

SECTION **FSU**  
FRONT SUSPENSION

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**FSU**

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# PRECAUTIONS

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## PRECAUTIONS

PFP:00001

### Caution

EES000SP

- When installing rubber bushings, final tightening must be carried out under unladen condition with tires on level ground. Oil will shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- Unladen condition means that fuel, coolant and lubricant are full. However spare tire, jack, and hand tools should be unloaded.
- After servicing suspension parts, be sure to check wheel alignment.
- Caulking nuts are not reusable. Always use new ones when installing. Since new caulking nuts are pre-oiled tighten as they are.

# PREPARATION

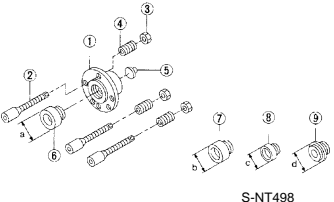
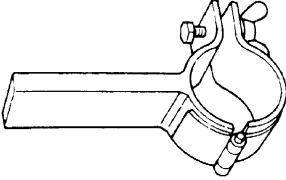
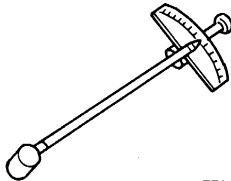
## PREPARATION

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### Special Service Tools

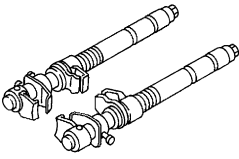
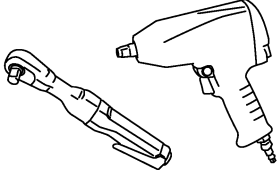
EES000SQ

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV991040S0 (   —   ) CCK gauge attachment 1. Plate 2. Guide bolts 3. Nuts 4. Springs 5. Center plate 6. KV99104020 Adapter A a: 72mm (2.83in) dia. 7. KV99104030 Adapter B b: 65mm (2.56in) dia. 8. KV99104040 Adapter C c: 57mm (2.24in) dia. 9. KV99104050 Adapter D d: 53.4mm (2.102in) dia.	 <p style="text-align: center;">S-NT498</p> Wheel alignment measurement
ST35652000 (   —   ) Strut attachment	 <p style="text-align: center;">ZZA0807D</p> Strut disassembly/re-assembly
ST3127 S000 (   —   ) Preload gauge	 <p style="text-align: center;">ZZA0806D</p> Measurement ball joint of sliding torque

## Commercial Service Tools

EES000SR

Tool name	Description
Spring compressor	 <p style="text-align: center;">S-NT717</p> <ul style="list-style-type: none"> <li>● Removing and installing coil spring</li> </ul>
Power tool	 <p style="text-align: center;">PBIC0190E</p> <ul style="list-style-type: none"> <li>● Removing wheel nuts</li> <li>● Removing under cover</li> <li>● Removing stabilizer assembly</li> </ul>

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

EES000SS

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			<a href="#">FSU-5</a>	<a href="#">FSU-9</a>	—	—	—	<a href="#">FSU-5</a>	<a href="#">FSU-6</a>	<a href="#">FSU-13</a>	NVH in PR section	NVH in RFD section.	NVH in RAX and RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in PS section.			
Possible cause and SUSPECTED PARTS		Improper installation, looseness	Strut deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	PROPELLER SHAFT	DIFFERENTIAL	REAR AXLE AND REAR SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING				
Symptom	FRONT SUSPENSION	Noise	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
		Shake	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
		Vibration	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
		Shimmy	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
		Judder	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
		Poor quality ride or handling	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x: Applicable

# FRONT SUSPENSION ASSEMBLY

## FRONT SUSPENSION ASSEMBLY

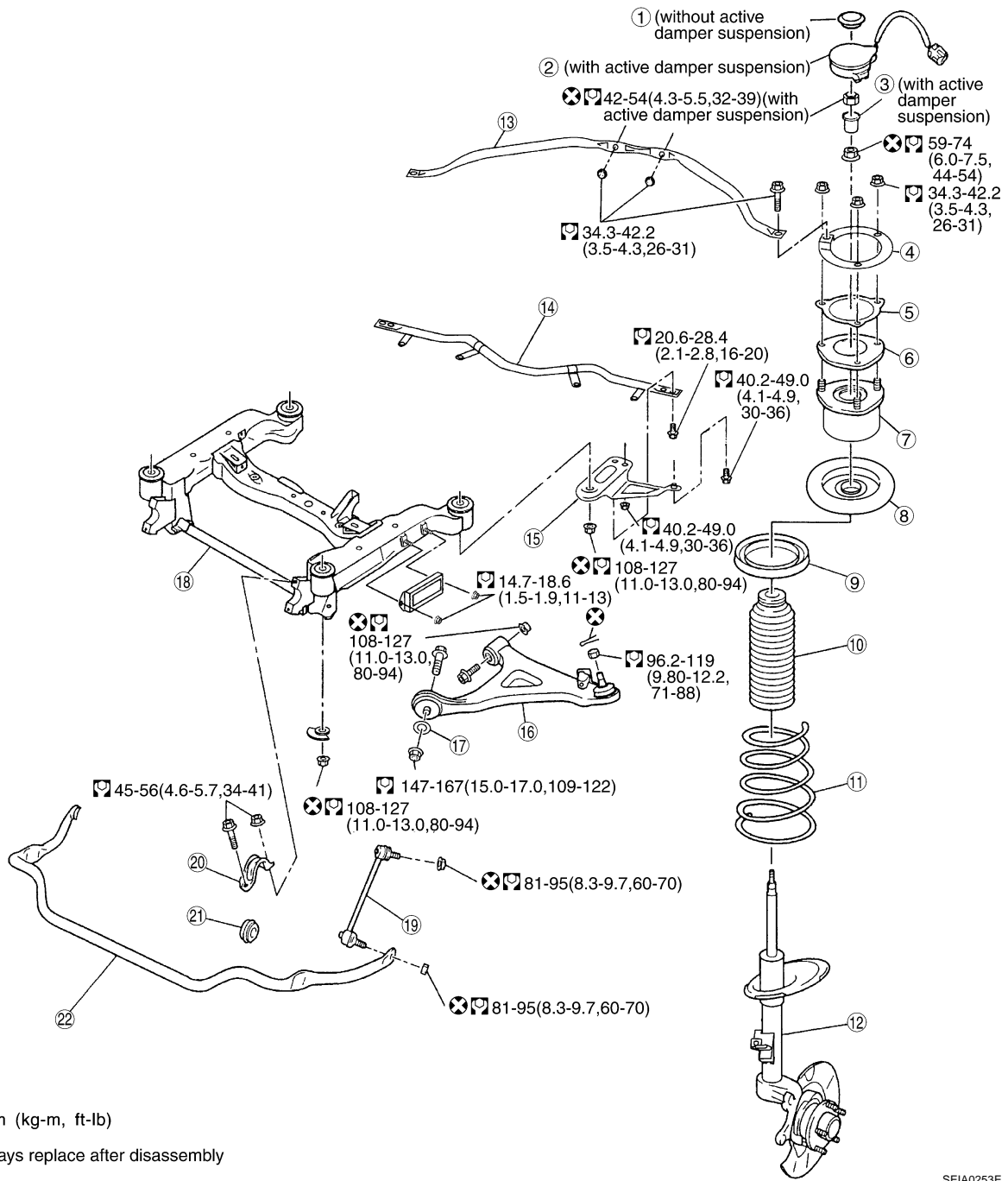
PF5:54010

### Components

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- |                               |                                     |                             |
|-------------------------------|-------------------------------------|-----------------------------|
| 1. Cap                        | 2. Actuator assembly                | 3. Actuator plate           |
| 4. Tower bar bracket          | 5. Strut mounting insulator bracket | 6. Strut mounting insulator |
| 7. Strut mounting bearing     | 8. Spring upper seat                | 9. Rubber seat              |
| 10. Bound bumper              | 11. Coil spring                     | 12. Strut assembly          |
| 13. Tower bar                 | 14. Front cross bar                 | 15. Member stay             |
| 16. Suspension arm            | 17. Washer                          | 18. Front suspension member |
| 19. Stabilizer connecting rod | 20. Stabilizer clamp                | 21. Stabilizer bushing      |
| 22. Stabilizer bar            |                                     |                             |

# FRONT SUSPENSION ASSEMBLY

EES000SU

## On-Vehicle Inspection and Service

Check that the mounting conditions (looseness, back lash) of each component and component statuses (wear, damage) are normal.

### INSPECTION LOWER BALL JOINT END PLAY

1. Set front wheels in a straight-ahead position. Do not depress brake pedal.
2. Measure axial end play by placing an iron pry bar or something similar between suspension arm and steering knuckle.

#### Standard value

**Axial end play : 0 mm (0 in)**

#### CAUTION:

**Be careful not to damage ball joint boot.**

### Strut Inspection

- Check strut for oil leakage, damage and replace if necessary.

### Wheel Alignment Inspection

EES000SV

#### DESCRIPTION

- Measure wheel alignment under unladen conditions. "Unladen conditions" means that fuel, coolant, and lubricant are full. However, spare tire, jack, and hand tools should be unloaded.

#### PRELIMINARY INSPECTION

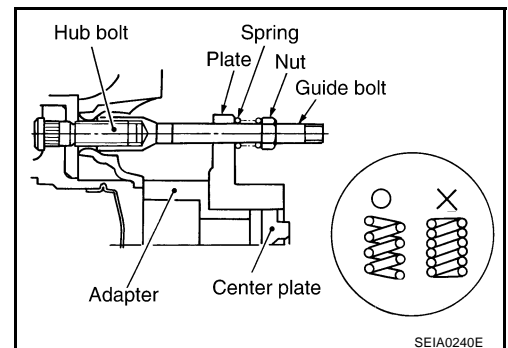
1. Check tires for improper air pressure and wear.
2. Check road wheels for runout.
3. Check wheel bearing axial end play.
4. Check suspension lower ball joint axial end play.
5. Check strut operation.
6. Check each mounting point of axle and suspension for looseness and deformation.
7. Check each link, arm and member for cracks, deformation, and other damage.
8. Check vehicle posture.

### INSPECTION OF CAMBER, CASTER AND KINGPIN INCLINATION ANGLES.

- Camber, caster and kingpin inclination angles cannot be adjusted.
- Before inspection, mount front wheels onto turning radius gauge. Mount rear wheels onto a stand that has same height so vehicle will remain horizontal.

### Using a CCK Gauge

1. Remove wheel nuts (3), and install a guide bolt (special service tool) to hub bolt.
2. Screw adapter (special service tool) into plate body (special service tool) until it contacts body tightly.
3. Screw center plate (special service tool) into plate body (special service tool).
4. Insert plate (special service tool) on guide bolt (special service tool). Put spring in, and then evenly screw in guide bolt nut (special service tool). When fastening guide bolt nut, do not completely compress spring.



# FRONT SUSPENSION ASSEMBLY

- Place the dent of alignment gauge onto the projection of center plate (special service tool) and tightly contact them to measure.

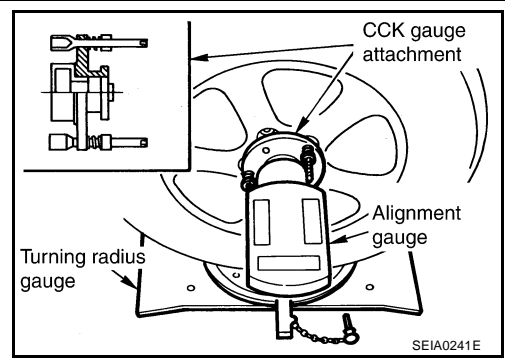
**Standard value**

**Camber, caster and kingpin inclination angles:**

Refer to [FSU-15, "SERVICE DATA"](#) .

**CAUTION:**

- If camber, caster, or kingpin inclination angle is outside the standard, check front suspension parts for wear and damage, and replace suspect parts if necessary.
- King pin inclination angles is reference value, no inspection is required.



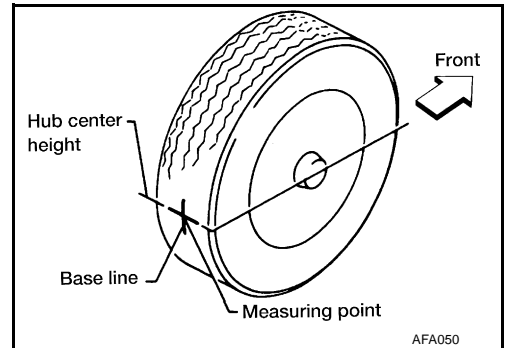
A  
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## Toe-in Inspection

Measure toe-in using the following procedure.

**WARNING:**

- Always perform the following procedure on a flat surface.
  - Make sure that no person is in front of vehicle before pushing it.
- Bounce front of vehicle up and down to stabilize the posture.
  - Push vehicle straight ahead about 5 m (16ft).
  - Put a mark on base line of tread (rear side) of both tires at the same height as hub center. These are measuring points.



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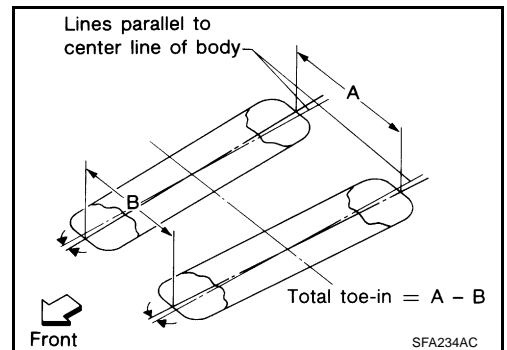
- Measure distance "A" (rear side).
- Push vehicle slowly ahead to rotate wheels 180 degrees (1/2 turn).

If wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward.

- Measure distance "B" (front side).

**Standard value**

**Total toe-in** : Refer to [FSU-15, "SERVICE DATA"](#)



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# COIL SPRING AND STRUT

PF5:55302

EES000SW

## COIL SPRING AND STRUT

### Removal and Installation

#### REMOVAL

1. Remove tire with power tool.
2. Remove brake caliper with power tool. Hang it in a place where it will not interfere with work.  
**CAUTION:**  
**Avoid depressing brake pedal while brake caliper is removed.**
3. Remove mounting nuts of brake hose from strut assembly. Refer to [BR-11, "BRAKE PIPING AND HOSE"](#).
4. Remove electrical wires of ABS wheel sensor from strut assembly.  
**CAUTION:**  
**Do not pull on ABS wheel sensor harness.**
5. Remove stabilizer connecting rod upper nut, separate strut assembly and stabilizer connecting rod.
6. Remove cotter pin of steering outer socket ball joint, and remove steering outer socket lock nut from strut assembly.
7. Use a ball joint remover (suitable tool) to remove steering outer socket from strut assembly.  
**CAUTION:**  
**To prevent damage to threads and to prevent ball joint remover (special service tool) from coming off, temporarily tighten lock nuts.**
8. Remove cotter pin of suspension arm ball joint, and, remove lock nut.
9. Use a ball joint remover (suitable tool) to remove strut assembly from suspension arm.  
**CAUTION:**  
**To prevent damage to threads and to prevent ball joint remover (special service tool) from coming off, temporarily tighten lock nuts.**
10. Turn actuator assembly to the left, and remove it from actuator plate.
11. Remove tower bar and strut upper nuts then remove strut mounting insulator bracket and strut assembly from vehicle.

#### INSTALLATION

- Refer to [FSU-5, "Components"](#), for tightening torque. Tighten in the reverse order of removal.

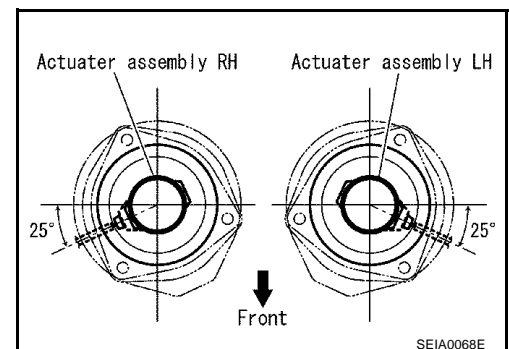
**CAUTION:**

**Refer to component parts location and do not reuse non-reusable parts.**

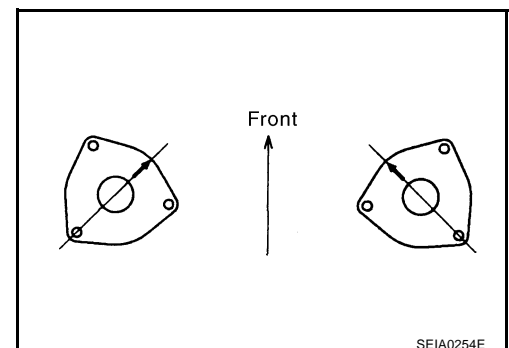
- Make sure actuator plate fits tightly into actuator assembly.
- Make sure actuator assembly is installed as shown in the figure.

**CAUTION:**

**If actuator assembly is subjected to impact or drop, do not use it.**



- Attach strut mounting insulator bracket as shown in the figure.





# COIL SPRING AND STRUT

EES000SX

## Disassembly and Assembly

### DISASSEMBLY

#### CAUTION:

Make sure piston rod on strut assembly is not damage when removing components from strut assembly.

1. Fix strut mounting insulator and remove actuator fixing nut, then remove actuator plate from strut assembly.

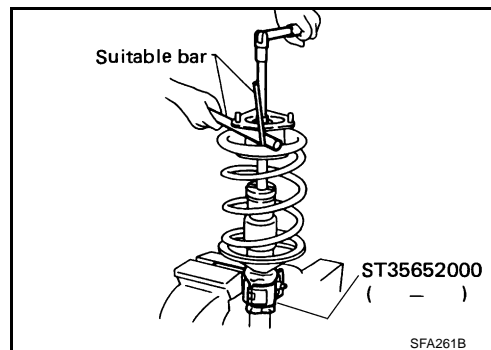
#### CAUTION:

Be careful not to deform actuator plate and strut mounting insulator.

2. Install strut attachment (special service tool) to strut assembly and fix it in a vice.

#### CAUTION:

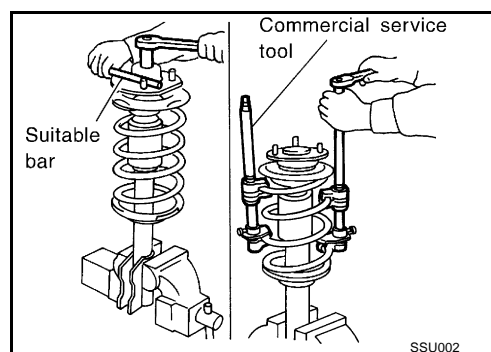
When installing strut attachment (special service tool), wrap a shop cloth around strut to protect it from damage.



3. Using a spring compressor (commercial service tool), compress coil spring between spring upper seat and spring lower seat (on strut) until coil spring is free.

#### CAUTION:

Be sure spring compressor is securely attached to coil spring. Compress coil spring.



4. After making sure coil spring is free between spring upper seat and spring lower seat of strut assembly. Remove piston rod lock nut.
5. Remove strut mounting insulator, strut mounting bearing, spring upper seat, rubber seat, coil spring and bound bumper from strut assembly.
6. Gradually release spring compressor (commercial service tool), and remove coil spring.

#### CAUTION:

Loosen while making sure coil spring attachment position does not move.

7. Remove strut attachment from strut assembly.

## INSPECTION AFTER DISASSEMBLY

### Strut Inspection

- Check strut assembly for deformation, cracks, damage, and replace if necessary.
- Check piston rod for damage, uneven wear, distortion, and replace if necessary.
- Check welded and sealed areas for oil leakage, and replace if necessary.

### Strut Mounting Insulator and Rubber Parts Inspection

Check strut mounting insulator, strut mounting insulator bracket for cracks, and rubber parts for wear. Replace them if necessary.

### Coil Spring Inspection

Check coil spring for cracks, wear, damage and replace if necessary.

# COIL SPRING AND STRUT

## ASSEMBLY

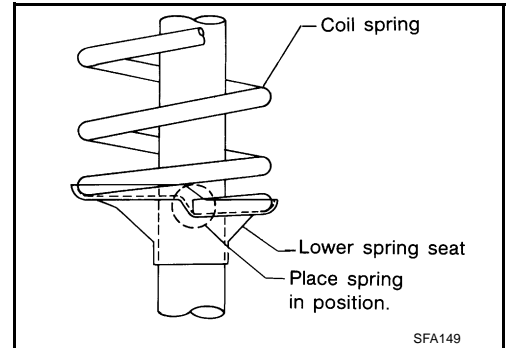
### CAUTION:

Make sure piston rod on strut assembly is not damaged when attaching components to strut assembly.

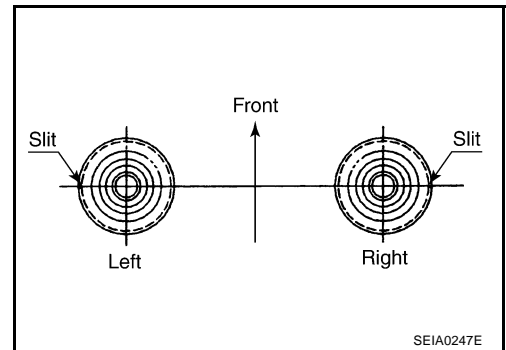
1. Compress coil spring using a spring compressor, and install it onto strut assembly.

### CAUTION:

- Face tube side of coil spring downward. Align lower end to spring seat as shown in the figure.
- Be sure spring compressor is securely attached to coil spring. Compress coil spring.



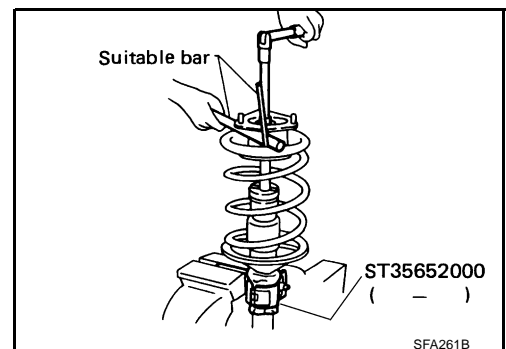
2. Apply soapy water to bound bumper and insert into spring upper seat. (Do not use machine oil.)
3. Install rubber seat, spring upper seat, strut mounting bearing, strut mounting insulator.
  - Installation position of spring upper seat as shown in the figure.



4. Fix strut mounting insulator, then tighten piston rod lock nut with the specified torque.

### CAUTION:

Be careful not to deform strut mounting insulator.



5. Gradually release spring compressor (commercial service tool), and remove spring compressor from coil spring.

### CAUTION:

Loosen while making sure coil spring attachment position does not move.

6. Install actuator plate onto strut assembly.
7. Fix strut mounting insulator, then tighten actuator plate fixing nut with the specified torque.

### CAUTION:

Be careful not to deform actuator plate and strut mounting insulator.

# SUSPENSION ARM

## SUSPENSION ARM

PFP:55501

### Removal and Installation

#### REMOVAL

1. Remove tire with power tool.
2. Remove under cover with power tool.
3. Remove cotter pin of lower ball joint, and then remove lock nut.
4. Use a ball joint remover (suitable tool) to remove suspension arm from strut assembly.

#### CAUTION:

To prevent damage to threads and to prevent ball joint remover (suitable tool) from coming off, temporarily tighten lock nuts.

5. Remove fixing bolts and nuts then remove suspension arm from vehicle.

#### INSPECTION AFTER REMOVAL

##### Visual Inspection

- Check suspension arm and bushing for deformation, cracks, or damage. Replace the entire suspension arm if cracks, deformation or any other damage is found.
- Check boot of ball joint for cracks or other damage, and also for grease leakage. If any non-standard condition is found, replace it.
- Check ball joint for excessive play. Replace suspension arm assembly if any of the following exists:

##### Ball Joint Inspection

Manually move ball stud to confirm it moves smoothly with no binding.

##### Oscillating Torque Inspection

- Hook spring scale onto cotter pin mounting hole. Check that spring scale value when ball stud begins moving is within the specified range.

##### Standard value

##### Oscillating torque:

0.5 - 3.4 N·m (0.06 - 0.34 kg, 5 - 30 lb)

##### Measured value of spring scale:

8.8 - 59.6 N (0.90 - 6.08 kg, 1.98 - 13.41 lb)

- If it is outside the specified range, replace suspension arm.

##### Sliding Torque Inspection

- Install mounting nut to ball stud. Using a preload gauge (special service tool), check the sliding torque is within the specified range.

##### Standard value

##### Sliding torque Inspection:

0.5 - 3.4 N·m (0.06 - 0.34 kg, 5 - 30 lb)

- If it is outside the specified range, replace suspension arm.

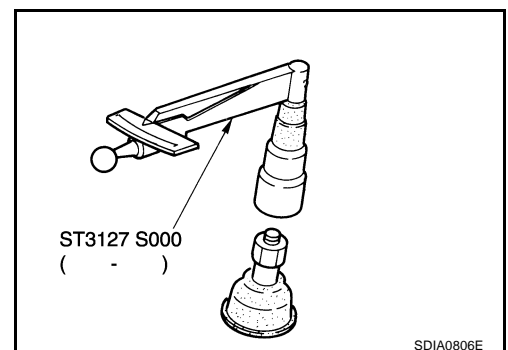
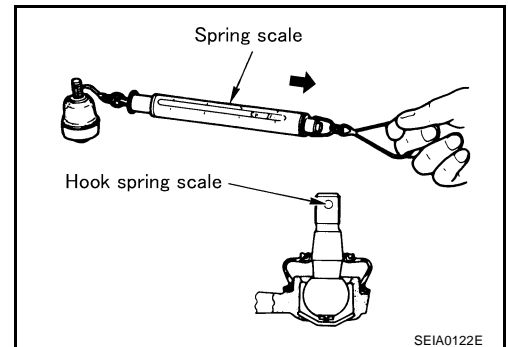
##### Axial End Play Inspection

- Push ball joint in the axial direction to check free play.

##### Standard value

Axial end play : 0 mm (0 in)

- If there is free play, replace suspension arm.



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# SUSPENSION ARM

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## INSTALLATION

- Refer to [FSU-5, "Components"](#) , for each tightening torque, etc. Tighten in the reverse order of removal.

**CAUTION:**

**Refer to component parts location and do not reuse non-reusable parts.**

- After installing suspension arm, check wheel alignment and adjust if necessary. Refer to [FSU-15, "SERVICE DATA"](#) .

# STABILIZER BAR

## STABILIZER BAR

PFP:56230

### Removal and Installation

EES000SZ

#### REMOVAL

1. Remove tire with power tool.
2. Remove under cover with power tool.
3. Remove mounting nuts on upper position of stabilizer connecting rod with power tool.
4. Remove stabilizer clamp mounting bolts and nuts with power tool.
5. Remove stabilizer bar from vehicle.

#### INSPECTION AFTER REMOVAL

Check stabilizer bar, stabilizer connecting rod, stabilizer bushing and stabilizer clamp for deformation, cracks and damage, and replace if necessary.

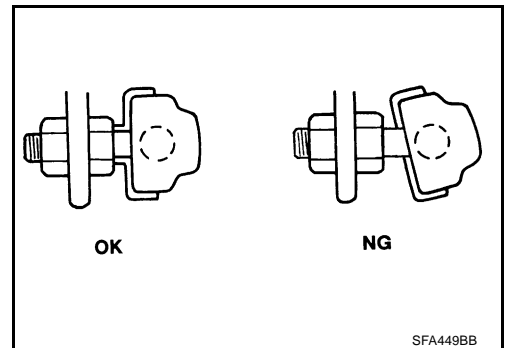
#### INSTALLATION

- Refer to [FSU-5, "Components"](#) , in "Front Suspension Assembly" for tightening torque. Follow the steps below to install.

**CAUTION:**

**Refer to component parts location and do not reuse non-reusable parts.**

- Tighten bolts and nuts for tightening stabilizer clamp. Tightening order is Front LH, Rear RH, Front RH, Rear LH.
- Stabilizer bar uses pillow ball type connecting rod. Position ball joint with case on pillow ball head parallel to stabilizer bar.



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# FRONT SUSPENSION MEMBER

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## FRONT SUSPENSION MEMBER

PFP:54401

### Removal and Installation

EES00070

#### REMOVAL

1. Remove tires with power tool.
2. Remove under cover.
3. Remove steering hydraulic piping bracket from front suspension member.
4. Remove steering gear and front suspension member attachment bolts and hang steering gear on vehicle. Refer to [PS-15, "POWER STEERING GEAR AND LINKAGE"](#)
5. Remove suspension arm from front suspension member. Refer to [FSU-11, "SUSPENSION ARM"](#) .
6. Remove stabilizer bar mounting bolts and nuts from front suspension member then suspend a stabilizer on vehicle.
7. Remove cross bar from member stay.
8. Set jack under front suspension member.
9. Remove member stay from front suspension member and body.
10. Remove mounting nuts front suspension member and body.
11. Slowly lower mission jack to remove front suspension member from vehicle.

#### INSTALLATION

- Refer to [FSU-5, "Components"](#) for tightening torque in the reverse order of removal.

**CAUTION:**

**Refer to component parts location and do not reuse non-reusable parts.**

- After installation, perform final tightening of each part under unladen conditions with tires on ground. Check wheel alignment. Refer to [FSU-15, "SERVICE DATA"](#) .

# SERVICE DATA

## SERVICE DATA

PPF:00030

### Wheel Alignment (Unladen)

EES000T1

Camber Degree minute (Decimal degree)	Minimum	- 1°30' (- 1.5°)	
	Nominal	- 0°45' (- 0.75°)	
	Maximum	1°30' (1.5°)	
	Left and right difference	45' (0.75°)	
Caster Degree minute (Decimal degree)	Minimum	5°25' (5.42°)	
	Nominal	6°10' (6.17°)	
	Maximum	6°55' (6.92°)	
	Left and right difference	45' (0.75°)	
Total toe-in	Distance (A - B)	Nominal	1 mm (0.04 in)

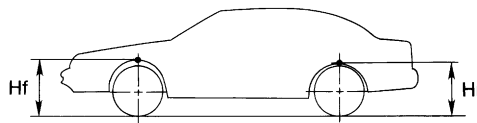
### Ball Joint

EES000T2

Axial end play	0 mm (0 in)		
Oscillating torque	0.5 - 3.4 N·m (0.06 - 0.34 kg·m, 5 - 30 in·lb)		
Measurement on spring balance (cotter pinhole position)	8.8 - 59.6 N (0.90 - 6.08 kg, 1.98 - 13.41 lb)		
Sliding torque	0.5 - 3.4 N·m (0.06 - 0.34 kg, 5 - 30 lb)		

### Wheelarch Height (Unladen\*)

EES000T3



SFA818A

Tire	225/55R17	225/55R17 (Runflat tire)	245/45R18
Front (Hf)	730 mm (28.74 in) [USA model]	734 mm (28.90 in)	726 mm (28.58 in)
Rear (Hr)	704 mm (27.72 in) [USA model] 705 mm (27.76 in) [Canada model]	707 mm (27.83 in) [USA model] 708 mm (27.87 in) [Canada model]	700 mm (27.56 in) [USA model] 701 mm (27.60 in) [Canada model]

\*: Fuel, radiator coolant and engine oil full. Spare tire, hand tools and mats in designated positions.

**SERVICE DATA**

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