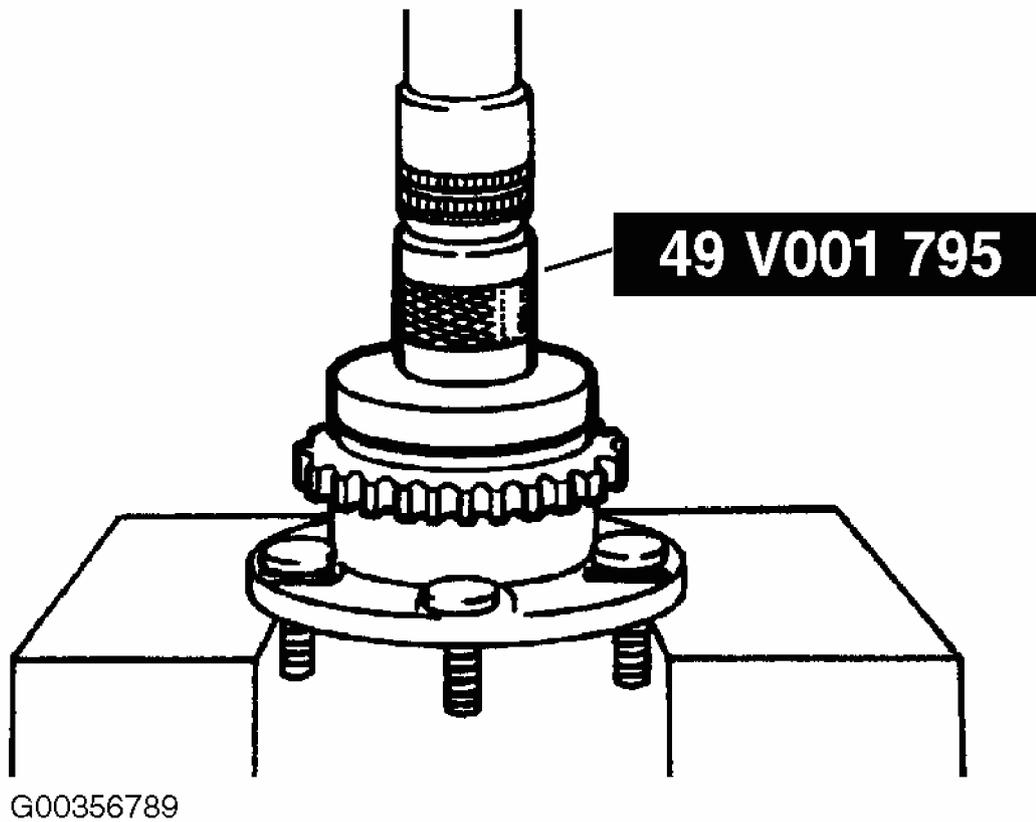


Fig. 41: Installing ABS Sensor Rotor
 Courtesy of MAZDA MOTORS CORP.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
ABS Wheel Speed Sensor Bolt	15-18 (19-25)
Brake Caliper Mounting Bolt	36-50 (49-68)
Coil Spring Upper Nut	12-16 (16-23)
Crossmember Component Mounting Bolts	68.7-85.9 (94-116)
Crossmember Component Nuts	24-33 (31-46)
Dust Cover To Knuckle Spindle Mounting Bolt	12-16 (16-22)
Intermediate Shaft Bolt	14-19 (18-26)
Front Crossbar Mounting Bolts	69-86 (94-116)
Front Crossmember Side Mounting Nuts	42-57 (57-87)
Front Crossmember Mounting Nuts	87-101 (118-137)
Lower Arm Ball Joint Nut	42-57 (57-77)

2003 Mazda MX-5 Miata

2002-03 SUSPENSION Front Suspension - MX-5 Miata

Lower Arm Bushing Bolt & Nut	69-83 (94-112)
Shock Absorber Mounting Bolt & Nut	69-86 (94-116)
Shock Absorber Upper Mounting Nuts	22-26 (30-36)
Stabilizer Bar Bracket	14-19 (18-26)
Stabilizer Control Link Nut	32-44 (44-60)
Steering Gear & Linkage Mounting Bolts	55-77 (75-104)
Strut Bar (Front) Bolts	12-16 (16-22)
Strut Bar (Front) Nuts	22-26 (30-36)
Tie-Rod End Ball Joint Nut	32-41 (43-56)
Upper Arm Ball Joint Nut	
2002	47-60 (63-82)
2003	40-52 (53-71)
Upper Arm Bushing Bolt & Nut	87-101 (118-137)
Wheel Hub Lock Nut	123-159 (167-215)
Wheel Lug Nuts	66-86 (89-117)