

SECTION **FSU**  
FRONT SUSPENSION

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B  
C  
D  
F  
G  
H  
I  
J  
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M  
N  
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CONTENTS

<b>SYMPTOM DIAGNOSIS</b> .....	2	<b>FRONT COIL SPRING AND STRUT</b> .....	8
<b>NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING</b> .....	2	Exploded View .....	8
NVH Troubleshooting Chart .....	2	Removal and Installation .....	8
<b>PRECAUTION</b> .....	3	Disassembly and Assembly .....	9
<b>PRECAUTIONS</b> .....	3	Inspection .....	10
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	3	Disposal .....	10
Precautions for Suspension .....	3	<b>TRANSVERSE LINK</b> .....	12
<b>PREPARATION</b> .....	4	Exploded View .....	12
<b>PREPARATION</b> .....	4	Removal and Installation .....	12
Special Service Tool .....	4	Inspection .....	12
Commercial Service Tool .....	4	<b>FRONT STABILIZER</b> .....	14
<b>PERIODIC MAINTENANCE</b> .....	5	Exploded View .....	14
<b>FRONT SUSPENSION ASSEMBLY</b> .....	5	Removal and Installation .....	14
Inspection .....	5	Inspection .....	15
<b>WHEEL ALIGNMENT</b> .....	6	<b>FRONT SUSPENSION MEMBER</b> .....	16
Inspection .....	6	Exploded View .....	16
Adjustment .....	6	Removal and Installation .....	16
<b>REMOVAL AND INSTALLATION</b> .....	8	Inspection .....	17
		<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	18
		<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	18
		Wheel Alignment .....	18
		Ball Joint .....	18
		Wheelarch Height .....	19

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

#### NVH Troubleshooting Chart

INFOID:000000006506743

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

Symptom		Possible cause and SUSPECTED PARTS										Reference						
		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	DIFFERENTIAL	FRONT AXLE AND FRONT SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING		
Noise	FRONT SUSPENSION	x	x	x	x	x	x			x	x	x	x	x	x	x	FSU-8, FSU-12, FSU-14, FSU-16	
		x	x	x	x		x				x	x	x	x	x	x		FSU-10
		x	x	x	x													—
		x	x	x	x													—
		x	x	x	x													—
		x	x	x	x													FSU-8, FSU-12, FSU-14, FSU-16
Shake	FRONT SUSPENSION																FSU-6	
																		FSU-15
																		NVH in DLN section
																		NVH in FAX and FSU sections
																		NVH in WT section
																		NVH in WT section
Vibration	FRONT SUSPENSION																NVH in FAX section	
																		NVH in BR section
																		NVH in ST section
Shimmy	FRONT SUSPENSION																	
Judder	FRONT SUSPENSION																	
Poor quality ride or handling	FRONT SUSPENSION																	

x: Applicable

# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

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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 "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

#### **WARNING:**

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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:**

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never 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.

#### Precautions for Suspension

INFOID:000000006506746

- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Spilled 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 >

## PREPARATION

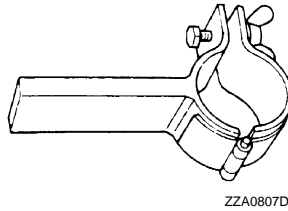
### PREPARATION

#### Special Service Tool

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

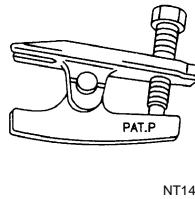
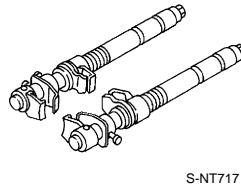
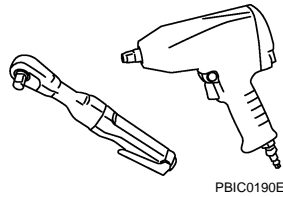
Tool number (Kent-More No.) Tool name	Description
ST35652000 ( — ) Strut attachment	Disassembling and assembling strut



#### Commercial Service Tool

INFOID:000000006506748

Tool name	Description
Power tool	Loosening bolts and nuts
Spring compressor	Removing and installing coil spring
Ball joint remover	Removing ball joint for steering knuckle



# FRONT SUSPENSION ASSEMBLY

< PERIODIC MAINTENANCE >

## PERIODIC MAINTENANCE

### FRONT SUSPENSION ASSEMBLY

#### Inspection

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#### COMPONENT PART

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

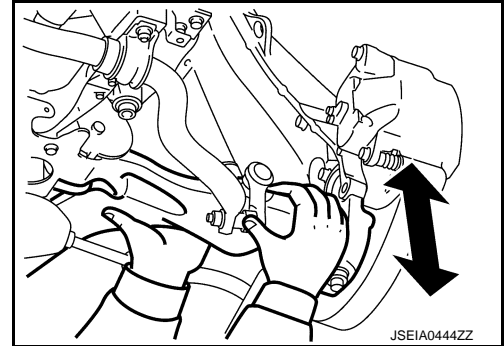
#### Ball Joint Axial End Play

1. Set front wheels in a straight-ahead position.
2. Move axle side of transverse link in the axial direction by hand. Check there is no end play.

**Axial end play** : Refer to [FSU-18. "Ball Joint"](#).

#### CAUTION:

- Never depress brake pedal when measuring.
- Never perform with tires on level ground.
- Be careful not to damage ball joint boot. Never damage the installation position by applying excessive force.



#### STRUT ASSEMBLY

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

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# WHEEL ALIGNMENT

< PERIODIC MAINTENANCE >

## WHEEL ALIGNMENT

### Inspection

INFOID:000000006506750

### DESCRIPTION

#### CAUTION:

- **Camber, caster, kingpin inclination angles cannot be adjusted.**
- **If camber, caster, or kingpin inclination angle is outside the standard, check front suspension parts for wear and damage. Replace suspect parts if a malfunction is detected.**
- **Kingpin inclination angle is reference value, no inspection is required.**
- **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.

### PRELIMINARY CHECK

Check the following:

- Tires for improper air pressure and wear. Refer to [WT-53, "Tire Air Pressure"](#).
- Road wheels for runout.
- Wheel bearing axial end play. Refer to [FAX-6, "Inspection"](#).
- Transverse link ball joint axial end play. Refer to [FSU-5, "Inspection"](#).
- Strut operation.
- Each mounting part of axle and suspension for looseness and deformation.
- Each of suspension member, strut assembly and transverse link for cracks, deformation and other damage.
- Vehicle height (posture).

### GENERAL INFORMATION AND RECOMMENDATIONS

- A four-wheel thrust alignment should be performed.
- This type of alignment is recommended for any NISSAN/INFINITI 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/INFINITI vehicle.
- The rack should be checked to ensure that it is level.
- Check 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.

### ALIGNMENT PROCESS

#### IMPORTANT:

Use only the alignment specifications listed in this Service Manual.

- When displaying the alignment settings, many alignment machines use “indicators”: (Green/red, plus or minus, Go/No Go). **Never use these indicators.**
- 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're using for more information.

### Adjustment

INFOID:000000008165683

### TOE-IN

- Loosen the steering outer socket, and then adjust the length using steering inner socket.

# WHEEL ALIGNMENT

< PERIODIC MAINTENANCE >

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Toe-in : Refer to [FSU-18, "Wheel Alignment"](#).

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**CAUTION:**

- Always evenly adjust both toe-in alternately and adjust the difference between the left and right to the standard.
- Always fix the steering inner socket when tightening the steering outer socket.
- After toe-in adjustment, adjust neutral position of steering angle sensor. Refer to [BRC-9, "Special Repair Requirement"](#).

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# FRONT COIL SPRING AND STRUT

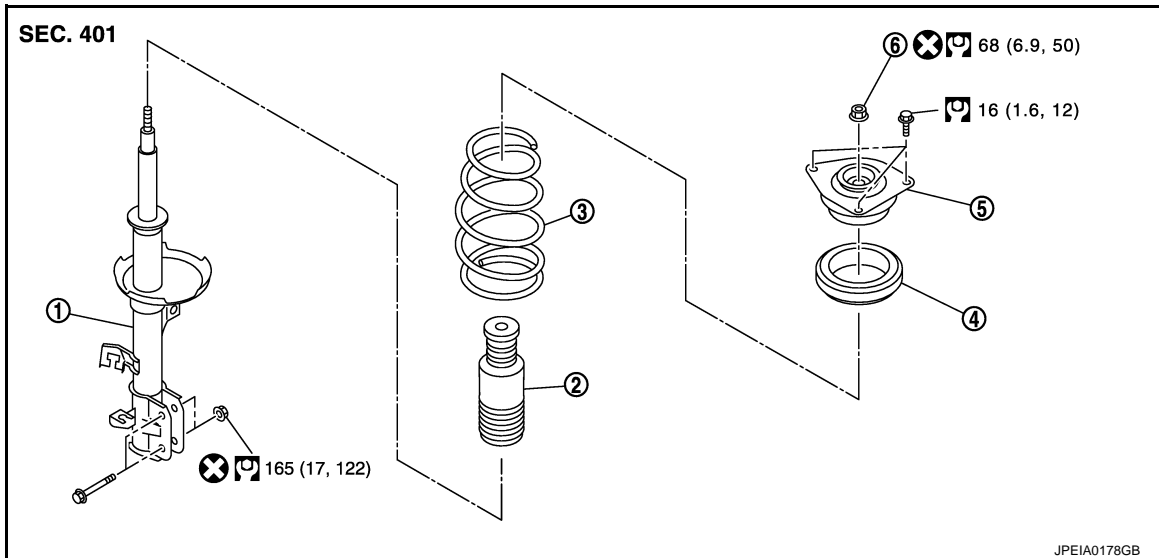
< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### FRONT COIL SPRING AND STRUT

Exploded View

INFOID:000000006506751



- |                           |                             |                        |
|---------------------------|-----------------------------|------------------------|
| 1. Strut                  | 2. Bound bumper             | 3. Coil spring         |
| 4. Strut mounting bearing | 5. Strut mounting insulator | 6. Piston rod lock nut |

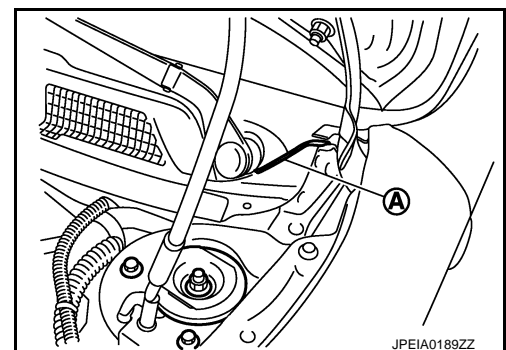
Refer to [GI-4, "Components"](#) for symbols in the figure.

## Removal and Installation

INFOID:000000006506752

### REMOVAL

1. Remove tires with power tool. Refer to [WT-45, "Exploded View"](#).
2. Remove lock plate. Refer to [BR-20, "FRONT : Exploded View"](#).
3. Remove wheel sensor. Refer to [BRC-109, "FRONT WHEEL SENSOR : Exploded View"](#).
4. Remove stabilizer connecting rod from strut assembly. Refer to [FSU-14, "Exploded View"](#).
5. Remove strut assembly from steering knuckle.
6. Remove cowl top cover rid (A).
7. Remove mounting bolts of strut mounting insulator with power tool, and then remove strut assembly.



### INSTALLATION

Note the following, and install in the reverse order of removal.



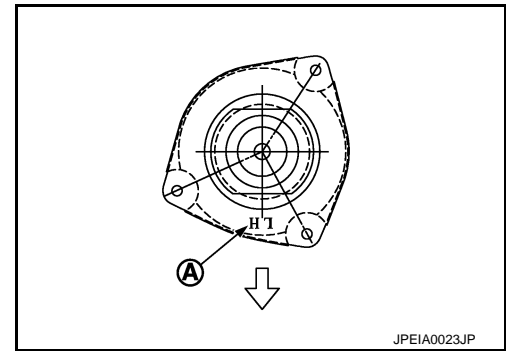
# FRONT COIL SPRING AND STRUT

## < REMOVAL AND INSTALLATION >

- Become it in ID letter (A) an illustration to the body front side.

↔ : Vehicle front

- Perform final tightening of bolts and nuts, under unladen conditions with tires on level ground.



INFOID:000000006506753

## Disassembly and Assembly

### DISASSEMBLY

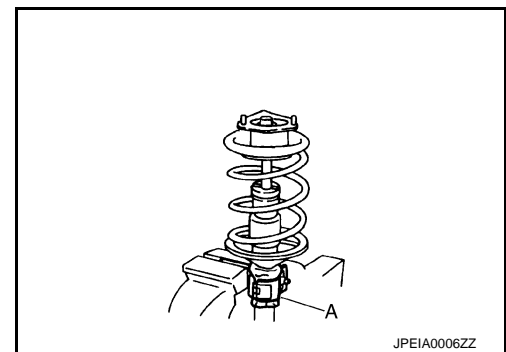
#### CAUTION:

**Never damage strut assembly piston rod when removing components from strut assembly.**

1. Install strut attachment (A) [SST: ST35652000 ( — )] to strut assembly and secure it in a vise.

#### CAUTION:

**When installing the strut attachment to strut assembly, wrap a shop cloth around strut to protect from damage.**

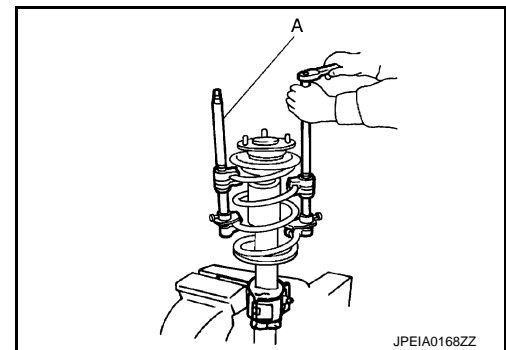


2. Using a spring compressor (A) (commercial service tool), compress coil spring between strut mounting bearing and lower seat (strut assembly) until coil spring with a spring compressor is free.

#### CAUTION:

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

3. Check coil spring with a spring compressor between strut mounting bearing and lower seat (strut assembly) is free. And then remove piston rod lock nut while securing the piston rod tip so that piston rod does not turn.



4. Remove strut mounting insulator and strut mounting bearing, and bound bumper from strut.
5. After removing coil spring with a spring compressor, then gradually release a spring compressor.

#### CAUTION:

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

6. Remove the strut attachment [SST: ST35652000 ( — )] from strut.

### ASSEMBLY

1. Install strut attachment [SST: ST35652000 ( — )] to strut and secure it in a vise.

#### CAUTION:

**When installing the strut attachment to strut assembly, wrap a shop cloth around strut to protect from damage.**

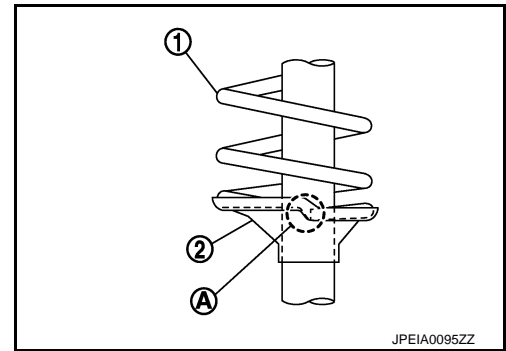
2. Install bound bumper onto strut mounting insulator.
3. Compress coil spring using a spring compressor (commercial service tool), and install it onto strut assembly.

#### CAUTION:

# FRONT COIL SPRING AND STRUT

## < REMOVAL AND INSTALLATION >

- Face tube side of coil spring (1) downward. Align the lower end (A) to lower seat (strut assembly) (2).
- Be sure a compressor is securely attached to coil spring. Compress coil spring.



4. Install strut mounting bearing and strut mounting insulator with bound bumper to strut.
  - Installation position of strut mounting insulator is shown in the figure.

↶ : Vehicle front

5. Secure piston rod tip so that piston rod does not turn, then tighten piston rod lock nut with specified torque.

**CAUTION:**

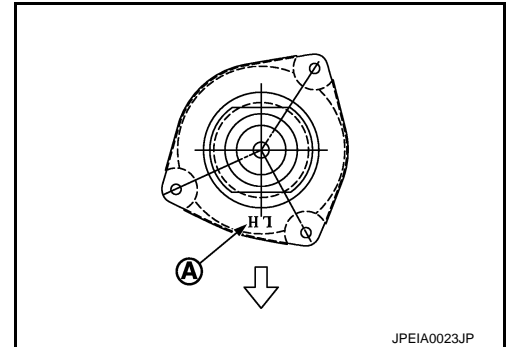
**Never reuse piston rod lock nut.**

6. Gradually release a spring compressor, and remove coil spring.

**CAUTION:**

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

7. Remove the strut attachment from strut assembly.



## Inspection

INFOID:000000006506754

### INSPECTION AFTER DISASSEMBLY

#### Strut

Check the following items, and replace the parts if necessary.

- Strut for deformation, cracks or damage
- Piston rod for damage, uneven wear or distortion
- Oil leakage

#### Strut Mounting Insulator and bound bumper Inspection

Check strut mounting insulator and bound bumper for cracks, wear or damage. Replace it if necessary.

#### Coil Spring

Check coil spring for cracks, wear or damage. Replace it if necessary.

### INSPECTION AFTER INSTALLATION

1. Check wheel sensor harness for proper connector. Refer to [BRC-109, "FRONT WHEEL SENSOR : Exploded View"](#).
2. Check wheel alignment. Refer to [FSU-6, "Inspection"](#).
3. Adjust neutral position of steering angle sensor. Refer to [BRC-9, "Special Repair Requirement"](#).

## Disposal

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1. Set strut assembly horizontally to the ground with the piston rod fully extracted.

## FRONT COIL SPRING AND STRUT

### < REMOVAL AND INSTALLATION >

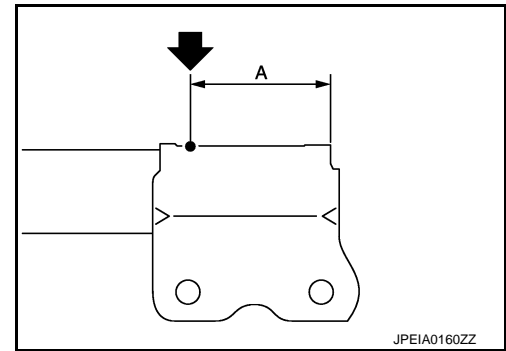
- Drill 2 – 3 mm (0.08 – 0.12 in) hole at the position (●) from top as shown in the figure to release gas gradually.

**CAUTION:**

- **Wear eye protection (safety glass).**
- **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)**

- 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.**

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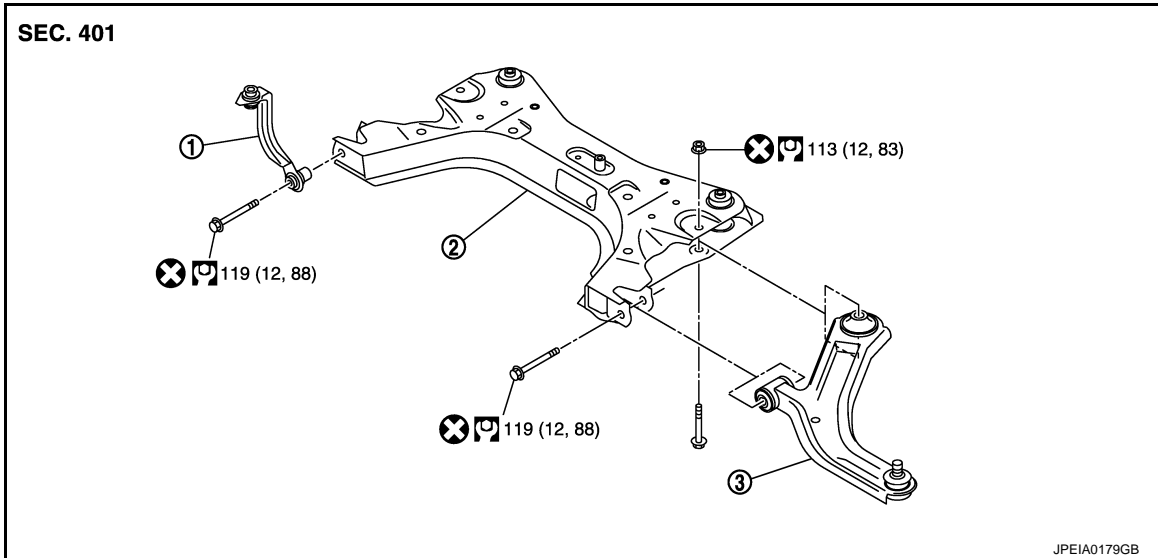
# TRANSVERSE LINK

< REMOVAL AND INSTALLATION >

## TRANSVERSE LINK

Exploded View

INFOID:000000006506756



1. Upper link (right side)                      2. Front suspension member                      3. Transverse link

Refer to [GI-4, "Components"](#) for symbols in the figure.

## Removal and Installation

INFOID:000000006506757

### REMOVAL

1. Remove tires with power tool. Refer to [WT-45, "Exploded View"](#).
2. Remove under cover. Refer to [EXT-23, "Exploded View"](#).
3. Remove transverse link from steering knuckle. Refer to [FAX-8, "Exploded View"](#).
4. Remove transverse link from suspension member.

**NOTE:**

Support the point around from upper link (right side) with a jack when removing transverse link (right side).

### INSTALLATION

Note the following, and install in the reverse order of removal.

- Perform final tightening of bolts and nuts at the front suspension member, under unladen conditions with tires on level ground.

## Inspection

INFOID:000000006506758

### INSPECTION AFTER REMOVAL

#### Transverse Link

Check the following items, and replace the part if necessary.

- Transverse link and bushing for deformation, cracks or damage.
- Ball joint boot for cracks or other damage, and also for grease leakage.

#### Swing Torque

1. Manually move ball stud to confirm it moves smoothly with no binding.
2. Move ball stud at least ten times by hand to check for smooth movement.

## TRANSVERSE LINK

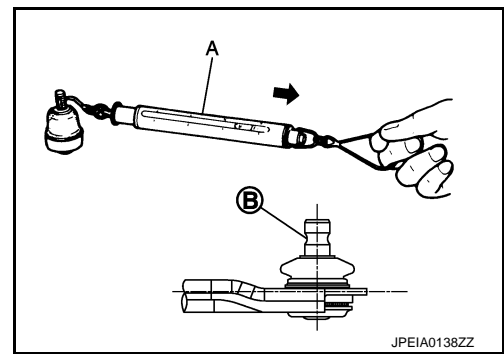
### < REMOVAL AND INSTALLATION >

- Hook a spring balance (A) at cutout on ball stud (B). Confirm spring balance measurement value is within specifications when ball stud begins moving.

**Swing torque** : Refer to [FSU-18, "Ball Joint"](#).

**Measurement on spring balance** : Refer to [FSU-18, "Ball Joint"](#)

- If swing torque exceeds standard range, replace transverse link assembly.



### Axial End Play

- Move ball stud at least ten times by hand to check for smooth movement.
- Move tip of ball stud in axial direction to check for looseness.

**Axial end play** : Refer to [FSU-18, "Ball Joint"](#).

- If axial end play exceeds the standard value, replace transverse link assembly.

### INSPECTION AFTER INSTALLATION

- Check wheel sensor harness for proper connector. Refer to [BRC-109, "FRONT WHEEL SENSOR : Exploded View"](#).
- Check wheel alignment. Refer to [FSU-6, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-9, "Special Repair Requirement"](#).

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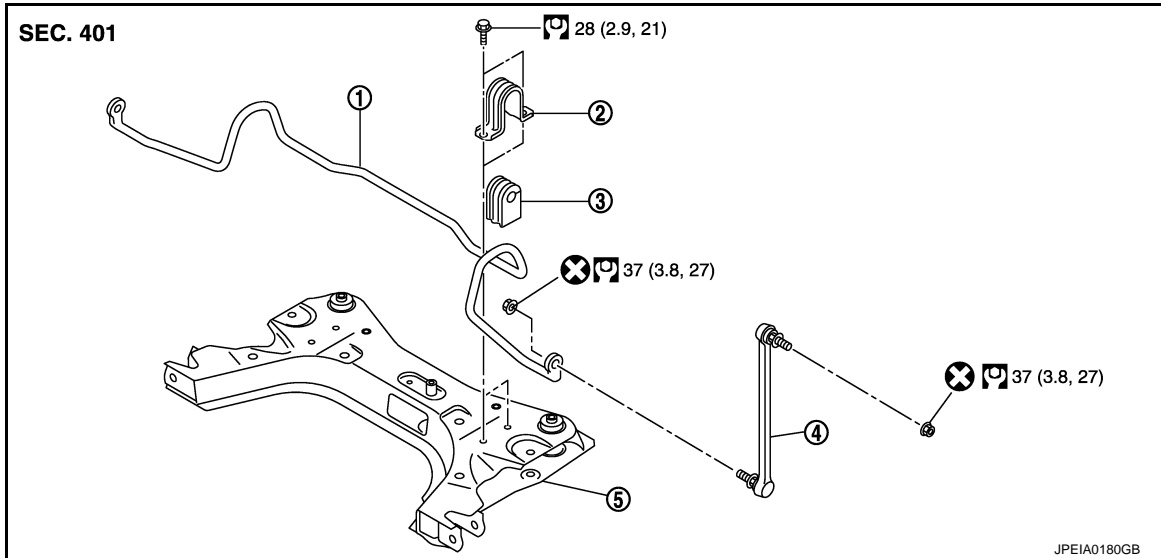
# FRONT STABILIZER

< REMOVAL AND INSTALLATION >

## FRONT STABILIZER

Exploded View

INFOID:000000006506759



- |                              |                            |                       |
|------------------------------|----------------------------|-----------------------|
| 1. Stabilizer bar            | 2. Stabilizer clamp        | 3. Stabilizer bushing |
| 4. Stabilizer connecting rod | 5. Front suspension member |                       |

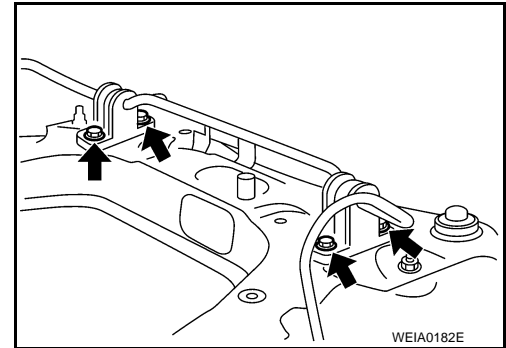
Refer to [GI-4, "Components"](#) for symbols in the figure.

## Removal and Installation

INFOID:000000006506760

### REMOVAL

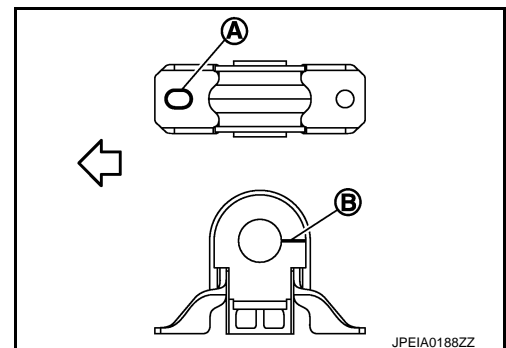
1. Remove tires power tool. Refer to [WT-45, "Exploded View"](#).
2. Remove front suspension member. Refer to [FSU-16, "Exploded View"](#).
3. Remove stabilizer connecting rod.
4. Remove mounting bolts (←) of stabilizer clamp, and then remove stabilizer clamp and stabilizer bushing from front suspension member.
5. Remove stabilizer bar.



### INSTALLATION

Note the following, and install in the reverse order of removal.

- Install stabilizer clamp that a linear hole (A) becomes vehicle front side (←).
- Install stabilizer bushing that slit (B) becomes vehicle rear side.



# FRONT STABILIZER

## < REMOVAL AND INSTALLATION >

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- Tighten the mounting nut to the specified torque while holding a hexagonal part of stabilizer connecting rod side.
- Perform final tightening of bolts and nuts at the vehicle installation position (rubber bushing), under unladen conditions with tires on level ground.

### Inspection

INFOID:000000006506761

#### INSPECTION AFTER REMOVAL

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

#### INSPECTION AFTER INSTALLATION

1. Check wheel sensor harness for proper connector. Refer to [BRC-109. "FRONT WHEEL SENSOR : Exploded View"](#).
2. Check wheel alignment. Refer to [FSU-6. "Inspection"](#).
3. Adjust neutral position of steering angle sensor. Refer to [BRC-9. "Special Repair Requirement"](#).

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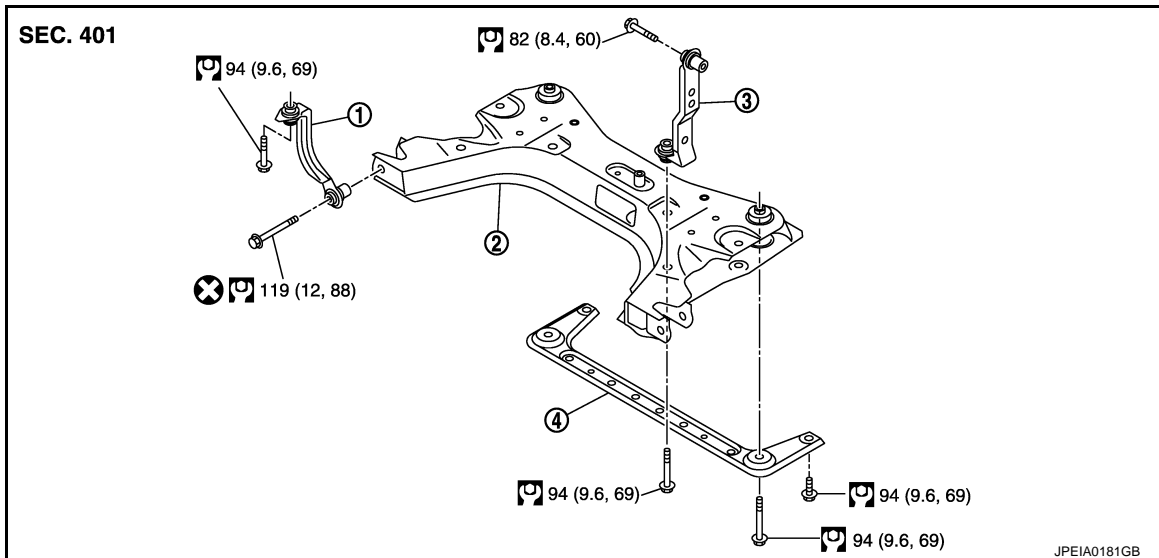
# FRONT SUSPENSION MEMBER

< REMOVAL AND INSTALLATION >

## FRONT SUSPENSION MEMBER

Exploded View

INFOID:000000006506762



1. Upper link (right side)
2. Front suspension member
3. Upper link (left side)
4. Member stay

Refer to [GI-4, "Components"](#) for symbols in the figure.

## Removal and Installation

INFOID:000000006506763

### REMOVAL

1. Remove tires with power tool. Refer to [WT-45, "Exploded View"](#).
2. Remove under cover. Refer to [EXT-23, "Exploded View"](#).
3. Remove wheel sensor. Refer to [BRC-109, "FRONT WHEEL SENSOR : Exploded View"](#).
4. Remove stabilizer connecting rod from strut assembly. Refer to [FSU-14, "Exploded View"](#).
5. Remove rear torque rod. Refer to [EM-75, "Exploded View"](#).
6. Remove transverse link from steering knuckle. Refer to [FAX-8, "Exploded View"](#).
7. Remove steering outer socket from steering knuckle. Refer to [ST-13, "Exploded View"](#).
8. Remove intermediate shaft from steering gear assembly. Refer to [ST-10, "Exploded View"](#).
9. Set suitable jack under front suspension member.

#### **CAUTION:**

**Check the stable condition when using a jack.**

10. Remove member stay rear mounting bolts.
11. Remove upper link mounting bolts (right side: vehicle body side, left side: suspension member side), and suspension member mounting bolts.
12. Gradually lower the jack to remove front suspension member from vehicle body.

#### **CAUTION:**

**Check the stable condition when using a jack.**

13. Remove upper link (left side) from vehicle body.
14. Remove upper link (right side), transverse links, stabilizer assembly from suspension member.
15. Remove steering gear assembly from suspension member. Refer to [ST-13, "Exploded View"](#).

### INSTALLATION

Note the following, and install in the reverse order of removal.

- Perform final tightening of bolts and nuts, under unladen conditions with tires on level ground.



# FRONT SUSPENSION MEMBER

< REMOVAL AND INSTALLATION >

## Inspection

INFOID:000000006506764

### INSPECTION AFTER DISASSEMBLY

Check front suspension member for cracks, wear or damage. Replace it if necessary.

### INSPECTION AFTER INSTALLATION

1. Check wheel sensor harness for proper connector. Refer to [BRC-109, "FRONT WHEEL SENSOR : Exploded View"](#).
2. Check wheel alignment. Refer to [FSU-6, "Inspection"](#).
3. Adjust neutral position of steering angle sensor. Refer to [BRC-9, "Special Repair Requirement"](#).

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**FSU**

## SERVICE DATA AND SPECIFICATIONS (SDS)

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Wheel Alignment

INFOID:000000006506765

Item		Standard	
Camber Degree minute (Decimal degree)	Minimum	-0° 55' (-0.92°)	
	Nominal	-0° 10' (-0.17°)	
	Maximum	0° 35' (0.58°)	
	Left and right difference	0° 45' (0.75°)	
Caster Degree minute (Decimal degree)	Minimum	3° 55' (3.92°)	
	Nominal	4° 40' (4.67°)	
	Maximum	5° 25' (5.41°)	
	Left and right difference	0° 45' (0.75°)	
Kingpin inclination Degree minute (Decimal degree)	Minimum	9° 10' (9.17°)	
	Nominal	9° 55' (9.92°)	
	Maximum	10° 40' (10.66°)	
Toe-in	Total toe-in Distance	Minimum	0 mm (0 in)
		Nominal	In 1.0 mm (0.05 in)
		Maximum	In 2.0 mm (0.07 in)
	Toe angle (left wheel or right wheel) Degree minute (Decimal degree)	Minimum	0° 00' (0.00°)
		Nominal	In 0° 03' (0.05°)
		Maximum	In 0° 06' (0.10°)

Measure value under unladen\* conditions.

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

### Ball Joint

INFOID:000000006506766

Item	Standard
Swing torque	0.5 – 4.9 N·m (0.05 – 0.5 kg·m, 5 – 43 in·lb)
Measurement on spring balance	15.4 – 150.8 N (1.6 – 15.4 kg, 3.6 – 33.9 lb)
Axial end play	0 mm (0 in)

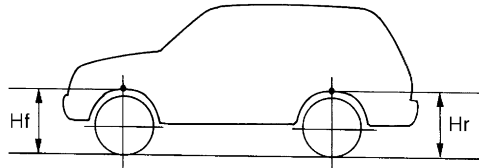
# SERVICE DATA AND SPECIFICATIONS (SDS)

## < SERVICE DATA AND SPECIFICATIONS (SDS)

### Wheelarch Height

INFOID:000000006506767

Item	Standard			
	USA		CANADA	
Destination				
Tire size	195/60R15	195/55R16	195/60R15	195/55R16
Front (Hf)	679 mm (26.73 in)	684 mm (26.93 in)	679 mm (26.73 in)	684 mm (26.93 in)
Rear (Hr)		683 mm (26.89 in)		



SFA746B

Measure value under unladen\* conditions.

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

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