

SECTION **FSU**
FRONT SUSPENSION

A
B
C
D

FSU

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PRECAUTIONS

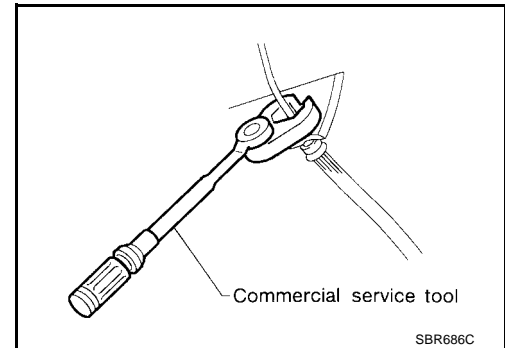
PRECAUTIONS

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Precautions

EES000MO

- 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, radiator 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

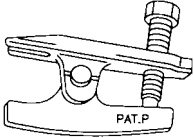
PREPARATION

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Special Service Tools

EES000MP

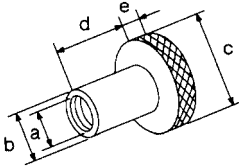
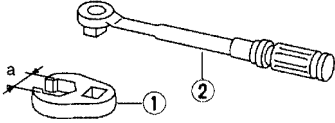
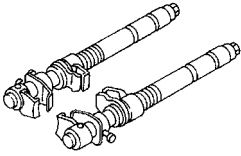
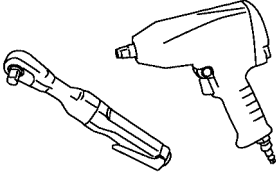
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
HT72520000 (J25730-A) Ball joint remover  NT146	Removing tie-rod outer end and lower ball joint

Commercial Service Tools

EES000MQ

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Tool name	Description
Attachment wheel alignment  NT148	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  NT360	Removing and installing each brake piping a: 10 mm (0.39 in)
Spring compressor  NT717	Removing and installing coil spring
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

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

Symptom		Possible Cause and SUSPECTED PARTS										Reference page											
		Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	Out-of-round	Imbalance	Incorrect air pressure	Uneven tire wear	Deformation or damage	Non-uniformity	Incorrect tire size	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
SUSPENSION	Noise	x	x	x	x	x	x									x	x			x	x	x	x
	Shake	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
	Shudder	x	x	x														x		x	x	x	x
	Poor quality ride or handling	x	x	x	x	x		x	x									x		x	x		
TIRES	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	x	
	Vibration										x				x	x	x	x				x	
	Shimmy	x							x	x	x	x	x	x			x	x		x	x	x	
	Shudder	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			
ROAD WHEEL	Noise	x							x	x					x	x	x	x	x		x	x	
	Shake	x							x	x					x	x	x	x	x		x	x	
	Shimmy, shudder	x							x	x							x	x	x	x		x	
	Poor quality ride or handling	x							x	x							x	x		x			

x: Applicable

FRONT SUSPENSION ASSEMBLY

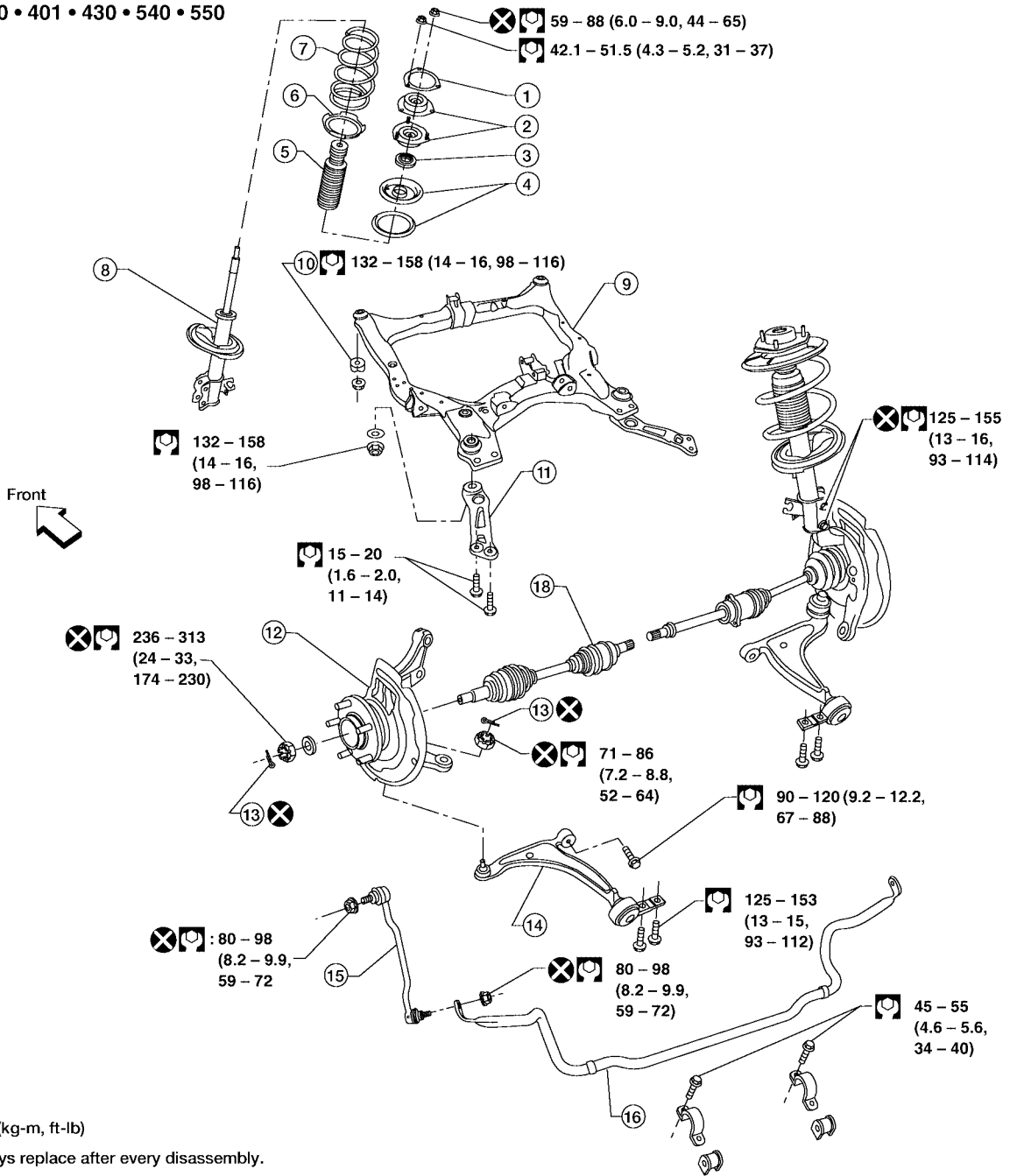
FRONT SUSPENSION ASSEMBLY

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Components

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SEC. 400 • 401 • 430 • 540 • 550



- | | | |
|---------------------------|--------------------------------------|---|
| 1. Gasket | 2. Shock absorber mounting insulator | 3. Upper rubber seat |
| 4. Shock absorber bushing | 5. Dust cover | 6. Coil spring |
| 7. Lower rubber seat | 8. Shock absorber | 9. Front suspension member |
| 10. Cup | 11. Member pin stay | 12. Wheel hub and steering knuckle assembly |
| 13. Cotter pin | 14. Transverse link | 15. Connecting rod |
| 16. Stabilizer bar | | |

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FRONT SUSPENSION ASSEMBLY

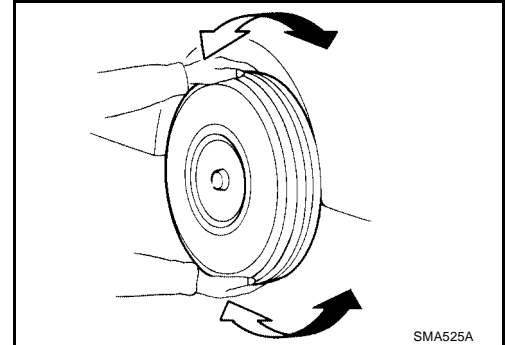
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On-vehicle Service FRONT SUSPENSION PARTS

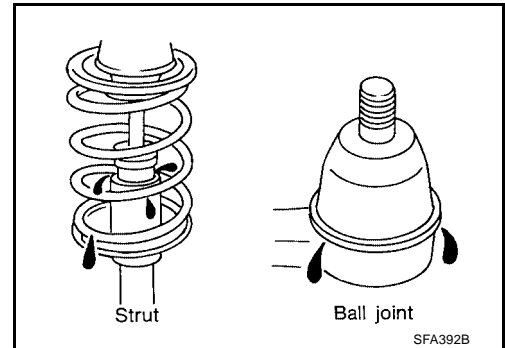
Check the front axle and front suspension parts for any excessive play, cracks, wear, or other damage.

- 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 torques : Refer to [FSU-5, "Components"](#) .

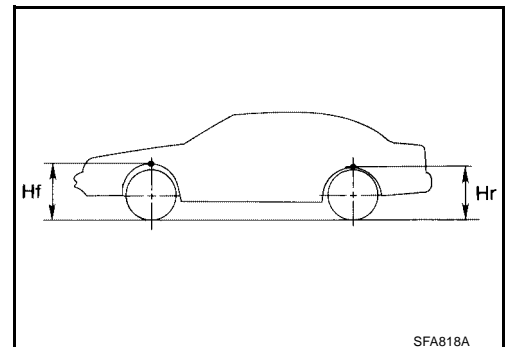


- Check the strut (shock absorber) for any oil leakage or other damage.
- Check the suspension ball joint for grease leakage and the ball joint dust cover for any cracks or other damage. If the ball joint dust cover is cracked or damaged, replace the transverse link.



- Check the spring height "Hf" and "Hr" from the top of the wheelarch to the ground.
- For proper measurement of the vehicle 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, radiator 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.

Standard height : Refer to [FSU-19, "Wheelarch Height \(Unladen*\)"](#) .



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

Front Wheel Alignment DESCRIPTION

EES000MU

NOTE:

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

*: Fuel, radiator 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.

Wheel runout : Refer to [WT-3, "Inspection"](#) .

- Check the front wheel bearings for looseness.
- Check the front suspension for looseness.
- Check the steering linkage for looseness.

FRONT SUSPENSION ASSEMBLY

- Check that the front shock absorbers work properly.
- Check the vehicle height (posture) in the unladen condition. Refer to [FSU-6, "FRONT SUSPENSION PARTS"](#).

CAMBER, CASTER AND KINGPIN INCLINATION

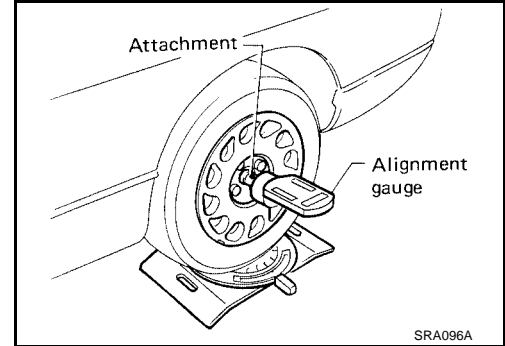
NOTE:

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-18, "Front Wheel Alignment \(Unladen*1\)"](#).

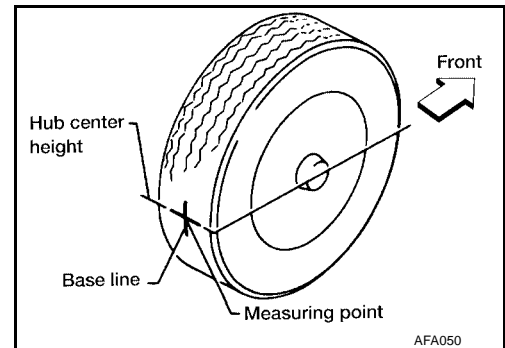
2. If the camber, caster or kingpin inclination is not within specification, inspect the front suspension parts. Replace any damaged or worn out parts.



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.



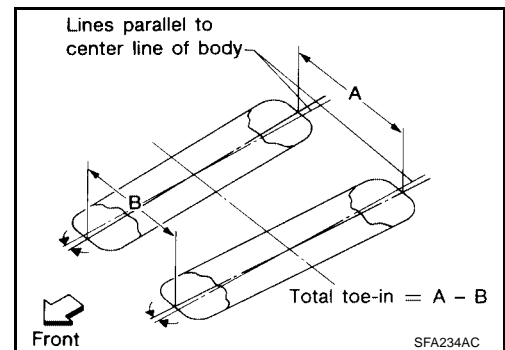
4. Measure the distance "A" on the rear side of the front tires as shown.
5. Push the vehicle slowly ahead to rotate the wheels 180° degrees (1/2 a turn).

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-18, "Front Wheel Alignment \(Unladen*1\)"](#).



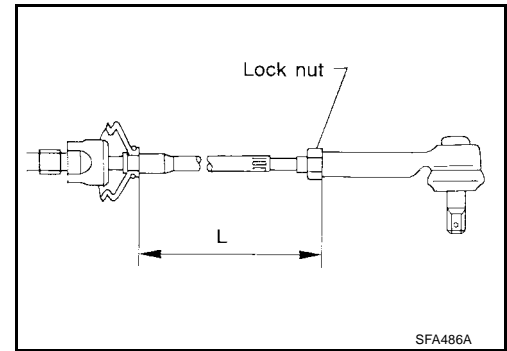
FRONT SUSPENSION ASSEMBLY

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-30, "Steering Gear and Linkage"](#) .

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

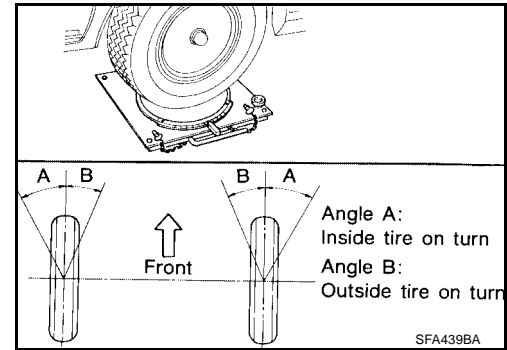
Lock nut : Refer to [PS-17, "Removal and Installation"](#) .



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-18, "Front Wheel Alignment \(Unladen*1\)"](#) .



COIL SPRING AND SHOCK ABSORBER

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COIL SPRING AND SHOCK ABSORBER

Removal and Installation

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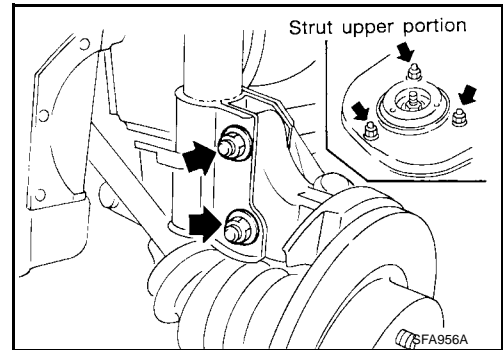
REMOVAL

1. Remove the wheel and tire using power tool. Refer to [WT-4, "Removal"](#) .
2. Disconnect the ABS sensor wire and front brake hose from the brackets on the front shock absorber (strut).
3. Disconnect the connecting rod upper link using power tool.
4. Support the wheel hub and steering knuckle assembly with a suitable wire.
5. Remove the engine side covers.
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.



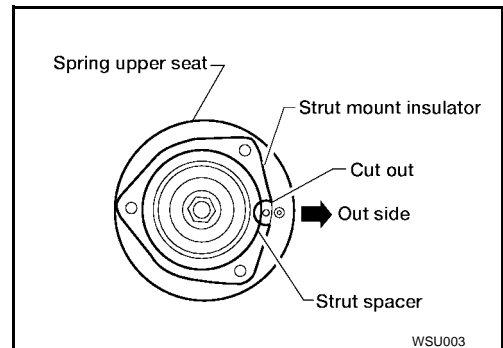
INSTALLATION

Installation is in the reverse order of removal.

- After installation, check that the front wheel alignment is within specification. Refer to [FSU-6, "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-5, "Components"](#) .

WARNING:

Always replace the shock absorber lower mounting nuts.



Disassembly

1. Set the shock absorber in a vise, then loosen (without removing) the piston rod lock nut as shown.

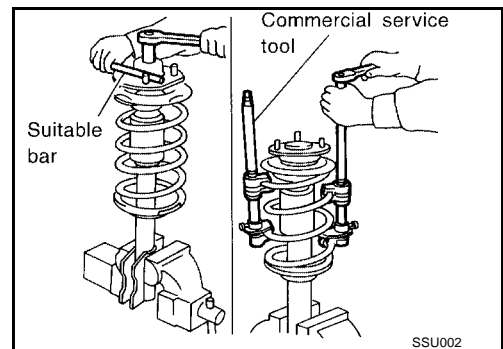
CAUTION:

Do not remove piston rod lock nut at this time.

2. Compress the spring using Tool so that the shock absorber mounting insulator can be turned by hand.

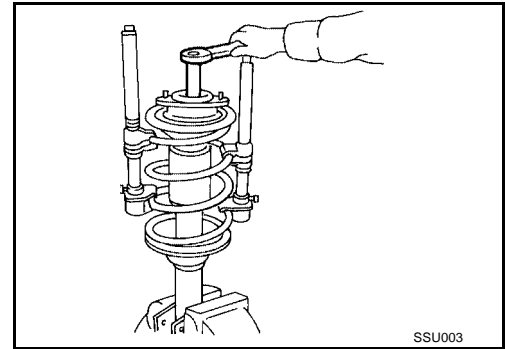
WARNING:

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.



EES000MX

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.

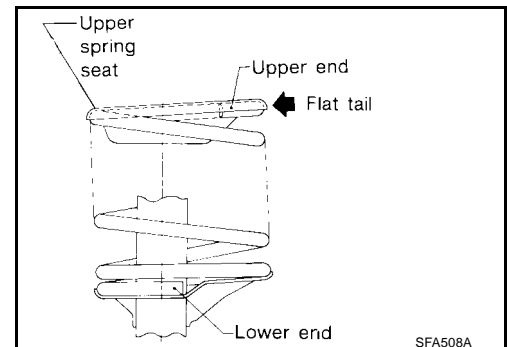
Front spring free height

SE model : 350 mm (13.78 in)

SL model : 360 mm (14.73 in)

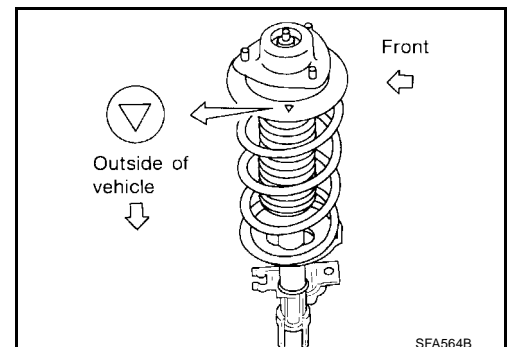
Assembly

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



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



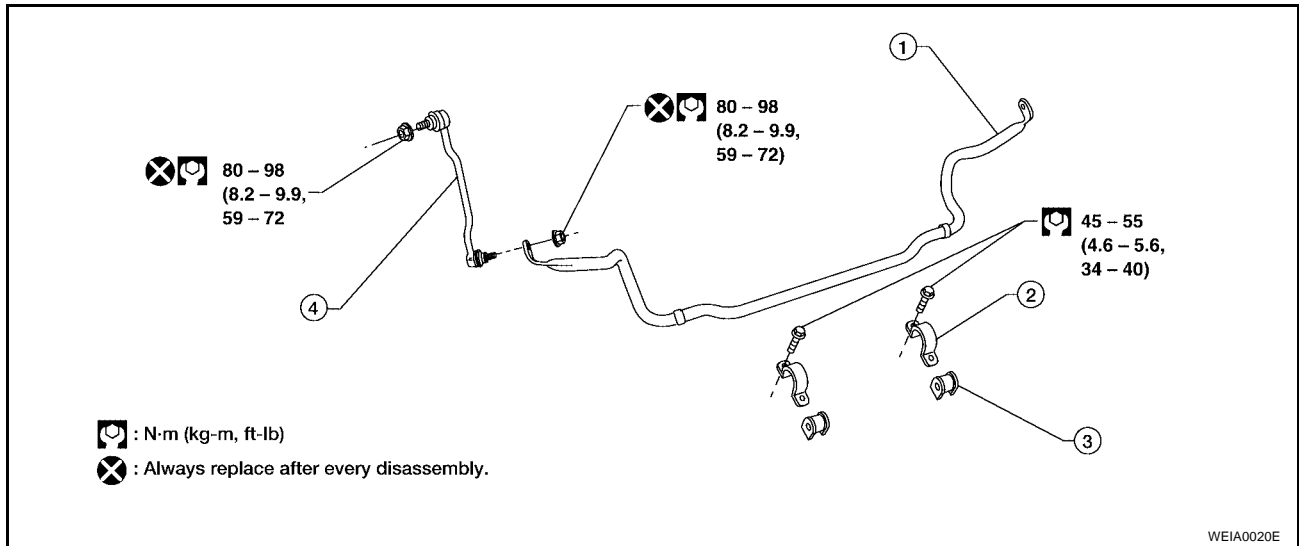
STABILIZER BAR

STABILIZER BAR

Removal and Installation

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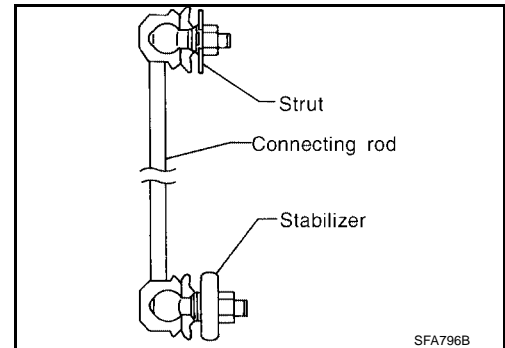
1. Stabilizer bar
4. Connecting rod

2. Bracket

3. Bushing

REMOVAL

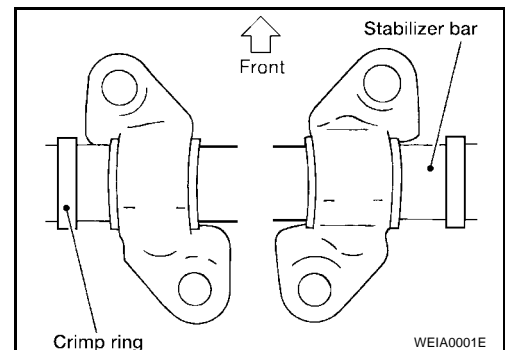
1. Remove the wheel and tire. Refer to [WT-4, "Removal"](#).
2. Disconnect the connecting rod end at the stabilizer bar using power tool.
 - Prevent the stabilizer connecting rod from turning by inserting a hex wrench into the end of the ball stud, then remove nut.
3. Remove the two stabilizer bar brackets from the front suspension member.
4. Remove the front stabilizer bar.
 - Remove the two stabilizer bushings as necessary.



INSTALLATION

Installation is in the reverse order of removal.

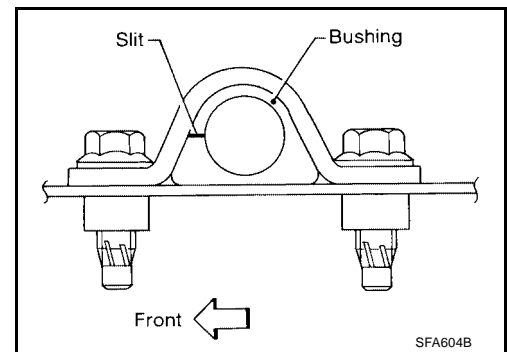
- When installing stabilizer, make sure that the clamps are facing in the correct direction as shown.



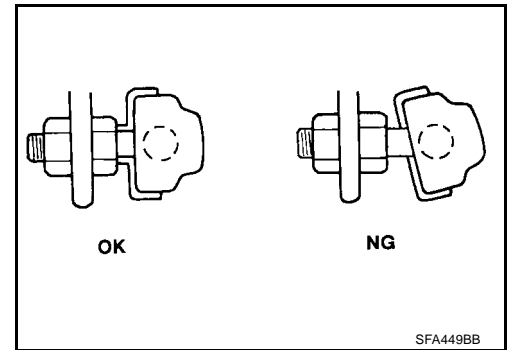
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STABILIZER BAR

- 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.

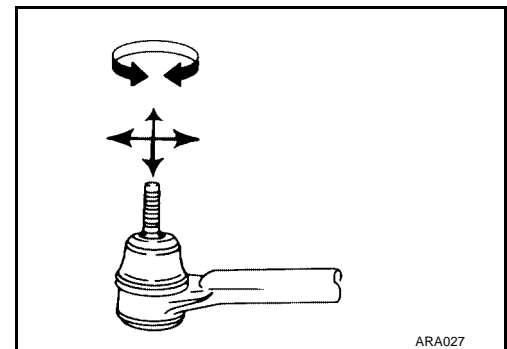


- Install stabilizer bar with ball joint socket properly placed.



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.



TRANSVERSE LINK

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TRANSVERSE LINK

Removal and Installation

EES000N1

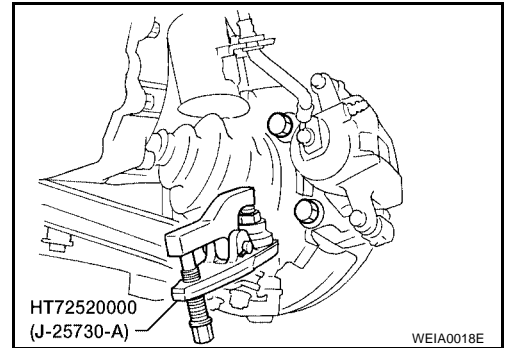
REMOVAL

1. Remove the wheel and tire. Refer to [WT-4, "Removal"](#).
2. Remove the lower ball joint cotter pin and remove the lower ball joint nut using power tool.

CAUTION:

Discard the cotter pin and use a new cotter pin for installation.

3. Disconnect the lower ball joint from the steering knuckle using Tool as shown.



4. Remove the member stay pin nut and two bolts using power tool, and remove the member stay pin.
5. Remove the two transverse link pivot bolts using power tool.
6. Remove the transverse link bolt and 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

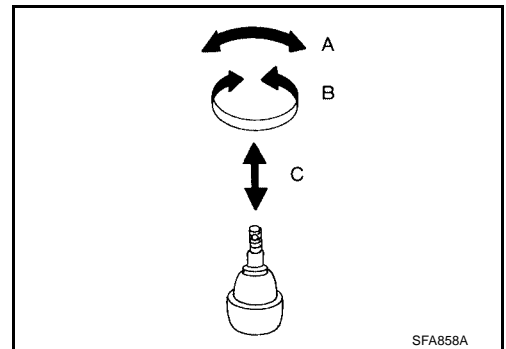
- Check the ball joint for excessive play. Replace the transverse link assembly if any of the following exists:
 - Lower ball joint stud is worn.
 - Lower ball joint is hard to swing.
 - Lower ball joint play in axial directions or end play is excessive.

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)



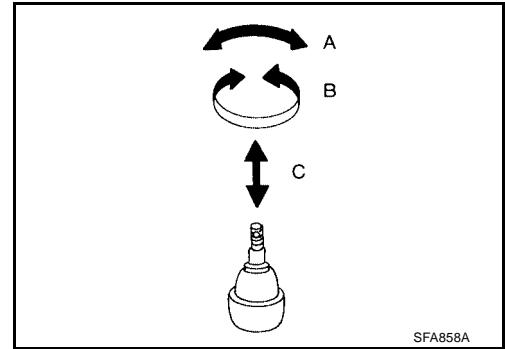
Turning Force

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)



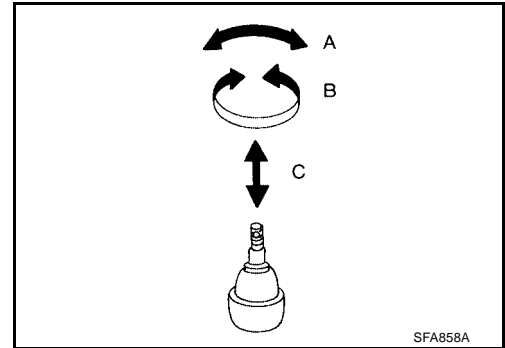
Vertical End Play

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-5, "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-6, "Front Wheel Alignment"](#) .

FRONT SUSPENSION MEMBER

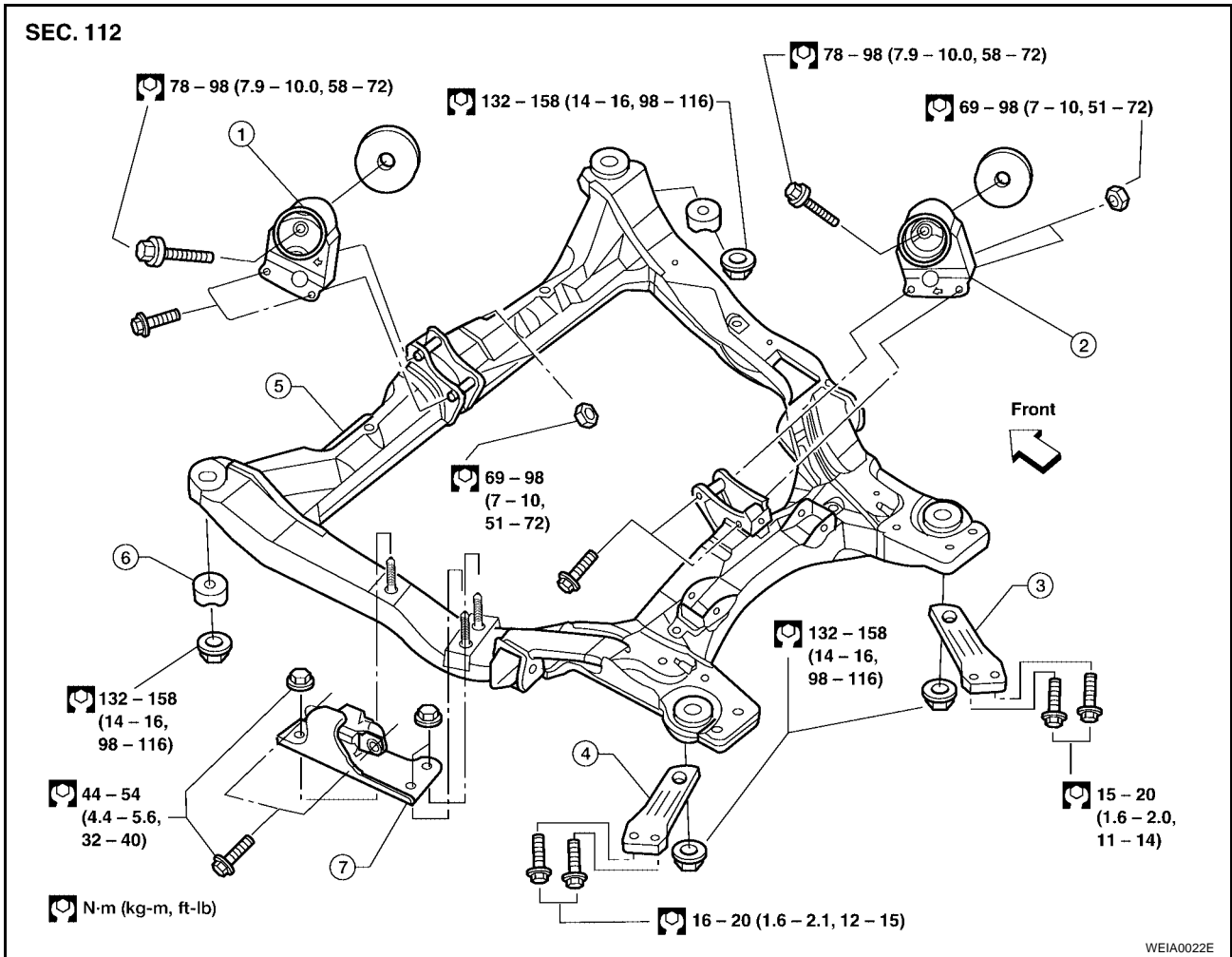
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FRONT SUSPENSION MEMBER

Removal and Installation

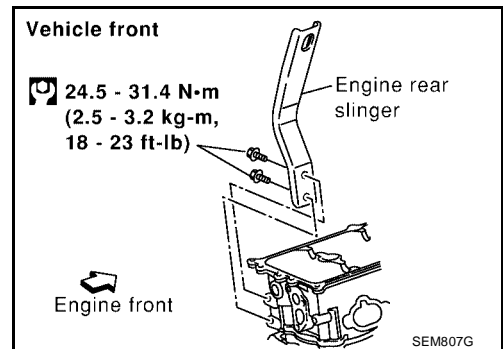
SEC. 112



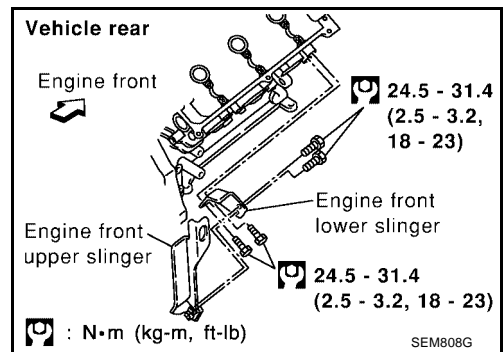
- | | | |
|--|----------------------------|------------------------|
| 1. Front engine mount | 2. Rear engine mount | 3. Member pin stay, RH |
| 4. Member pin stay, LH | 5. Front suspension member | 6. Cup |
| 7. LH transaxle mounting insulator (5 A/T) | | |

REMOVAL

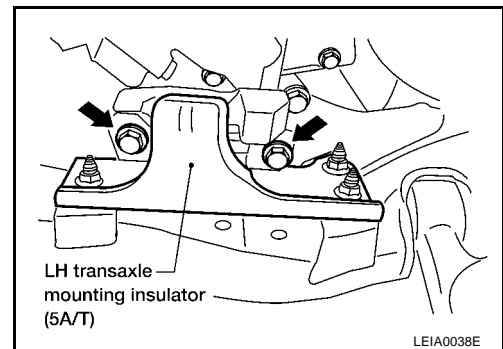
- For vehicles equipped with the 5 A/T, install the engine slingers into the front of the left cylinder head, and the right rear cylinder head as shown.



FRONT SUSPENSION MEMBER



2. For vehicles equipped with the 5 A/T, support the engine from the front and rear slingers using a suitable tool.
3. Remove the engine under cover.
4. Remove the front wheels and tires. Refer to [WT-4, "Removal"](#) .
5. Remove the splash shields.
6. For vehicles equipped with the 5 A/T, remove the two LH transaxle mounting insulator bolts.

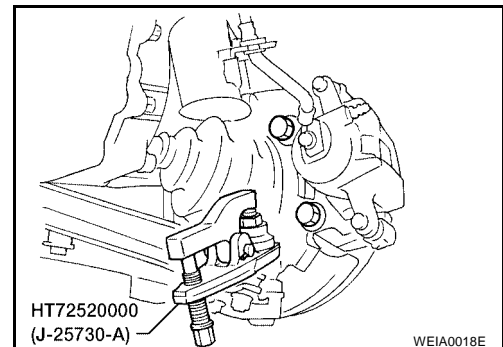


7. Remove the lower ball joint cotter pin and remove the lower ball joint nut using power tool.

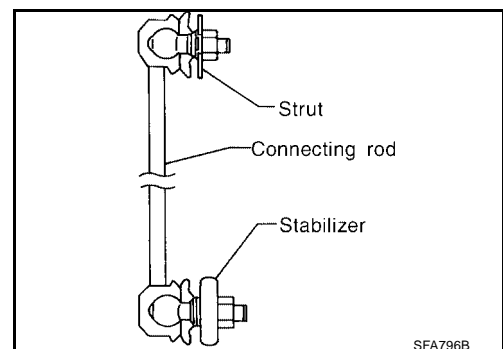
CAUTION:

Discard the cotter pin and use a new cotter pin for installation.

8. Disconnect the lower ball joint from the steering knuckle using Tool as shown.
9. Remove the front exhaust tube using power tool. Refer to [EX-3, "Removal and Installation"](#) .
10. Remove the power steering line bracket from the front suspension member.
11. Remove the mounting bolts on the lower side of the steering gear.
12. Disconnect the front and rear engine mount electrical connectors, if equipped.



13. Disconnect the connecting rod from the front strut using power tool.
14. Set a transmission jack under the front suspension member, then remove the mounting nuts from the front suspension member using power tool.
15. Remove the mounting bolts from the front suspension member pin stay on the vehicle body side using power tool.
16. Remove the through bolts from the front and rear engine mounts.
17. Lower the transmission jack slowly to remove the suspension member.



- 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.

FRONT SUSPENSION MEMBER

INSTALLATION

Installation is in the reverse order of removal.

- For vehicles equipped with the 5 A/T, tighten the two LH transaxle mounting insulator bolts to specification.
- Tighten the stabilizer bar and connecting rod nuts and bolts to specification. Refer to [FSU-5, "Components"](#).

CAUTION:

Tighten the suspension nuts and bolts with the vehicle on the ground.

- Install the stabilizer bar bushings and brackets in the specified orientation. Refer to [FSU-11, "Removal and Installation"](#).
- Tighten the steering gear mounting bolts to specification. Refer to [PS-17, "Removal and Installation"](#).
- Check the wheel alignment. Refer to [FSU-6, "Front Wheel Alignment"](#).

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SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

General Specifications (Front)

EES000N3

Suspension type	Independent MacPherson strut
Shock absorber type	Double-acting hydraulic
Stabilizer bar	Standard equipment

Front Wheel Alignment (Unladen*1)

EES000N4

Tire size		225/55R17	245/45R18	
Camber degree minute (decimal degree)	Minimum	-1°00' (-1.00°)		
	Nominal	-0°15' (-0.25°)		
	Maximum	0°30' (0.50°)		
	Left and right difference	45' (0.75°) or less		
Caster degree minute (decimal degree)	Minimum	2°05' (2.08°)		
	Nominal	2°50' (2.83°)		
	Maximum	3°35' (3.58°)		
	Left and right difference	45' (0.75°) or less		
Kingpin inclination degree minute (decimal degree)	Minimum	13°50' (13.83°)		
	Nominal	14°35' (14.58°)		
	Maximum	15°20' (15.33°)		
Total toe-in	Distance (A - B) mm (in)	Minimum	-0.5 (-0.02)	
		Nominal	0.5 (0.02)	
		Maximum	1.5 (0.06)	
	Angle (left plus right) degree minute (decimal degree)	Minimum	—	
		Nominal	2' (0.03°)	
		Maximum	—	
Wheel turning angle full turn*2	Inside degree minute (decimal degree)	Minimum	31°00' (31.0°)	
		Nominal	34°30' (34.5°)	
		Maximum	35°30' (35.5°)	
	Outside degree minute (decimal degree)	Nominal	28°30' (28.5°)	

*1: Fuel, radiator 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.

Lower Ball Joint

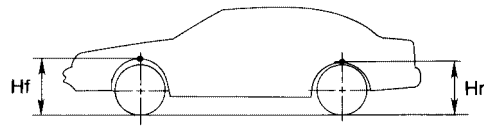
EES000N5

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)

SERVICE DATA AND SPECIFICATIONS (SDS)

Wheelarch Height (Unladen*)

EES000N6



SFA618A

Tire	225/55R17	245/45R18
Front (Hf) mm (in)	739 (29.09)	737 (29.02)
Rear (Hr) mm (in)	705 (27.76)	705 (27.76)

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

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SERVICE DATA AND SPECIFICATIONS (SDS)
