SECTION FSU
FRONT SUSPENSION

CONTENTS

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000008642178

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

Reference page		FSU-13	FSU-16	—	—	—	FSU-13	FSU-6	FSU-6	WT-55, "NVH Troubleshooting Chart"	WT-55, "NVH Troubleshooting Chart"	FAX-4, "NVH Troubleshooting Chart"	BR-6, "NVH Troubleshooting Chart"	ST-8, "NVH Troubleshooting Chart"
Possible cause and SUSPECTED PARTS		Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	TIRES	ROAD WHEEL	DRIVE SHAFT AND WHEEL HUB	BRAKES	STEERING
Symptom	Noise	×	×	×	×	×	×			×	×	×	×	×
	Shake	×	×	×	×		×			×	×	×	×	×
	Vibration	×	×	×	×	×				×		×		×
	Shimmy	×	×	×	×			×		×	×		×	×
	Shudder	×	×	×						×	×		×	×
	Poor quality ride or handling	×	×	×	×	×		×	×	×	×			

×: Applicable

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000008642179

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Service Notice or Precautions

INFOID:0000000008642180

- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Oil might shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- Unladen conditions mean that fuel, engine coolant and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.
- After servicing suspension parts, be sure to check wheel alignment.
- Self-lock nuts are not reusable. Always use new ones when installing. Since new self-lock nuts are pre-oiled, tighten as they are.

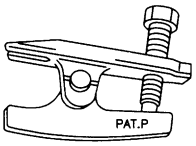
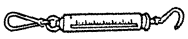
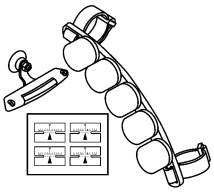
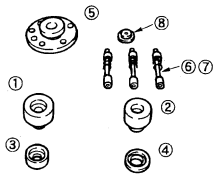
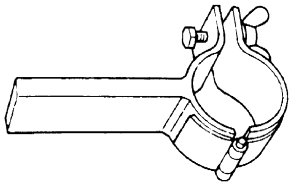
PREPARATION

PREPARATION

Special Service Tool

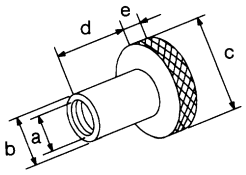
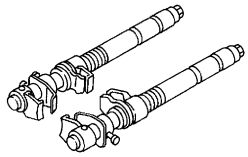
INFOID:0000000008642181

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

Tool number (Kent-Moore No.) Tool name	Description
HT7252000 (J-25730-B) Ball joint remover  S-NT146	Removing tie-rod outer and lower ball joint
— (J-44372) Spring gauge  LST024	Measuring steering wheel turning force, rack sliding force and ball joint swinging force
— (J-49286) Drift and Pull gauge  AWEIA0156ZZ	Measuring drift and pull
KV991040S1 (—) CCK gauge attachment 1. KV99104020 Adapter A 2. KV99104030 Adapter B 3. KV99104040 Adapter C 4. KV99104050 Adapter D 5. KV99104060 Plate 6. KV99104070 Guide bolt 7. KV99104080 Spring 8. KV99104090 Center plate  ZZA1167D	Measuring wheel alignment
ST35652000 (—) Strut attachment  ZZA0807D	Disassembling and assembling strut

Commercial Service Tool

INFOID:0000000008642182

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts
Attachment wheel alignment  NT148	Measure wheel alignment **a: M24 x 1.5 thread pitch** **b: 35 mm (1.38 in) dia.** **c: 65 mm (2.56 in) dia.** **d: 56 mm (2.20 in) dia.** **e: 12 mm (0.47 in) dia.**
Spring compressor  NT717	Removing and installing coil spring

PERIODIC MAINTENANCE

FRONT SUSPENSION ASSEMBLY

Inspection and Adjustment

INFOID:0000000008642183

INSPECTION

Make sure the mounting conditions (looseness, backlash) of each component and component conditions (wear, damage) are normal.

LOWER BALL JOINT END PLAY

1. Set front wheels in a straight-ahead position. Do not depress brake pedal.
2. Place an iron bar or similar tool between upper link and steering knuckle.
3. Measure axial end play by prying it up and down. Refer to FSU-18, "Ball Joint".
   CAUTION:
   Be careful not to damage ball joint boot. Do not damage the installation position by applying excessive force.

SHOCK ABSORBER

Check for oil leakage, damage and replace if malfunction is detected.

WHEEL ALIGNMENT

Description

Measure wheel alignment under unladen conditions.

NOTE:

"Unladen conditions" means that fuel, engine coolant, and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.

General Information and Recommendations

- A four-wheel thrust alignment should be performed.
  - This type of alignment is recommended for any NISSAN vehicle.
  - The four-wheel "thrust" process helps ensure that the vehicle is properly aligned and the steering wheel is centered.
  - The alignment rack itself should be capable of accepting any NISSAN vehicle.
  - The rack should be checked to ensure that it is level.
- Make sure the machine is properly calibrated.
  - Your alignment equipment should be regularly calibrated in order to give correct information.
  - Check with the manufacturer of your specific equipment for their recommended Service/Calibration Schedule.

Preliminary Check

Check the following:

1. Tires for improper air pressure and wear.
2. Road wheels for runout. Refer to WT-65, "Road Wheel".
3. Wheel bearing axial end play. Refer to FAX-26, "Wheel Bearing".
4. Transverse link ball joint axial end play. Refer to FSU-10, "Removal and Installation".
5. Shock absorber operation.
6. Each mounting part of axle and suspension for looseness and deformation.
7. Each of suspension member, shock absorber, upper link and transverse link for cracks, deformation and other damage.
8. Vehicle height (posture).

Alignment Process

IMPORTANT:

Use only the alignment specifications listed in this Service Manual.

- When displaying the alignment settings, many alignment machines use "indicators" **Do not use these indicators.**: (Green/red, plus or minus, Go/No Go).
  - The alignment specifications programmed into your machine that operate these indicators may not be correct.

- This may result in an ERROR.

• Most camera-type alignment machines are equipped with both "Rolling Compensation" method and optional "Jacking Compensation" method to "compensate" the alignment targets or head units. "Rolling Compensation" is the preferred method.

- If using the "Rolling Compensation" method, after installing the alignment targets or head units, push or pull on the rear wheel to move the vehicle. Do not push or pull on the vehicle body.
- If using the "Jacking Compensation" method, after installing the alignment targets or head units, raise the vehicle and rotate the wheels 1/2 turn both ways.

NOTE:
Do not use the "Rolling Compensation" method if you are using sensor-type alignment equipment.

- Follow all instructions for the alignment machine you are using for more information.

ADJUSTMENT

Camber, Caster and Kingpin Inclination Angles

CAUTION:
Camber, caster, kingpin inclination angles cannot be adjusted.

REMOVAL AND INSTALLATION

FRONT COIL SPRING AND STRUT

Removal and Installation

INFOID:0000000008642184

REMOVAL

1. Remove front wheel and tire using power tool. Refer to WT-60, "Adjustment".
2. Remove the wheel sensor harness from the front coil spring and strut. Refer to BRC-102, "Removal and Installation - Front Wheel Sensor".
3. Remove the brake hose lock plate.
4. Remove the lower strut bolts and nuts. Refer to FSU-13, "Exploded View".
5. Remove the front side cover from the strut tower.
6. Remove the upper strut bolts and remove the front coil spring and strut from vehicle.

INSPECTION AFTER REMOVAL

Check the front coil spring and strut for any oil leakage or other damage. Replace as necessary.

INSTALLATION

Installation is in the reverse order of removal.

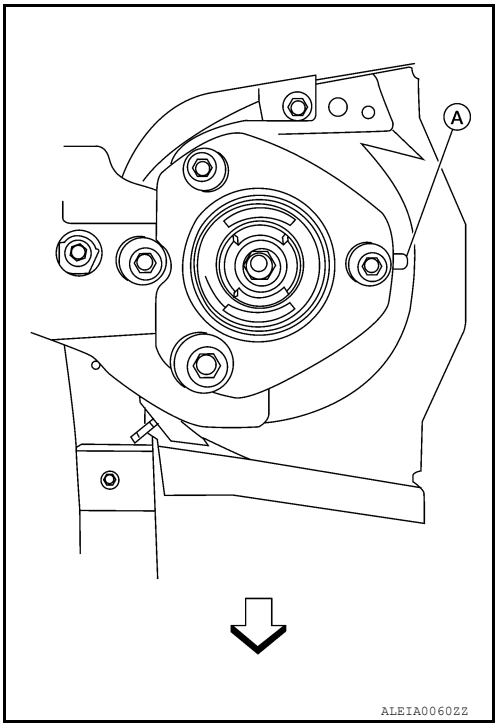
CAUTION:

Do not reuse the lower strut nuts.

- Be sure tab (A) on strut mount insulator is positioned as shown.

⇦ **: Vehicle front**

- Check wheel alignment. Refer to FSU-6, "Inspection and Adjustment".



Disposal

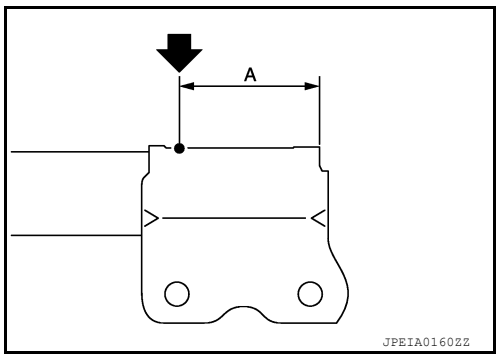
INFOID:0000000008642185

1. Set the front suspension strut horizontally with the piston rod fully extended.

2. Drill 2 – 3 mm (0.08 – 0.12 in) hole at the position (●) from top as shown to release gas gradually.

CAUTION:
- **Wear eye protection (safety glasses).**
- **Wear gloves.**
- **Be careful with metal chips or oil blown out by the compressed gas.**

NOTE:
- Drill vertically in this direction (⬅).
- Directly to the outer tube avoiding brackets.
- The gas is clear, colorless, odorless, and harmless.



A : 20 – 30 mm (0.79 – 1.18 in)

3. Position the drilled hole downward and drain oil by moving the piston rod several times.

CAUTION:
Dispose of drained oil according to the law and local regulations.

TRANSVERSE LINK

Removal and Installation

INFOID:0000000008642186

REMOVAL

1. Remove front wheel and tire using power tool. Refer to WT-60, "Adjustment".
2. Remove the knuckle spindle bolt and nut at the transverse link.
3. Remove the steering knuckle from the transverse link using Tool. Refer to FSU-13, "Exploded View".

Tool number : HT7252000 (J-25730-B)

4. Remove the stabilizer connecting rod nut at the front stabilizer.
5. Slightly loosen the transverse link bolts.
6. Remove the transverse link bolts and nuts. Remove the transverse link from the front suspension member.

INSPECTION AFTER REMOVAL

Visual Inspection

Check transverse link and bushing for deformation, cracks, and other damage. Replace the entire transverse link assembly if cracks, deformation or any other damage is found.

Ball Joint Inspection

CAUTION:

Before measurement, move the ball joint at least ten times by hand to check for smooth movement.

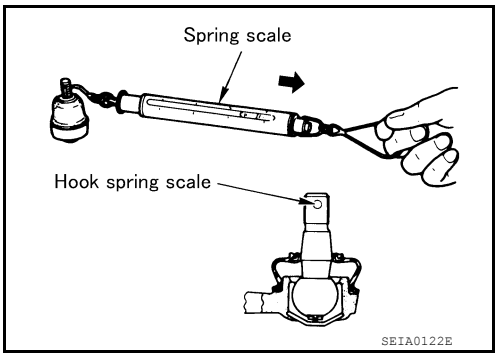
Swing Torque Inspection

- Hook Tool at cutout on ball stud. Confirm Tool measurement value is within specifications when ball stud begins moving.

Tool number : — (J-44372)

Swing torque : Refer to FSU-18, "Ball Joint".

Measurement on spring balance : Refer to FSU-18, "Ball Joint".



- If the value is outside the standard, replace transverse link.

Axial End Play Inspection

- Move tip of ball joint in axial direction to check for looseness.

Axial end play : Refer to FSU-18, "Ball Joint".

- If any looseness is noted, replace transverse link.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Do not reuse the transverse link nuts at the front suspension member.

- Tighten transverse link bolts with vehicle unladen and all four tires on flat, level ground. Refer to FSU-13, "Exploded View".
- After installation, check wheel alignment. Refer to FSU-6, "Inspection and Adjustment".

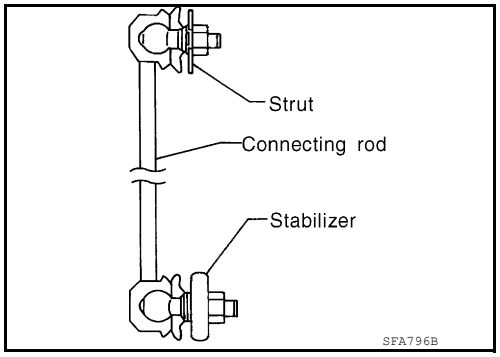
FRONT STABILIZER

Removal and Installation

INFOID:0000000008642187

REMOVAL

1. Remove the steering gear and linkage. Refer to ST-26, "Removal and Installation".
2. Remove the nuts on the upper portion of stabilizer connecting rod.



3. Remove the stabilizer clamp bolts.
4. Remove the front stabilizer from the vehicle.

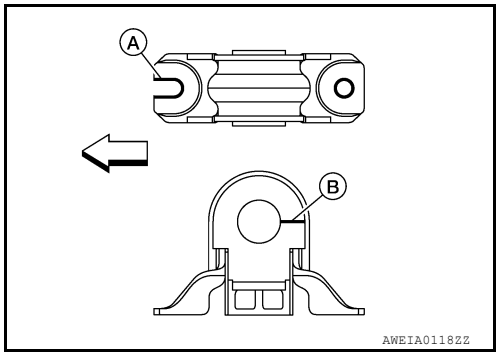
INSPECTION AFTER REMOVAL

Check the front stabilizer, the stabilizer connecting rod, the stabilizer bushing, and the stabilizer clamp for deformation, cracks and damage. Replace if necessary.

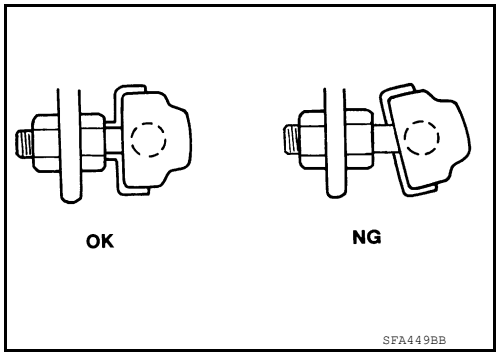
INSTALLATION

Installation is in the reverse order of removal. Refer to FSU-13, "Exploded View".

- When installing stabilizer, make sure that notch (A) in stabilizer clips face front.
- Make sure each slit (B) in the surface of each stabilizer bushing faces the rear of the vehicle.
- ⇦: Front.



- The front stabilizer uses a pillow ball type stabilizer connecting rod. Position the ball joint with the case on the pillow ball head parallel to the front stabilizer.



STEERING KNUCKLE

Removal and Installation

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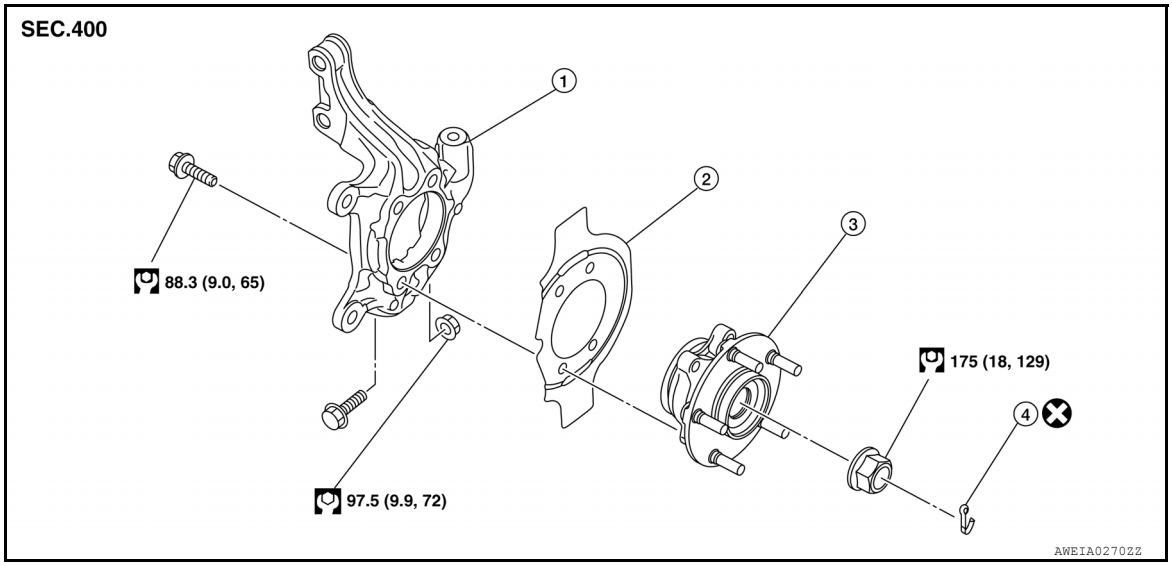

1. Steering knuckle
2. Splash guard
3. Wheel hub and bearing
4. Cotter pin

REMOVAL

1. Remove the front wheel hub and bearing. Refer to FAX-7, "Removal and Installation".
2. Remove the steering linkage from the steering knuckle. Refer to ST-26, "Removal and Installation".
3. Remove the knuckle spindle bolt and nut at the transverse link.
4. Remove the lower strut bolts and nuts. Remove the steering knuckle. Refer to FSU-13, "Exploded View".

INSPECTION AFTER REMOVAL

Check the steering knuckle for deformity, cracks and damage on each part. Replace if necessary.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Do not reuse the lower strut nuts.

Do not reuse the cotter pin.

UNIT REMOVAL AND INSTALLATION

FRONT SUSPENSION ASSEMBLY

Exploded View

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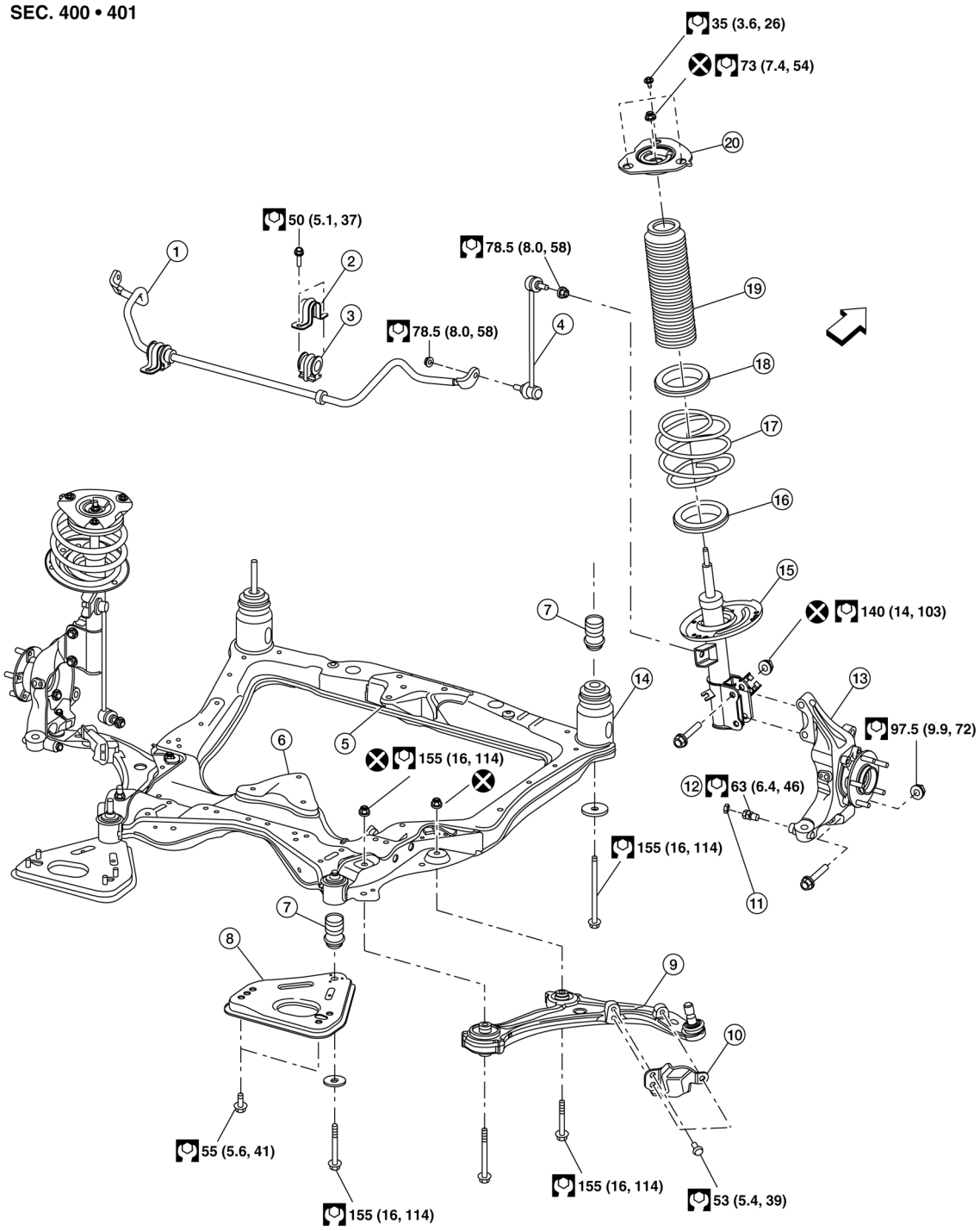


AWEIA0269ZZ

1. Front stabilizer
2. Stabilizer clamp
3. Stabilizer bushing
4. Stabilizer connecting rod
5. Front mount bracket
6. Rear mount bracket
7. Member insulator
8. Member pin stay
9. Transverse link
10. Steering stopper bracket
11. Stopper bolt cap
12. Steering stopper bolt
13. Steering knuckle
14. Front suspension member
15. Front suspension strut
16. Front spring lower rubber seat
17. Front spring
18. Strut mount bearing
19. Bound bumper
20. Strut mount insulator

⇦ Front

Removal and Installation

INFOID:0000000008642190

REMOVAL

- Engine, transmission and suspension member must be removed as an assembly. Refer to EM-103, "Removal and Installation".
- Once removed as an assembly, lift engine and transmission off suspension member using suitable tool.

INSTALLATION

Installation is in the reverse order of removal.

- After installation, perform final tightening of each part under unladen conditions with tires on ground. Refer to FSU-13, "Exploded View".
- Check wheel alignment. Refer to FSU-6, "Inspection and Adjustment".

UNIT DISASSEMBLY AND ASSEMBLY

FRONT COIL SPRING AND STRUT

Disassembly and Assembly

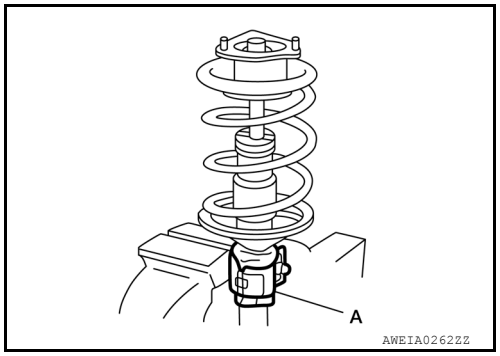
INFOID:0000000008642191

DISASSEMBLY

1. Install Tool (A) to the front coil spring and strut.

Tool number : ST35652000 (—)

CAUTION:
When installing Tool (A), wrap a shop cloth around the front coil spring and strut to protect the parts from damage.

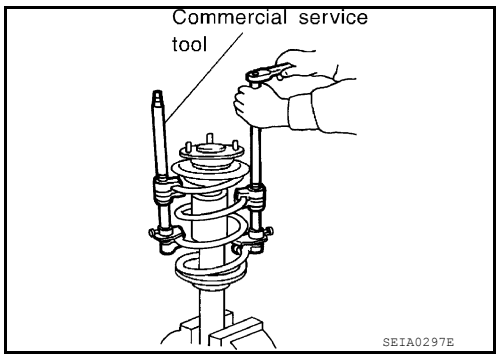


2. Secure Tool (A) in a vise.
3. Slightly loosen the piston rod lock nut.

WARNING:
Do not remove piston rod lock nut completely. If the piston rod lock nut is removed completely, the front spring can jump out and may cause serious damage or injury.

4. Compress the front spring using a spring compressor (commercial service tool).

WARNING:
Make sure that the pawls of the two spring compressors are firmly hooked on the front spring. The spring compressors must be tightened alternately so as not to tilt the front spring.



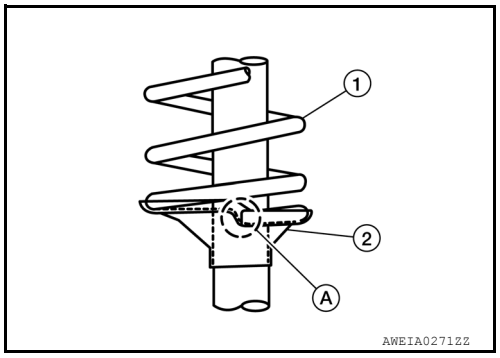
5. Make sure the front spring is free between the strut mount bearing and the front spring lower rubber seat. Remove the piston rod lock nut.
6. Remove the strut mount insulator, the bound bumper, and the strut mount bearing.
7. Remove the bound bumper from the strut mount insulator.
8. Gradually release the spring compressor (commercial service tool) and remove the front spring.
9. Remove the front spring lower rubber seat.

ASSEMBLY

1. Install the front spring lower rubber seat (2) to the front suspension strut.
2. Compress the front spring (1) using a spring compressor (commercial service tool), and install the front spring to the front suspension strut.

WARNING:
Make sure that the pawls of the two spring compressors are firmly hooked on the front spring. The spring compressors must be tightened alternately so as not to tilt the front spring.

CAUTION:
Face the tube side of the coil spring downward. Align the front spring lower end (A) to the front spring lower rubber seat as shown.

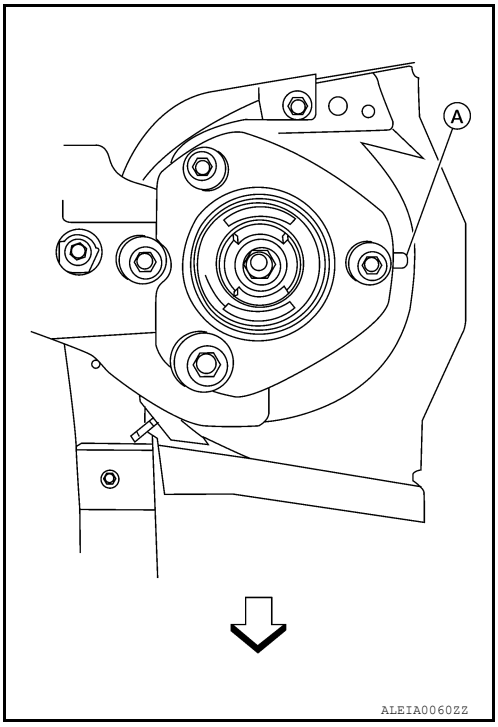


3. Install the bound bumper to the strut mount insulator.

CAUTION:
- **Be sure to install the bound bumper to the strut mount insulator securely.**
- **When installing the bound bumper, use soapy water. Do not use machine oil or other lubricants.**

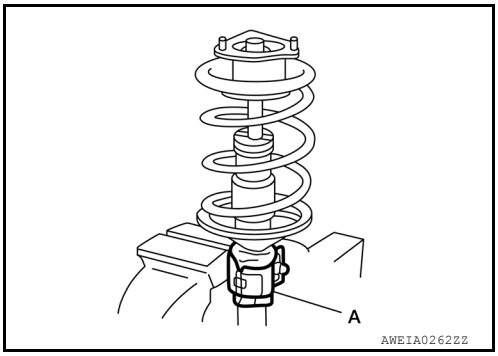
4. Install the strut mount bearing, the bound bumper, and the strut mount insulator to the strut. Temporarily install the piston rod lock nut.
   CAUTION:
   Do not reuse the piston rod lock nut.
5. Be sure tab (A) on strut mount insulator is positioned as shown.

   ⇦ **: Vehicle front**



6. Be sure the front spring is properly set in the front spring lower rubber seat. Gradually release the spring compressor (commercial service tool).
   CAUTION:
   Be sure the strut mount bearing is properly aligned to the strut mount insulator and to the front spring.
7. Tighten the piston rod lock nut to the specified torque.
8. Remove Tool (A) from the vise.

   Tool number : ST35652000 (—)
9. Remove Tool (A) from the front coil spring and strut.



Inspection

INFOID:0000000008642192

INSPECTION AFTER DISASSEMBLY

Front Suspension Strut
- Check the front suspension strut for deformation, cracks, and damage. Replace if necessary.
- Check the piston rod for damage, uneven wear, and distortion. Replace if necessary.
- Check the welded and sealed areas for oil leakage. Replace if necessary.

Insulator and Rubber Parts

Check the strut mount insulator for cracks. Check the front spring lower rubber seat and the strut mount bearing for wear. Replace if necessary.

Front Spring

Check the front spring for cracks, wear, and damage. Replace if necessary.

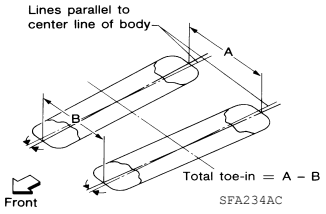
SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Wheel Alignment (Unladen*)

INFOID:0000000008642193

Market			United States/Canada		Mexico	
Tire size			P245/45R18	P245/40R19	P245/45R18	P245/40R19
Camber Degree minute (Decimal degree)	(LH)	Minimum	-1°05’ (-1.08°)	-1°10’ (-1.17°)	-0°55’ (-0.92°)	
		Nominal	-0°20’ (-0.33°)	-0°25’ (-0.42°)	-0°10’ (-0.17°)	
		Maximum	0°25’ (0.42°)	0°20’ (0.33°)	0°35’ (0.58°)	
	(RH)	Minimum	-1°20’ (-1.33°)	-1°25’ (-1.42°)	-1°10’ (-1.17°)	
		Nominal	-0°35’ (-0.58°)	-0°40’ (-0.67°)	-0°25’ (-0.42°)	
		Maximum	0°10’ (0.17°)	0°05’ (0.08°)	0°20’ (0.33°)	
	(RH) with respect to (LH)		0°15’ ± 0°33’ (0.25°± 0.55°)			
Caster Degree minute (Decimal degree)		Minimum	4°10’ (4.17°)	4°15’ (4.25°)	3°45’ (3.75°)	
		Nominal	4°55’ (4.92°)	5°00’ (5.00°)	4°30’ (4.50°)	
		Maximum	5°40’ (5.67°)	5°45’ (5.75°)	5°15’ (5.25°)	
		Maximum left and right difference	0°33’ (0.55°)			
Kingpin inclination Degree minute (Decimal degree)			14°25’ (14.42°)		14°05’ (14.08°)	



Total toe-in	Distance (A - B)	Minimum	Out 1 mm (Out 0.039 in)
		Nominal	In 1 mm (In 0.039 in)
		Maximum	In 3 mm (In 0.118 in)
	Angle (LH and RH) Degree minute (Decimal degree)	Minimum	Out 0°04′48″ (Out 0.08°)
		Nominal	In 0°04′48″ (In 0.08°)
		Maximum	In 0°14′24″ (In 0.24°)
Wheel turning angle			Refer to ST-37, "Steering Angle"

*: Fuel, engine coolant, and lubricants are full. Spare tire, jack, hand tools, and mats are in designated positions.

Ball Joint

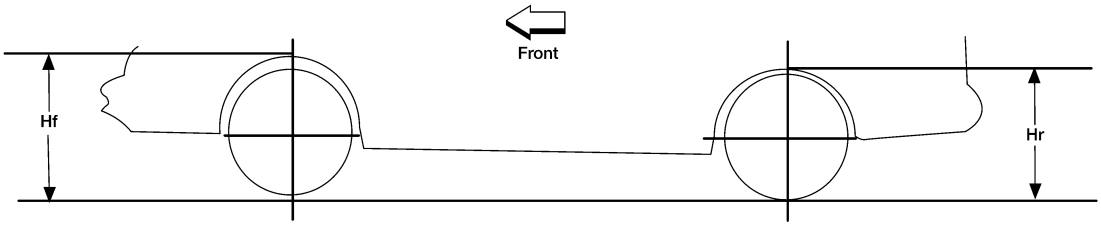
INFOID:0000000008642194

Measurement on spring balance (cotter pinhole position)	7.94 - 53.97 N (0.81 - 5.50 kg, 1.79 - 12.2 lb)
Axial endplay	0.1 mm (0.004 in) or less

Wheelarch Height (Unladen*1)

INFOID:0000000008642195

Unit: mm (in)



LEIA0085E

Market	United States			Canada			Mexico	
Tire size	P245/ 45R18*2	P245/ 45R18*3	P245/ 40R19*2	P245/ 45R18*2	P245/ 45R18*3	P245/ 40R19*2	P245/ 45R18*2	P245/ 40R19*2
Front (Hf)	719 (28.31)	719 (28.31)	723 (28.46)	720 (28.35)	719 (28.31)	723 (28.46)	729 (28.70)	732 (28.82)
Rear (Hr)	728 (28.66)	727 (28.62)	730 (28.74)	728 (28.66)	727 (28.62)	730 (28.74)	747 (29.41)	750 (29.53)

*1: Fuel, engine coolant, and lubricants are full. Spare tire, jack, hand tools, and mats are in designated positions.

*2: Without top load sunroof

*3: With top load sunroof