

SECTION **FSU**
FRONT SUSPENSION

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FSU

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PRECAUTIONS

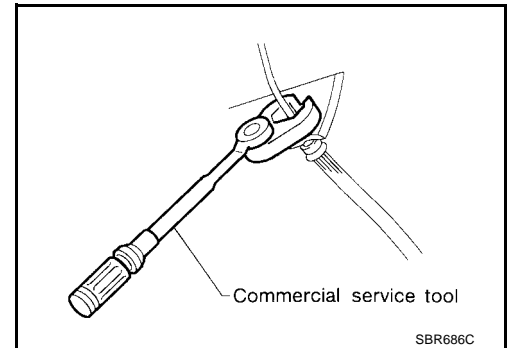
PRECAUTIONS

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Precautions

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- When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. Oil will shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
*: Fuel, engine coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- After installing removed suspension parts, check wheel alignment and adjust if necessary.
- Use flare nut wrench when removing or installing brake tubes.
- Always torque brake lines when installing.
- Lock nuts are un reusable parts; always use new ones. When replacing, do not wipe the oil off the new lock nut before tightening.



PREPARATION

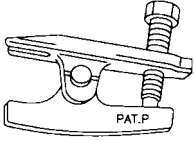
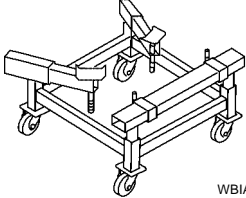
PREPARATION

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Special Service Tools

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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
HT72520000 (J25730-A) Ball joint remover	 Removing outer tie-rod end and lower ball joint
— (J-47242) Engine support table	 Front suspension member removal

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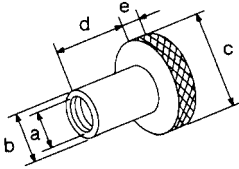
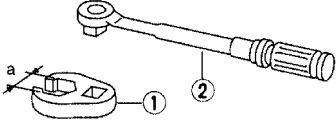
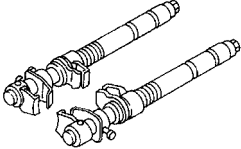
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Commercial Service Tools

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Tool name	Description
Attachment wheel alignment	 Measure wheel alignment a: Screw M24 x 1.5 pitch b: 35 mm (1.38 in) dia. c: 65 mm (2.56 in) dia. d: 56 mm (2.20 in) e: 12 mm (0.47 in)
1. Flare nut crowfoot 2. Torque wrench	 Removing and installing each brake piping a: 10 mm (0.39 in)
Spring compressor	 Removing and installing coil spring

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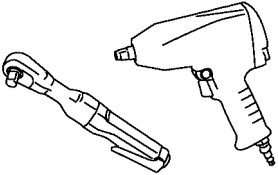
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PREPARATION

Tool name	Description
Engine lifting bracket  LEIA0062E	Removing and installing suspension member with 5A/T
Power tool  PBIC0190E	Loosening bolts and nuts

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

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NVH Troubleshooting Chart

EES000NT

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

Reference page		FSU-6	FSU-11	FSU-11	—	FSU-11	FSU-6	FSU-7	FSU-12	FAX-4, "NVH Troubleshooting Chart"	FAX-4, "NVH Troubleshooting Chart"	WT-3, "NVH Troubleshooting Chart"	WT-3, "NVH Troubleshooting Chart"	BR-5, "NVH Troubleshooting Chart"	PS-5, "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	DRIVE SHAFT	AXLE	TIRES	ROAD WHEEL	BRAKES	STEERING	
Symptom	Noise	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
	Vibration	x	x	x	x	x				x	x	x				x
	Shimmy	x	x	x	x			x			x	x	x	x	x	x
	Shudder	x	x	x							x	x	x	x		x
	Poor quality ride or handling	x	x	x	x	x		x	x		x	x	x			

x: Applicable

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FRONT SUSPENSION ASSEMBLY

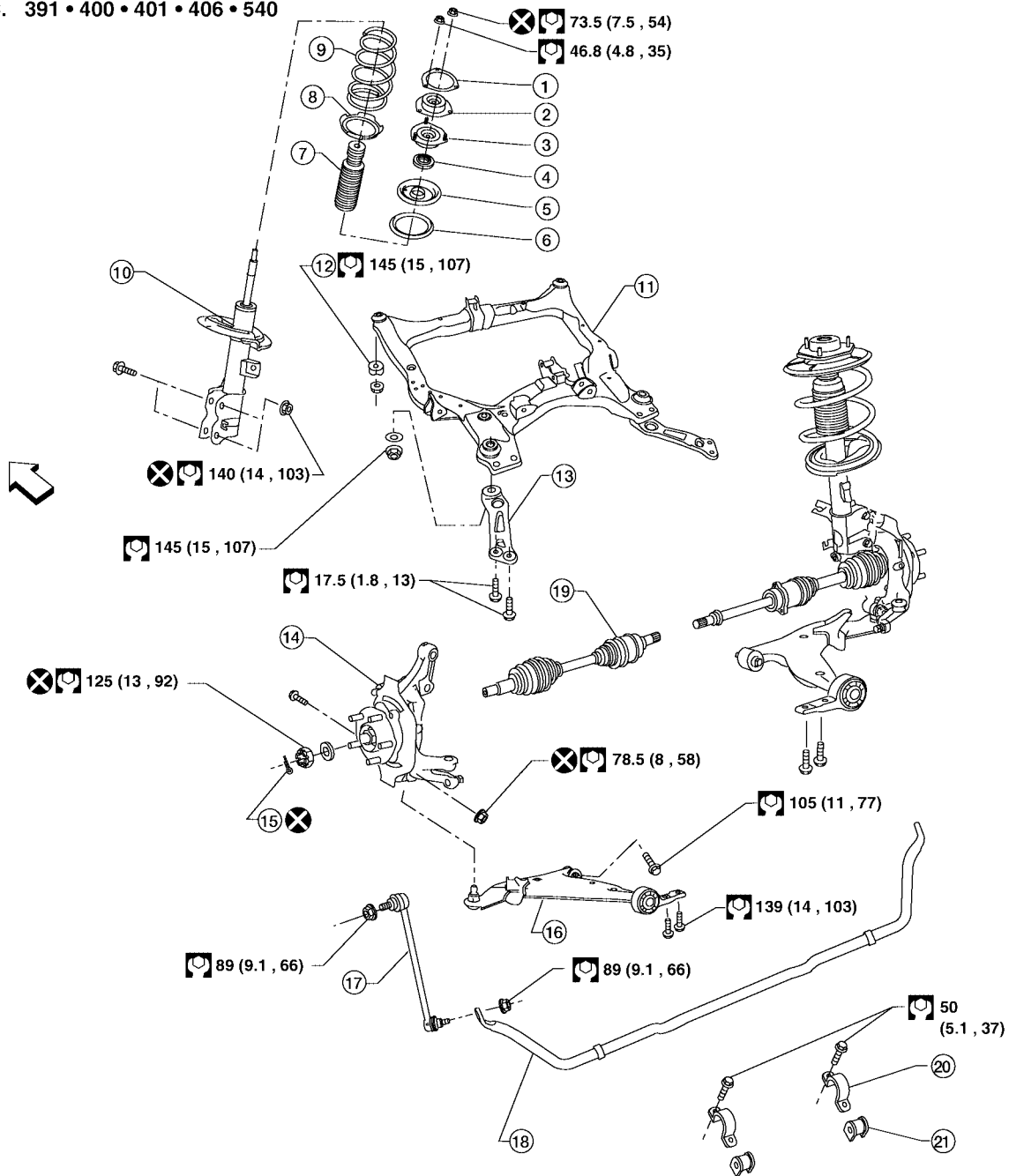
FRONT SUSPENSION ASSEMBLY

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Components

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SEC. 391 • 400 • 401 • 406 • 540



- | | | |
|---------------------|---|-------------------------------|
| 1. Strut spacer | 2. Strut mount insulator | 3. Mounting insulator bracket |
| 4. Strut bearing | 5. Upper spring seat | 6. Upper rubber seat |
| 7. Dust cover | 8. Lower rubber seat | 9. Coil spring |
| 10. Strut | 11. Front suspension member | 12. Cup |
| 13. Member pin stay | 14. Wheel hub and steering knuckle assembly | 15. Cotter pin |
| 16. Transverse link | 17. Connecting rod | 18. Stabilizer bar |
| 19. Drive shaft | 20. Stabilizer clamp | 21. Stabilizer bushing |
| ← Front | | |

LEIA0124E

FRONT SUSPENSION ASSEMBLY

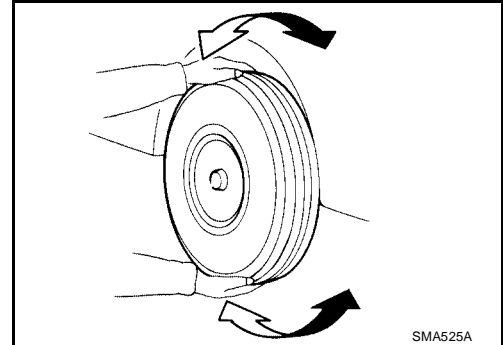
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On-vehicle Service FRONT SUSPENSION PARTS

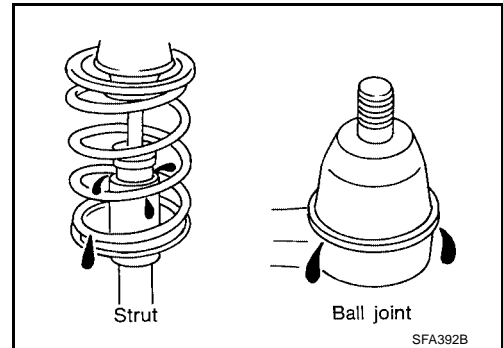
Check the front axle and front suspension parts for any excessive play, cracks, wear, or other damage.

- Raise the vehicle on a hoist and shake each front wheel to check for excessive play.
- Make sure that the cotter pin is inserted in the lower ball joint.
- Retighten all of the axle and suspension nuts and bolts to the specified torque.

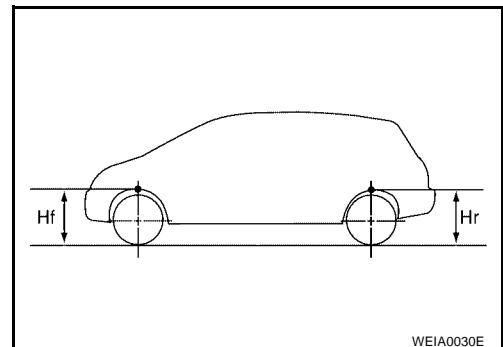
Tightening torque : Refer to [FSU-6, "Components"](#) .



- Check the strut (shock absorber) for any oil leakage or other damage.
- Check the suspension ball joint for grease leakage and the ball joint dust cover for any cracks or other damage. If the ball joint dust cover is cracked or damaged, replace the transverse link.



- Check the wheelarch height "Hf" and "Hr" from the top of the wheelarch to the ground.
 - For proper measurement of the wheelarch height, the vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (the tread wear indicators must not be showing).
 - *: Fuel, engine coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
 - Bounce the vehicle up and down several times before measuring the height.



Wheelarch height : Refer to [FSU-20, "Wheelarch Height \(Unladen*\)"](#) .

- The wheelarch height is not adjustable. If the height is out of specification, check for worn springs or suspension parts.

Front Wheel Alignment DESCRIPTION

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NOTE:

Before checking the front wheel alignment, be sure to make a preliminary inspection (Unladen*).

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

PRELIMINARY INSPECTION

- Check the tires for wear and improper inflation.
- Check the wheel runout. Refer to [WT-4, "Inspection"](#) .
- Check the front wheel bearings for looseness.
- Check the front suspension for looseness.
- Check the steering linkage for looseness.
- Check that the front shock absorbers work properly.

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FRONT SUSPENSION ASSEMBLY

- Check the vehicle height (posture) in the unladen condition. Refer to [FSU-7, "FRONT SUSPENSION PARTS"](#).

CAMBER, CASTER AND KINGPIN INCLINATION

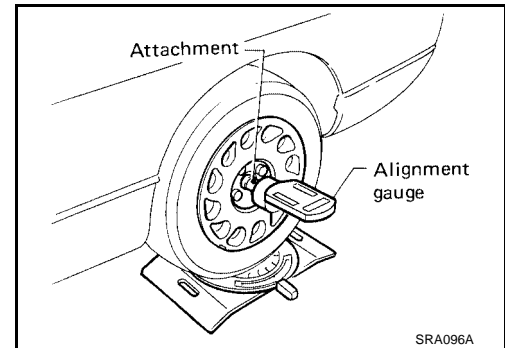
NOTE:

Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure the camber, caster and kingpin inclination of both the right and left wheels using attachment Tool and a suitable alignment gauge.

Camber, caster and kingpin inclination : Refer to [FSU-19, "Front Wheel Alignment \(Unladen*1\)"](#)

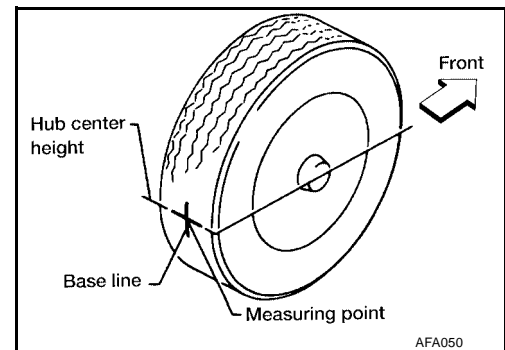
2. If the camber, caster or kingpin inclination is not within specification, inspect the front suspension parts. Replace any damaged or worn out parts.



TOE-IN

WARNING:

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



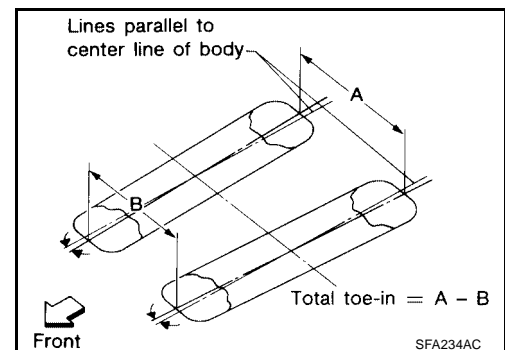
4. Measure the distance "A" on the rear side of the front tires as shown.
5. Push the vehicle slowly ahead to rotate the wheels 180° degrees (1/2 a turn).

CAUTION:

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

6. Measure the distance "B" on the front side of the front tires at the same marks as shown.

Total toe-in : Refer to [FSU-19, "Front Wheel Alignment \(Unladen*1\)"](#).



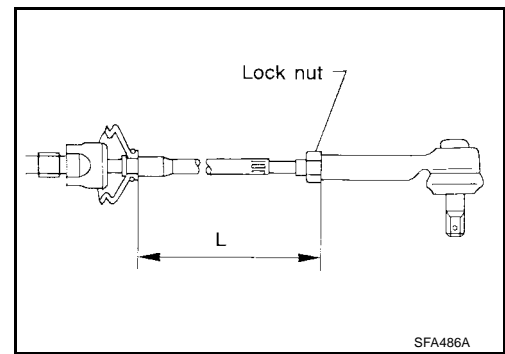
FRONT SUSPENSION ASSEMBLY

7. Adjust the toe-in by varying the length of the steering outer tie-rods.
 - a. Loosen the outer tie-rod lock nuts.
 - b. Adjust the toe-in by screwing the outer tie-rods in or out.

Standard length "L" : Refer to [PS-29. "Steering Gear and Linkage"](#) .

- c. Tighten the outer tie-rod lock nuts to specified torque.

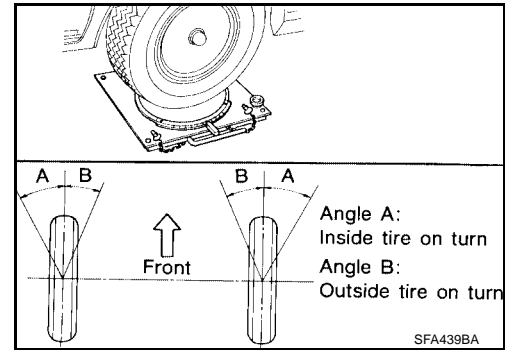
Lock nut : Refer to [PS-15. "Removal and Installation"](#) .



FRONT WHEEL TURNING ANGLE

1. Set the front wheels in a straight-ahead position. Then move the vehicle forward until the front wheels rest on the turning radius gauge as shown.
2. Rotate steering wheel all the way right and left; measure the turning angles "A" and "B" as shown.

Wheel turning angle (full turn) : Refer to [FSU-19. "Front Wheel Alignment \(Unladen*1\)"](#) .



COIL SPRING AND SHOCK ABSORBER

COIL SPRING AND SHOCK ABSORBER

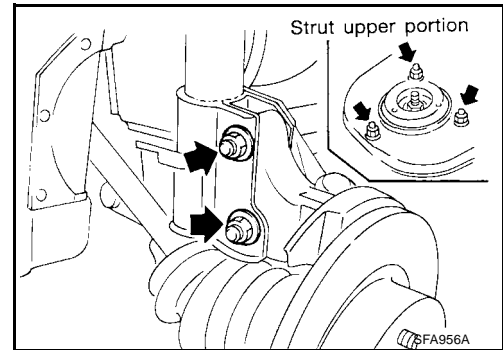
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Removal and Installation

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REMOVAL

1. Remove the wheel and tire using power tool. Refer to [WT-6, "Rotation"](#) .
 2. Remove cowl top and cowl top extension. Refer to [EI-18, "Removal and Installation"](#) .
 3. Disconnect the ABS sensor wire and front brake hose from the brackets on the front shock absorber (strut).
 4. Disconnect the connecting rod upper link using power tool.
 5. Support the wheel hub and steering knuckle assembly with a suitable wire.
 6. Remove the shock absorber lower bolts and nuts using power tool.
 7. Remove the three upper strut mounting nuts using power tool.
- CAUTION:**
Do not remove piston rod lock nut on vehicle.
8. Remove the coil spring and shock absorber (strut) assembly.



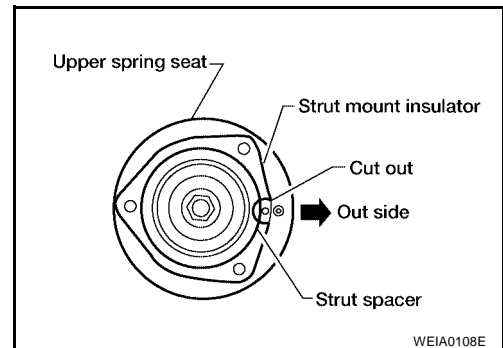
INSTALLATION

Installation is in the reverse order of removal.

- After installation, check that the front wheel alignment is within specification. Refer to [FSU-7, "Front Wheel Alignment"](#) .
- When installing the strut spacer, it must be positioned as shown.
- Tighten all nuts and bolts to specification using power tool. Refer to [FSU-6, "Components"](#) .

WARNING:

Always replace the shock absorber lower mounting nuts.



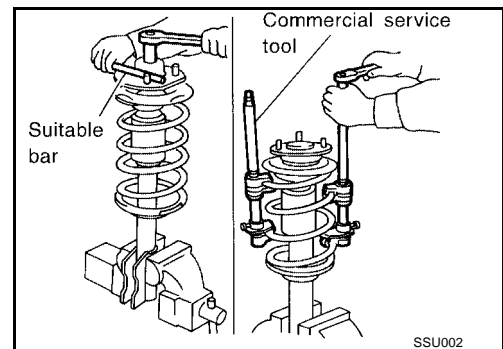
Disassembly

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1. Set the shock absorber in a vise, then loosen (without removing) the piston rod lock nut as shown.
- CAUTION:**
Do not remove piston rod lock nut at this time.
2. Compress the spring using commercial service tool until the strut mounting insulator can be turned by hand.

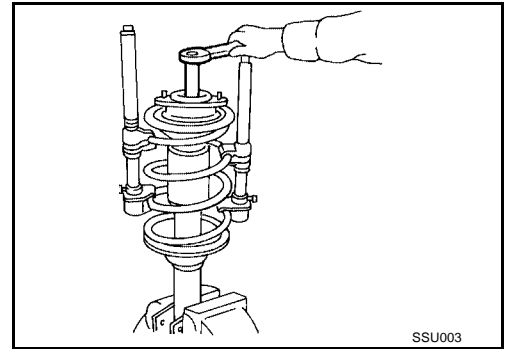
WARNING:

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



COIL SPRING AND SHOCK ABSORBER

3. Remove the piston rod lock nut.



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Inspection

SHOCK ABSORBER ASSEMBLY

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage and replace if necessary.

MOUNTING INSULATOR AND RUBBER PARTS

Check cemented rubber-to-metal portion for separation or cracks. Check rubber parts for deterioration and replace if necessary.

THRUST BEARING

Check thrust bearing parts for abnormal noise or excessive rattle in axial direction and replace if necessary.

COIL SPRING

- Check for cracks, deformation or other damage and replace if necessary.
- Check the free spring height.

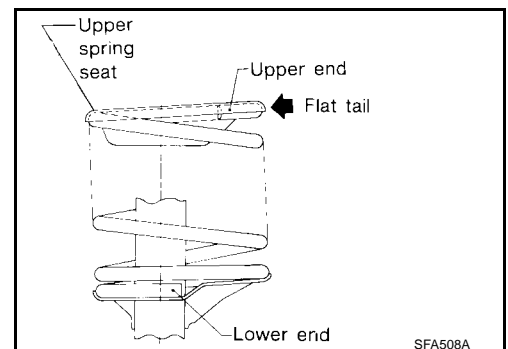
Front spring free height

SE model : 340 mm (13.39 in)

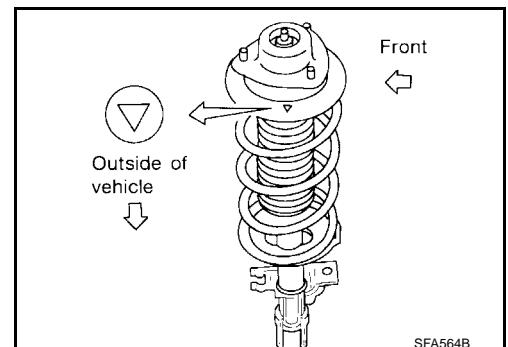
SL model : 350 mm (13.78 in)

Assembly

1. When installing coil spring on strut, it must be positioned as shown.



2. Install upper spring seat with alignment mark facing the outer side of vehicle, in line with strut-to-knuckle attachment points.



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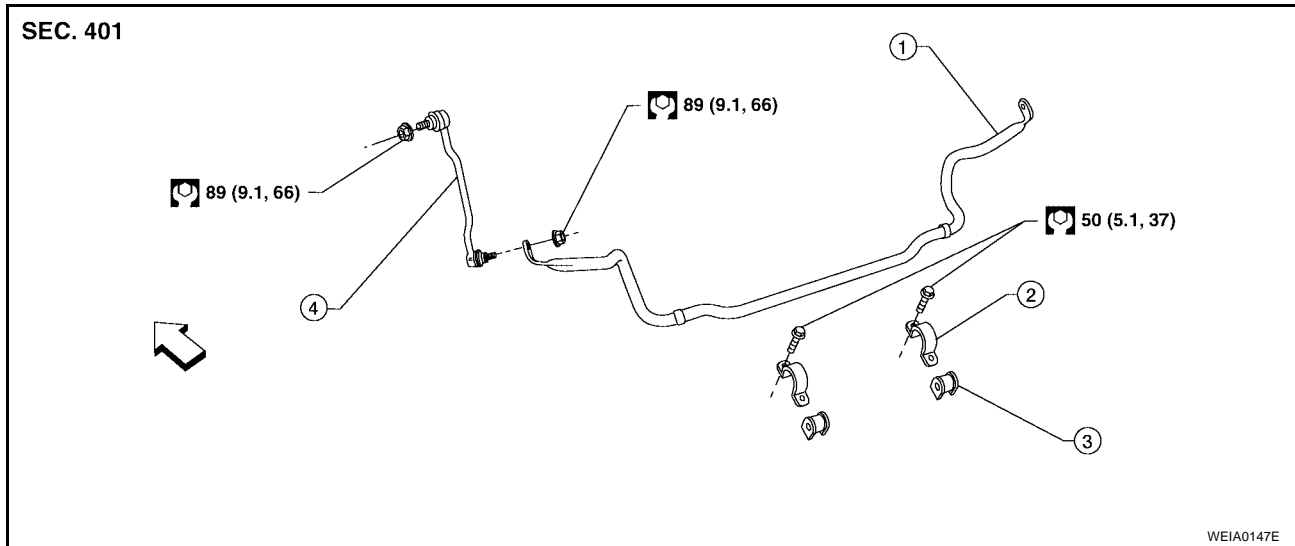
STABILIZER BAR

STABILIZER BAR

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Removal and Installation

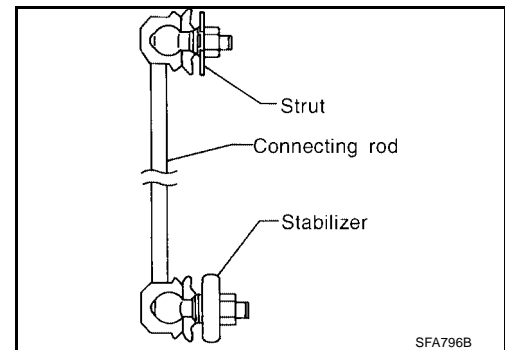
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1. Stabilizer bar
2. Bracket
3. Bushing
4. Connecting rod
← Front

REMOVAL

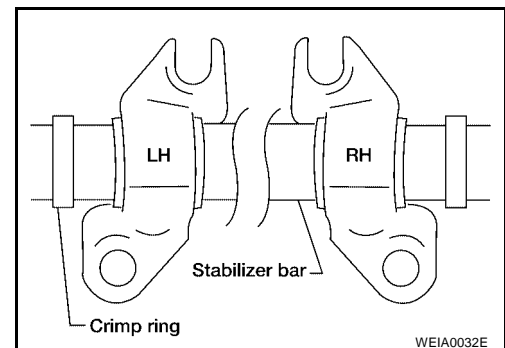
1. Remove the wheel and tire using power tool. Refer to [WT-6, "Rotation"](#).
2. Remove the mounting bolts on the lower side of the steering gear. Refer to [PS-15, "Removal and Installation"](#).
 - Support steering gear.
3. Disconnect the connecting rod end at the stabilizer bar using power tool.
 - Prevent the stabilizer connecting rod from turning by inserting a hex wrench into the end of the ball stud, then remove nut.
4. Remove the two stabilizer bar brackets from the front suspension member.
5. Remove the front stabilizer bar by withdrawing from side.
 - Remove the two stabilizer bushings as necessary.



INSTALLATION

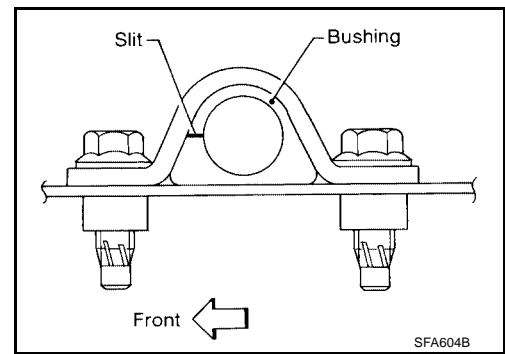
Installation is in the reverse order of removal.

- When installing stabilizer, make sure that the clamps are facing in the correct direction as shown.



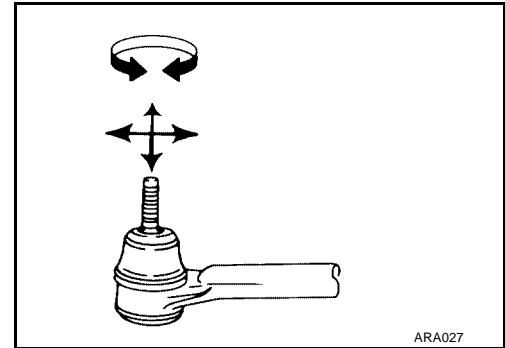
STABILIZER BAR

- Make sure that slit in bushing is in the position as shown.
- Lubricate the inner and outer surfaces of the bushing using a silicone lubricant.



Inspection

- Check the stabilizer bar for deformation or cracks and replace if necessary.
- Check the bushings for deterioration or cracks. Replace if necessary.
- Check that the ball joint can rotate in all directions. If movement is not smooth and free, replace stabilizer bar connecting rod.



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TRANSVERSE LINK

TRANSVERSE LINK

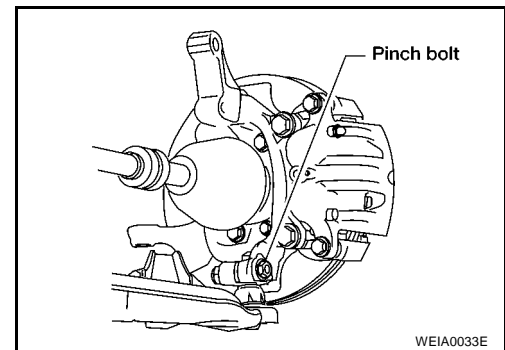
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Removal and Installation

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REMOVAL

1. Remove the wheel and tire. Refer to [WT-6, "Rotation"](#) .
2. Remove lower ball joint pinch bolt using power tool, then separate transverse link from the steering knuckle assembly.



3. Remove the two transverse link pivot bolts using power tool.
4. Remove the transverse link from the front suspension member.

INSPECTION AFTER REMOVAL

Visual Check

- Check the transverse link for damage, cracks or deformation. Replace it if necessary.
- Check the bushing for damage, cracks and deformation. Replace the transverse link if necessary.

Lower Ball Joint

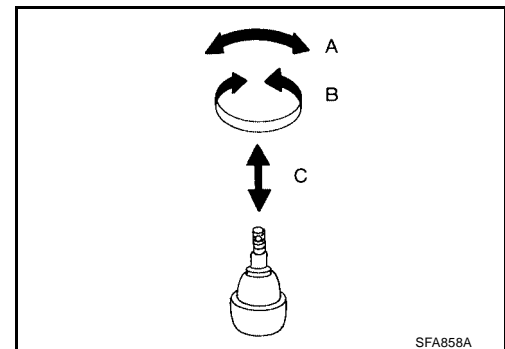
- Check the ball joint for excessive play. Replace the transverse link assembly if any of the following exists:
 - Lower ball joint stud is worn.
 - Lower ball joint is hard to swing.
 - Lower ball joint play in axial directions or end play is excessive.

Swinging Force

NOTE:

Before checking the axial forces and end play, turn the lower ball joint at least 10 revolutions so that the ball joint is properly broken in.

Swinging force "A" (measuring from cotter pin hole of ball stud) : 7.8 - 54.9 N (0.8 - 5.6 kg-f, 1.8 - 12.3 lb-f)



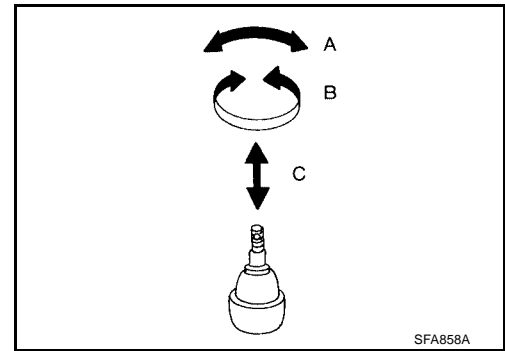
Turning Force

NOTE:

Before checking the axial forces and end play, turn the lower ball joint at least 10 revolutions so that the ball joint is properly broken in.

TRANSVERSE LINK

Turning torque "B" : 0.49 - 3.43 N·m (5.0 - 35.0 kg-cm,
4.3 - 30.4 in-lb)



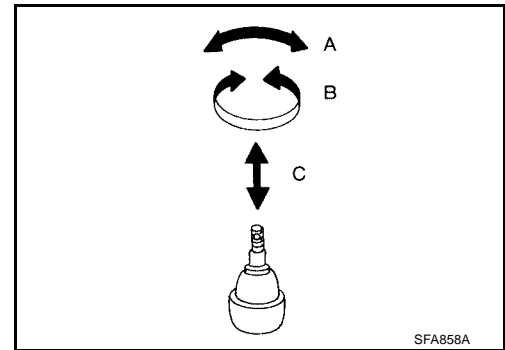
Vertical End Play

Check dust cover for damage. Replace it and the cover clamp if necessary.

NOTE:

Before checking the axial forces and end play, turn the lower ball joint at least 10 revolutions so that the ball joint is properly broken in.

Vertical end play "C" : 0 mm (0 in)



INSTALLATION

Installation is in the reverse order of removal.

- Tighten the transverse link mounting bolts to specified torque. Refer to [FSU-6, "Components"](#) . During installation, the final tightening must be done with the vehicle at curb weight and the tires on the ground.

CAUTION:

Discard the old cotter pin and use a new cotter pin for installation of the lower ball joint nut.

- After installation, check the wheel alignment. Refer to [FSU-7, "Front Wheel Alignment"](#) .

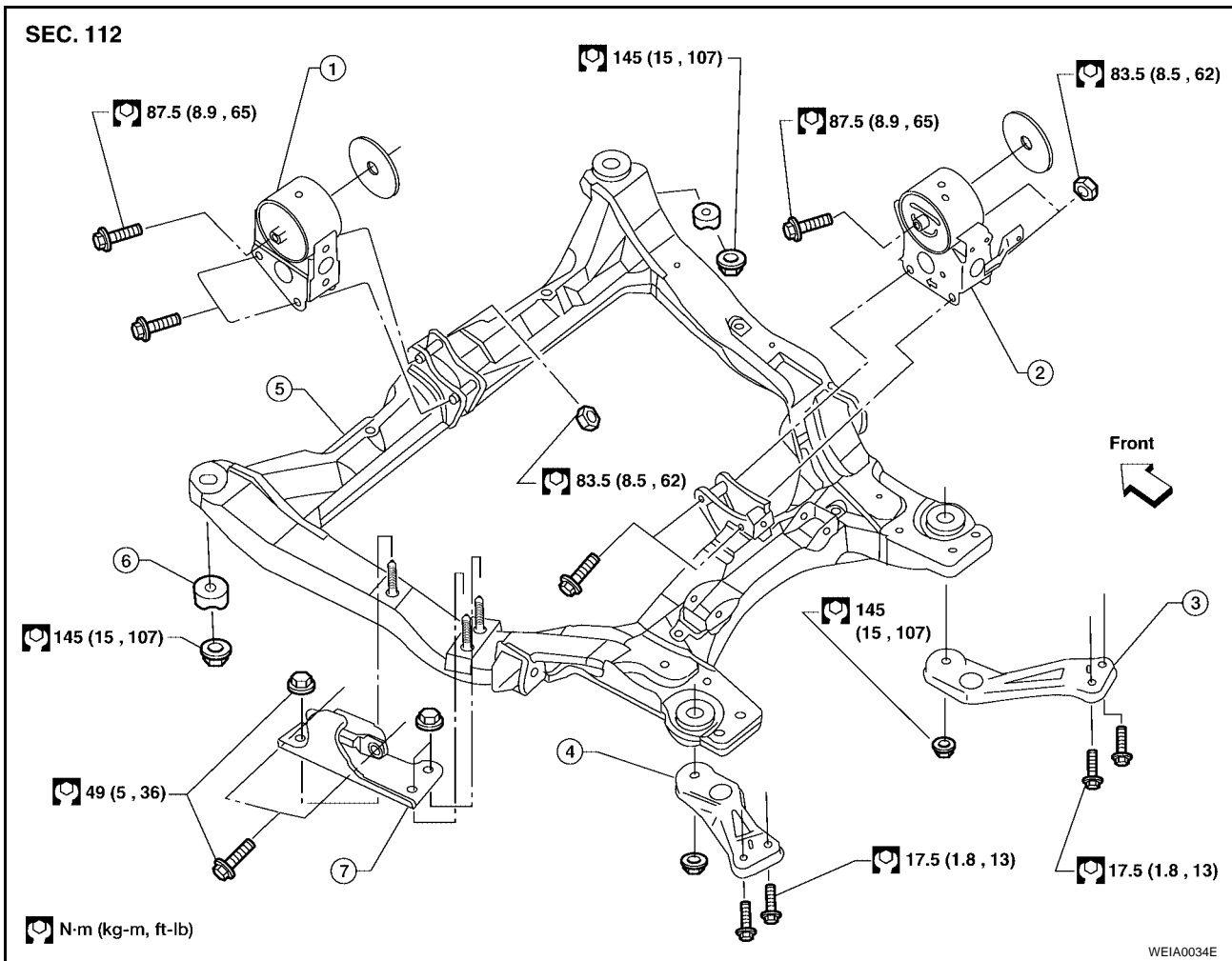
FRONT SUSPENSION MEMBER

FRONT SUSPENSION MEMBER

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Removal and Installation

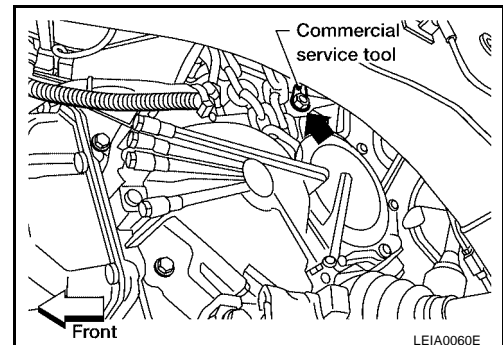
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- | | | |
|--|----------------------------|------------------------|
| 1. Front engine mount | 2. Rear engine mount | 3. Member pin stay, RH |
| 4. Member pin stay, LH | 5. Front suspension member | 6. Cup |
| 7. LH transaxle mounting insulator (5 A/T) | | |

REMOVAL

1. Remove the front wheels and tires using power tool. Refer to [WT-6, "Rotation"](#).
2. Remove the engine under cover.
3. Remove the splash shields.
4. For vehicles equipped with the 5 A/T, remove the LH transaxle mounting insulator nuts using power tool.
 - a. Remove cowl top and cowl top extension. Refer to [EI-18, "Removal and Installation"](#).
 - b. Install a commercially available engine lifting bracket onto the transaxle with bolt as shown.

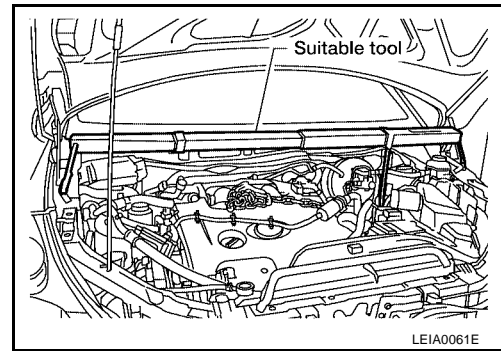


FRONT SUSPENSION MEMBER

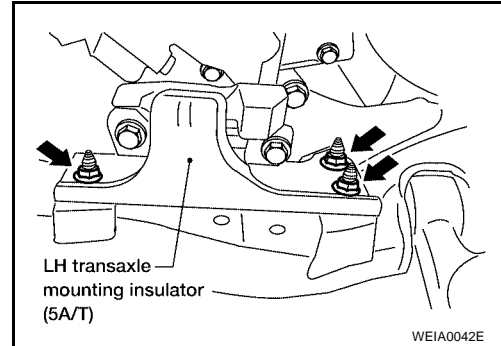
- c. Support engine from engine lifting bracket using suitable tool as shown.

CAUTION:

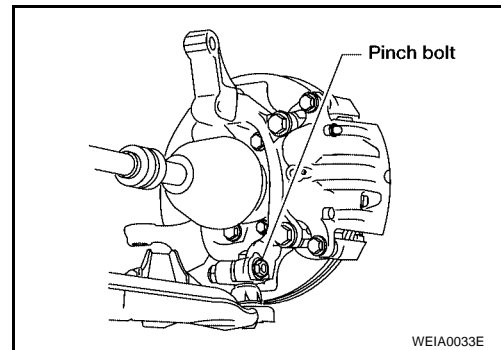
Be sure suitable tool is securely resting on hoodledge as shown.



- d. Remove the three transaxle mounting insulator nuts using power tool.



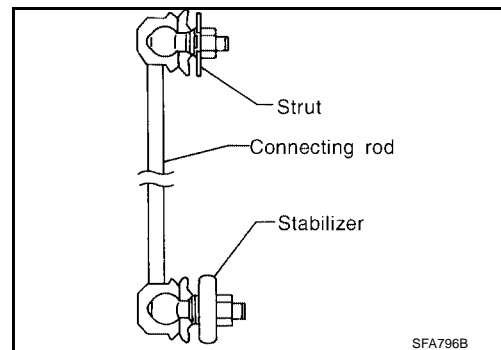
5. Remove the lower ball joint pinch bolt using power tool, then separate the transverse link from the steering knuckle. Refer to [FSU-6, "Components"](#) .
6. Remove the front exhaust tube using power tool. Refer to [EX-3, "Removal and Installation"](#) .
7. Remove the power steering line bracket from the front suspension member.
8. Remove the mounting bolts on the lower side of the steering gear. Refer to [PS-15, "Removal and Installation"](#) .
9. Disconnect the front engine mount electrical connector.



10. Disconnect the connecting rod from the front strut using power tool.
11. Set a Tool under the front suspension member, then remove the mounting nuts from the front suspension member using power tool.

Tool number : — (J-47242)

12. Remove the mounting bolts from the front suspension member pin stay on the vehicle body side using power tool.
13. Remove the through bolts from the front and rear engine mounts.
14. Lower the suspension member slowly to remove.
- If necessary, remove the exhaust hanger bracket from the front suspension member.
 - If necessary, remove the front and rear engine mounts.
 - If necessary, remove the transverse link.



INSPECTION AFTER REMOVAL

Check the front suspension member for deformation, cracks, or any other damage. Replace if necessary.

INSTALLATION

Installation is in the reverse order of removal noting the following:

FRONT SUSPENSION MEMBER

- For vehicles equipped with the 5 A/T, tighten the two LH transaxle mounting insulator bolts to specification.
- Install the stabilizer bar bushings and clamps in the specified orientation. Refer to [FSU-12, "Removal and Installation"](#) .
- Tighten the stabilizer bar and connecting rod nuts and bolts to specification. Refer to [FSU-6, "Components"](#) .
- Tighten the steering gear mounting bolts to specification. Refer to [PS-15, "Removal and Installation"](#) .
- Check the wheel alignment. Refer to [FSU-7, "Front Wheel Alignment"](#) .

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

General Specifications (Front)

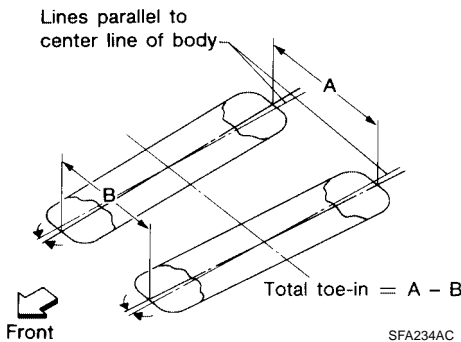
EES00005

Suspension type	Independent strut with coil springs
Shock absorber type	Double-acting hydraulic
Stabilizer bar	Standard equipment

Front Wheel Alignment (Unladen*1)

EES00006

Tire size		P225/65HR16	P225/60HR17
Camber degree minute (decimal degree)	Minimum	-1°15' (-1.25°)	
	Nominal	-0°30' (-0.50°)	
	Maximum	0°15' (0.25°)	
	Left and right difference	45' (0.75°) or less	
Caster degree minute (decimal degree)	Minimum	1°57' (1.95°)	
	Nominal	2°42' (2.70°)	
	Maximum	3°27' (3.45°)	
	Left and right difference	45' (0.75°) or less	
Kingpin inclination degree minute (decimal degree)	Minimum	13°39' (13.65°)	
	Nominal	14°24' (14.40°)	
	Maximum	15°09' (15.15°)	



Total toe-in	Distance (A - B) mm (in)	Minimum	-0.75 (-0.0295)
		Nominal	0.25 (0.0098)
		Maximum	1.25 (0.0492)
Angle (left plus right) degree minute (decimal degree)	Angle (left plus right) degree minute (decimal degree)	Minimum	0° 3' 30" (0.06°)
		Nominal	0° 6' (0.10°)
		Maximum	0° 8' 30" (0.14°)
Wheel turning angle full turn*2	Inside degree minute (decimal degree)	Minimum	35°15' (35.25°)
		Nominal	38°45' (38.75°)
		Maximum	39°45' (39.75°)
	Outside degree minute (decimal degree)	Nominal	32°30' (32.5°)

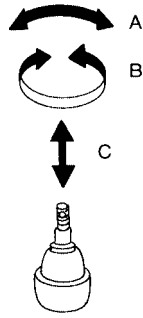
*1: Fuel, engine coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

SERVICE DATA AND SPECIFICATIONS (SDS)

Lower Ball Joint

EES00007

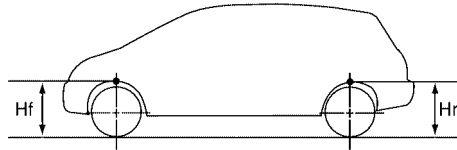


SFA858A

Swinging force "A" (Measuring point: cotter pin hole of ball stud) N (kg-f, lb-f)	7.8 - 54.9 (0.8 - 5.6, 1.8 - 12.3)
Turning torque "B" N·m (kg-cm, in-lb)	0.49 - 3.43 (5.0 - 35.0, 4.3 - 30.4)
Vertical end play "C" mm (in)	0 (0)

Wheelarch Height (Unladen*)

EES00008



WEIA0030E

Tire	P225/65HR16	P225/60HR17
Front (Hf) mm (in)	740 (29.13)	740 (29.13)
Rear (Hr) mm (in)	749 (29.49)	749 (29.49)

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