# FRONT & REAR SUSPENSION G



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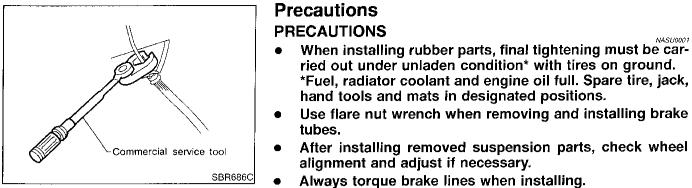
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#### Precautions

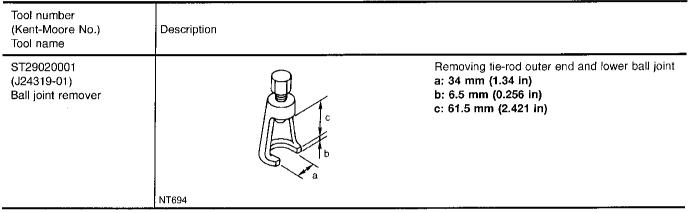
### **FRONT SUSPENSION**



#### Preparation

#### SPECIAL SERVICE TOOLS

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



NASU0003

#### **COMMERCIAL SERVICE TOOLS**

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench		Removing and installing each brake piping a: 10 mm (0.39 in)
Spring compressor	NT360	Removing and installing coil spring
	State I and the second se	
	NT717	

Noise, Vibration and Harshness (NVH) Troubleshooting

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# Noise, Vibration and Harshness (NVH) Troubleshooting

	I roubleshooting					በብል																					
Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.						-																					
R	efer	ence page	SU-4, 16	SU-9, 19			-	SU-9, 19	SU-7	SU-12, 21	2-US							NVH in PD section	NVH in PD section	NVH in AX section	NVH in AX section	Refer to SUSPENSION in this chart.	Refer to TIRES in this chart.	Refer to ROAD WHEEL in this chart.	NVH in BR section	NVH in ST section	EM LC EC
																						Ве		Be			
			looseness	deformation, ction	deterioration		-		hent						e		i										FE Cl
		ble Cause and ECTED PARTS	Improper installation,	Shock absorber defor damage or deflection	or mounting	Parts interference	fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	round	nce	Incorrect air pressure	Uneven tire wear	Deformation or damage	Non-uniformity	Incorrect tire size	PROPELLER SHAFT	DIFFERENTIAL	SHAFT		SUSPENSION		ROAD WHEEL	ES	RING	MT
			Improp	Shock damag	Bushing	Parts i	Spring	Susper	Incorre	Stabiliz	Out-of-round	Imbalance	Incorre	Unevel	Deform	Non-ur	Incorre	PROPI	DIFFE	DRIVE	AXLE	SUSPE	TIRES	ROAD	BRAKES	STEERING	A:T
		Noise	×	×	×	×	×	×									-	×	×	×	×		×	×	×	×	TTË
		Shake	×	×	×	×		x										×		×	×		×	×	×	×	
	NOI8	Vibration	×	×	×	×	×											×		×	×		×			×	PD
	SUSPENSION	Shimmy	×	×	×	х			×												×		×	×	×	×	0.57
	SUSF	Judder	×	×	×																×		×	×	×	×	AX
		Poor quality ride or han- dling	×	×	×	×	×		×	×											×		×	×			SU
		Noise	×								×	×	×	×	×	×		×	×	x	×	×		×	×	×	BR
_		Shake	×								×	×	×	×	×		×	×		×	×	×		×	×	×	12/010
Symptom		Vibration											×				×	×		×	×	×				×	ST
Syn	TIRES	Shimmy	×								×	×	×	×	×	×	×				×	×		×	×	×	i
		Judder	×								×	×	×	х	×		×				×	×		×	×	×	RS
		Poor quality ride or han- dling	×								×	×	×	×	×		×				×	×		×			BT
		Noise	×								×	×			×			×	×	×	×	×	×		×	×	i 
	E	Shake	×								×	×			×			×		×	×	×	×		×	×	HA
	ROAD WHEEL	Shimmy, Jud- der	×	_							×	×			×						×	×	×		×	×	SC
	RO	Poor quality ride or han- dling	×								×	×			×	1					×	×	×			<u>.</u>	

×: Applicable

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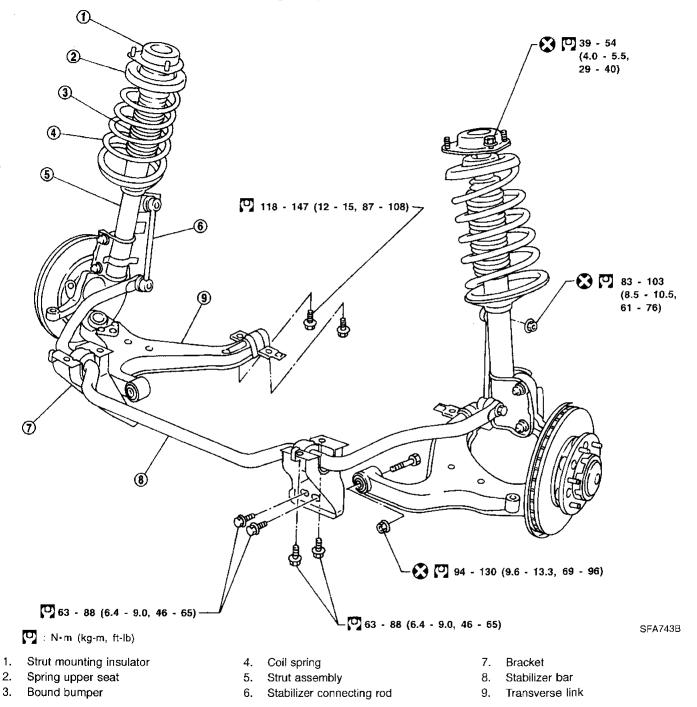
#### Components

2WD

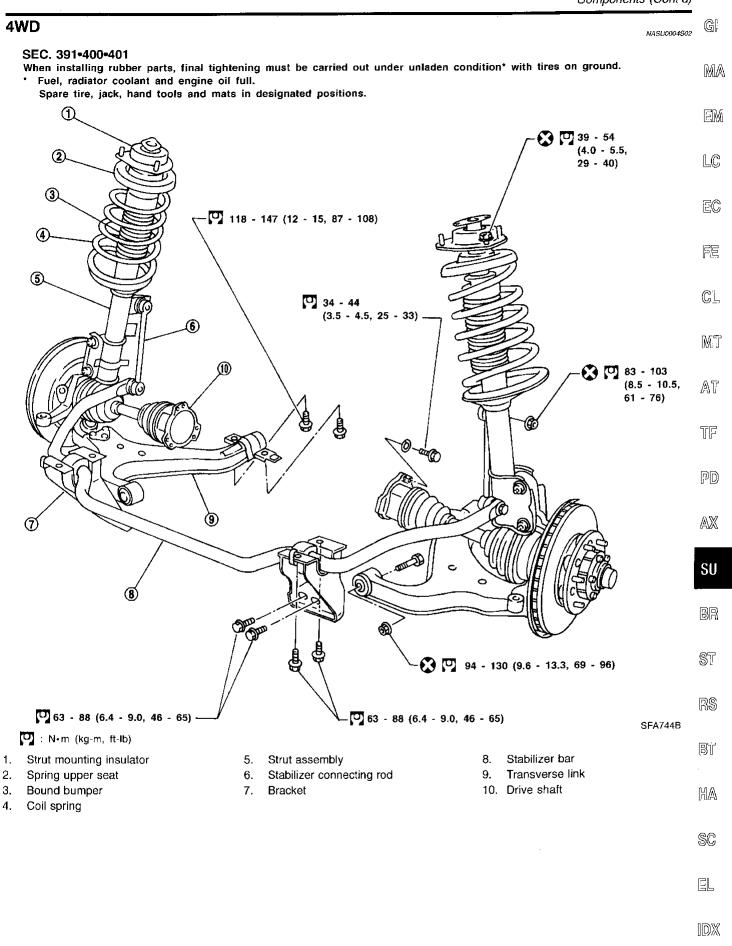
SEC. 400•401

When installing rubber parts, final tightening must be carried out under unladen condition\* with tires on ground. \* Fuel, radiator coolant and engine oil full.

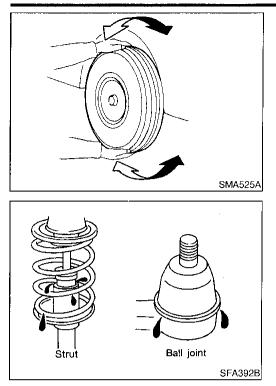
Spare tire, jack, hand tools and mats in designated positions.



**SU-4** 



On-vehicle Service



#### On-vehicle Service FRONT SUSPENSION PARTS

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

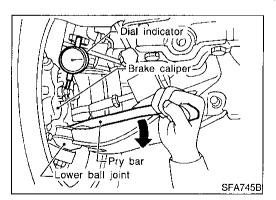
- 1. Shake each front wheel to check for excessive play.
- 2. Retighten all axle and suspensions nuts and bolts to the specified torque.

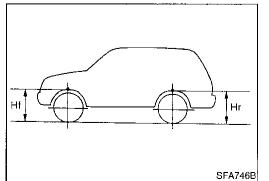
Tightening torque: Refer to "Components", SU-9.

- 3. Check strut (shock absorber) for oil leakage and other damage.
- 4. Check suspension ball joint for grease leakage and ball joint dust cover for cracks and other damage.

If ball joint dust cover is cracked or damaged, replace ball joint assembly.

- 5. Check suspension ball joint end play.
- a. Jack up front of vehicle and set the stands.
- b. Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
- c. Make sure front wheels are straight and brake pedal is depressed.





- d. Place a pry bar between transverse link and knuckle.
- e. While raising and releasing pry bar, observe maximum dial indicator value.

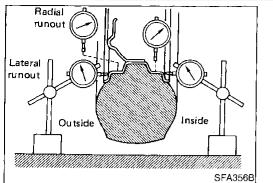
#### Vertical end play: 0 mm (0 in)

If ball joint vertical end play exists, remove lower ball joint assembly and recheck the ball joint. Refer to "Tranverse Link and Lower Ball Joint", SU-13.

- 6. Check spring height from top of wheelarch to ground using the following procedure.
- a. Park vehicle on a level surface with vehicle unladen\*.
  \*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- b. Check tires for proper inflation and wear (tread wear indicator must not be showing).
- c. Bounce vehicle up and down several times and measure dimensions Hf and Hr. Refer to SDS, SU-23.

Spring height is not adjustable. If out of specification, check for worn springs and suspension parts.

On-vehicle Service (Cont'd)



#### FRONT WHEEL ALIGNMENT

GI NASU0006 Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen\*). \*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand

MA tools and mats in designated positions.

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AX

Preliminary Inspection	EC
1. Check tires for wear and improper inflation.	J0006S01
2. Check wheel runout on outside and inside.	
Wheel runout average	
[(Outside runout value + Inside runout value) x 0.5	<b>j]:</b>
Refer to SDS, SU-23.	• CL
<ol><li>Check front wheel bearings for looseness.</li></ol>	
<ol><li>Check front suspension for looseness.</li></ol>	[Mn]
5. Check steering linkage for looseness.	
6. Check that struts work properly.	0.55
7. Check vehicle posture (Unladen).	At
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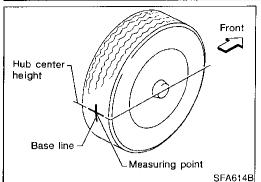
SU Camber, Caster and Kingpin Inclination Camber, caster and kingpin inclination are preset at factory BR and cannot be adjusted. Measure camber, caster and kingpin inclination of both right 1. and left wheels with a suitable alignment gauge. ST Camber, Caster and Kingpin inclination: Refer to SDS, SU-22. RS If camber, caster or kingpin inclination is not within 2. specification, inspect front suspension parts. Replace damaged or worn out parts. ßí

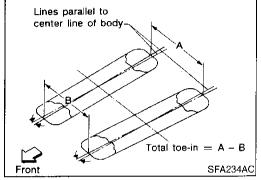
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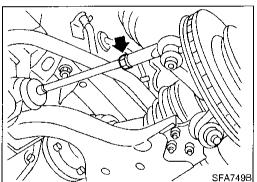
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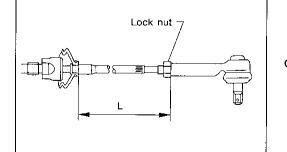
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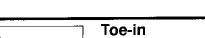
#### On-vehicle Service (Cont'd)











FRONT SUSPENSION

Measure toe-in using the following procedure. WARNING:

Always perform the following procedure on a flat surface.

NASU0006S03

- Make sure that no person is in front of the vehicle before pushing it.
- 1. Bounce front of vehicle up and down to stabilize the posture.
- 2. Push the vehicle straight ahead about 5 m (16 ft).
- Put a mark on base line of the tread (rear side) of both tires at the same height of hub center. This mark is a measuring point.
   Massure distance "A" (rear side)
- 4. Measure distance "A" (rear side).
- 5. Push the vehicle slowly ahead to rotate the wheels 180 degrees (1/2 turn).

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

6. Measure distance "B" (front side).

Total toe-in: Refer to SDS, SU-22.

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

Make sure both tie-rods are the same length.

Standard length "L":

Refer to ST section ("Steering Gear and Linkage", "SDS").

c. Tighten lock nuts to specified torque.

Lock nut tightening torque: Refer to ST section ("POWER STEERING GEAR AND LINKAGE").

# A B B A Front B A Inside tire on turn Angle B: Outside tire on turn SFA439BA

SFA486A

#### Front Wheel Turning Angle

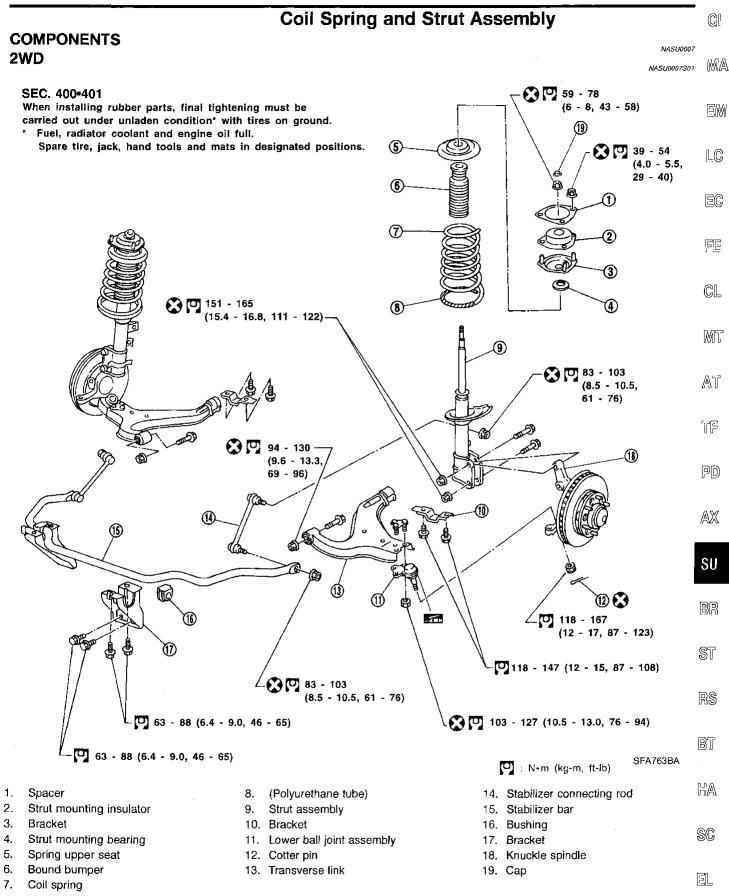
# Turning angle is set by stroke length of steering gear rack and cannot be adjusted.

- 1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly.
- 2. Rotate steering wheel all the way right and left; measure turning angle.

Do not hold the steering wheel on full lock for more than 15 seconds.

Wheel turning angle (Full turn): Refer to SDS, SU-22.

**SU-8** 



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#### 4WD

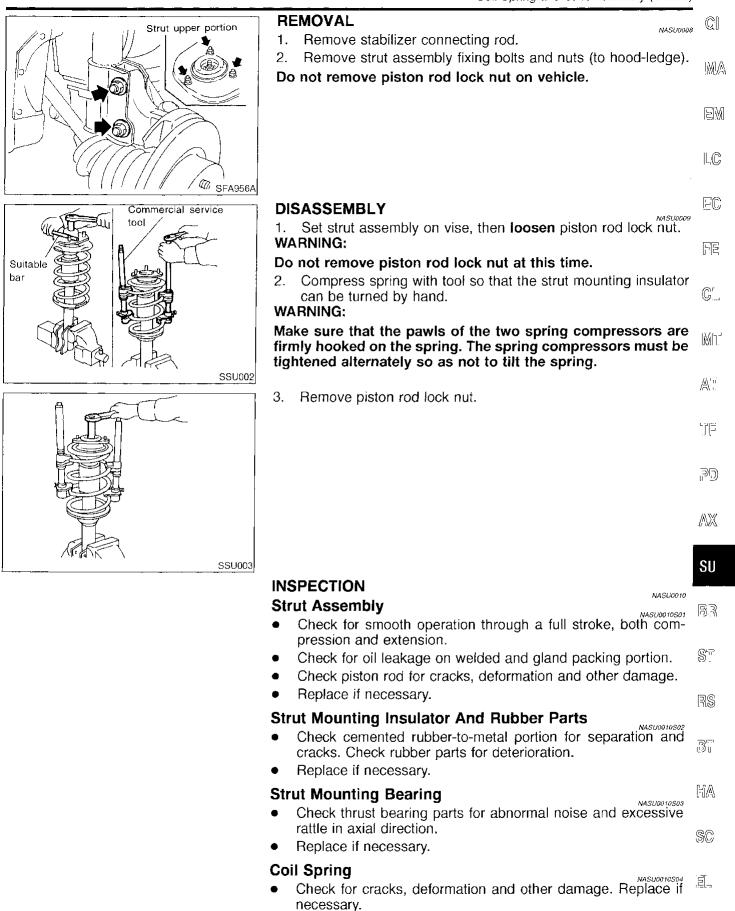
#### SEC. 391•400•401 When installing rubber parts, final tightening must be 59 - 78 carried out under unladen condition\* with tires on ground. (6 - 8, 43 - 58) Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions. (5) 39 - 54 (4.0 - 5.5, 29 - 40) 6 ⓓ D(2) 34 - 44 3 (3.5 - 4.5, 25 - 33) (8) Ð (15.4 - 165) (15.4 - 16.8, (9) 111 - 122) 83 - 103 (8.5 - 10.5, 61 - 76)働 1(II) Ø A) 0 118 - 167 6 (12 - 17, 87 - 123) 118 - 147 (12 - 15, 87 - 108) - 🔀 🔽 83 - 103 (8.5 - 10.5, 61 - 76) - 🐼 🌄 94 - 130 (9.6 - 13.3, 69 - 96) 63 - 88 (6.4 - 9.0, 46 - 65) 103 - 127 (10.5 - 13.0, 76 - 94) 63 - 88 (6.4 - 9.0, 46 - 65) SFA764BA 🕐 : N•m (kg-m, ft-lb) 1. Spacer 9. Strut assembly 16. Bushing 2. Strut mounting insulator 10. Bracket 17. Bracket 3. Bracket 11. Lower ball joint assembly 18. Knuckle spindle 4. Strut mounting bearing 12. Cotter pin 19. Snap ring Spring upper seat 13. Transverse link 20. Hub cap

- 5.
- 6. Bound bumper
- 7. Coil spring
- 8. (Polyurethane tube)

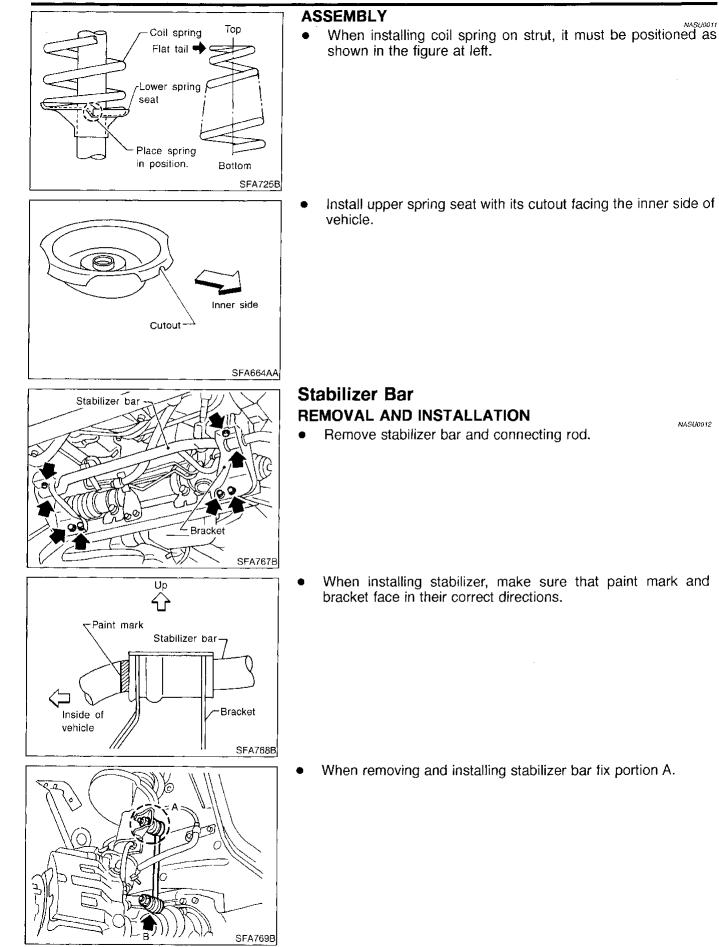
- 14. Stabilizer connecting rod
- 15. Stabilizer bar

NASU0007502

- 21. Drive shaft
- 22. Cap



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	Stabilizer Bar (Cont'd)	
Install stabilizer bar with ball joint socket p View from B	roperly placed.	Gi
		EM
OK NG		<u>1</u> C
INSPECTION	NASUD013	EC
<ul> <li>Check stabilizer for deformation and cracks sary.</li> <li>Check rubber bushings for deterioration and cracks</li> </ul>	. Replace if neces-	jëe
<ul> <li>if necessary.</li> <li>Check ball joint can rotate in all directions. smooth and free, replace stabilizer bar con</li> </ul>		CL
		MT
	pint	AT
REMOVAL AND INSTALLATION Separate drive shaft from knuckle. — 4WD Refer to AX section ("Drive Shaft", "FRONT		TF
Refer to AX section ("Drive Shaft", "FRONT 2. Separate lower ball joint stud from knuckle. 3. Remove lower ball joint assembly from tran		PD
4. Remove transverse link. 5. During installation, final tightening must be		AX
weight with tires on ground. SFA757B SFA757B SFA757B SFA757B	n-vehicle Service",	SU
SU-7.		BR
		ST :
		RS
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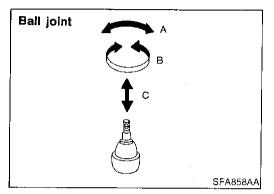
## INSPECTION

#### **Transverse Link**

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-NASU0015
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- Check transverse link for damage, cracks and deformation.
   Replace it if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



#### Lower Ball Joint

- Check ball joint for excessive play. Replace lower ball joint assembly if any of the following exists:
- Ball stud is worn.
- Joint is hard to swing.
- Play in axial direction is excessive.

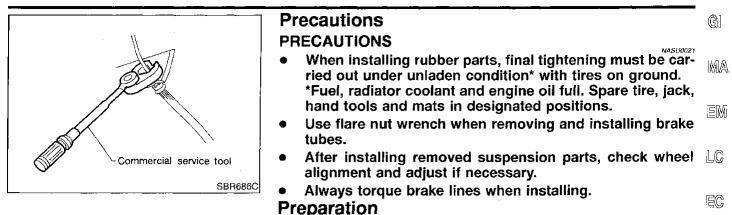
Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

- Swinging force "A":
- (measuring point: cotter pin hole of ball stud) Refer to SDS, SU-22.
- Turning torque "B":
  - Refer to SDS, SU-22.
- Vertical end play "C":
- Refer to SDS, SU-22.

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

# **REAR SUSPENSION**

Precautions



# COMMERCIAL SERVICE TOOLS

# Tool name Description 1 Flare nut crowfoot 2 Torque wrench Removing and installing each brake piping a: 10 mm (0.39 in) CL

#### Noise, Vibration and Harshness (NVH) Troubleshooting

Refer to "Noise, Vibration and Harshness (NVH) Troubleshooting", "FRONT SUSPENSION", SU-3.

PD

AX

SU

BR

ST

RS

BT.

HA

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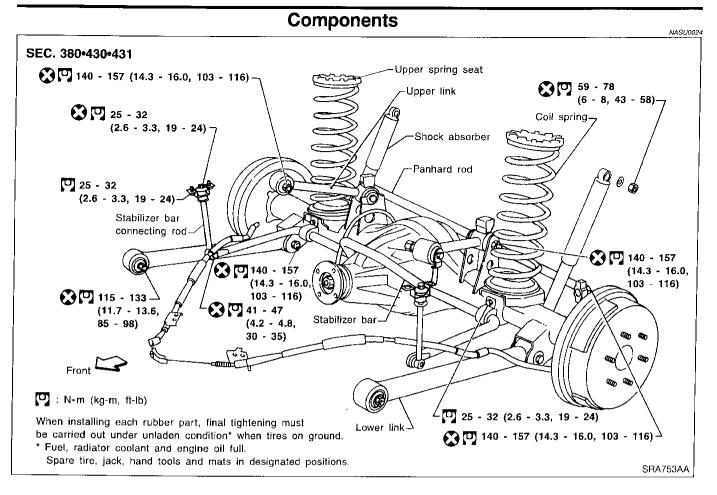
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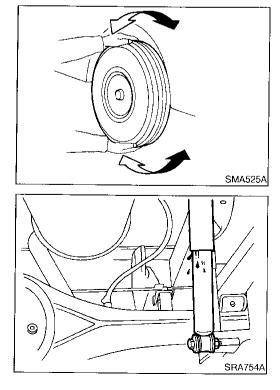
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#### Components

### **REAR SUSPENSION**





#### On-vehicle Service REAR SUSPENSION PARTS

Check rear axle and rear suspension parts for excessive play, wear and damage.

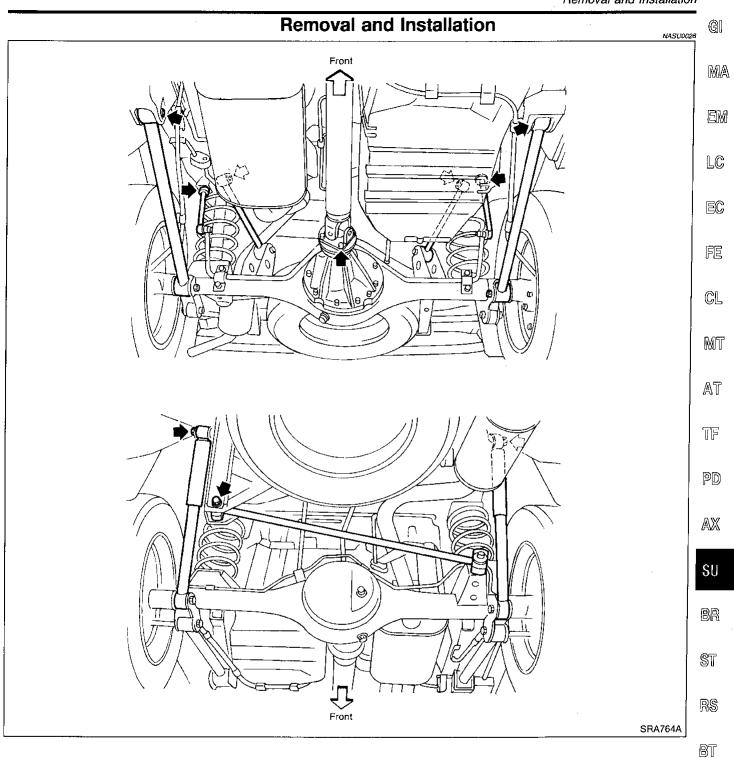
- 1. Shake each rear wheel to check for excessive play.
- 2. Retighten all nuts and bolts to the specified torque.

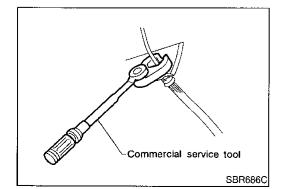
Tightening torque: Refer to "Coil Spring and Shock Absorber", SU-19.

- 3. Check shock absorber for oil leakage and other damage.
- 4. Check shock absorber bushing for excessive wear and other damage.
- 5. Check wheelarch height. Refer to "On-vehicle Service", "FRONT SUSPENSION", SU-6.

**SU-16** 

## **REAR SUSPENSION**





- 1. Support axle and suspension components with a suitable jack and block.
- 2. Disconnect brake hydraulic line and parking brake cables at back plates.

#### CAUTION:

- Use flare nut wrench when removing and installing brake tubes.
- Before removing the rear suspension assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the rear suspension assembly. Failure to do

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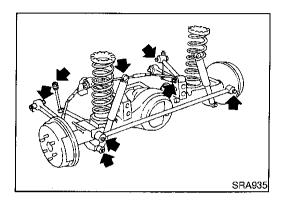
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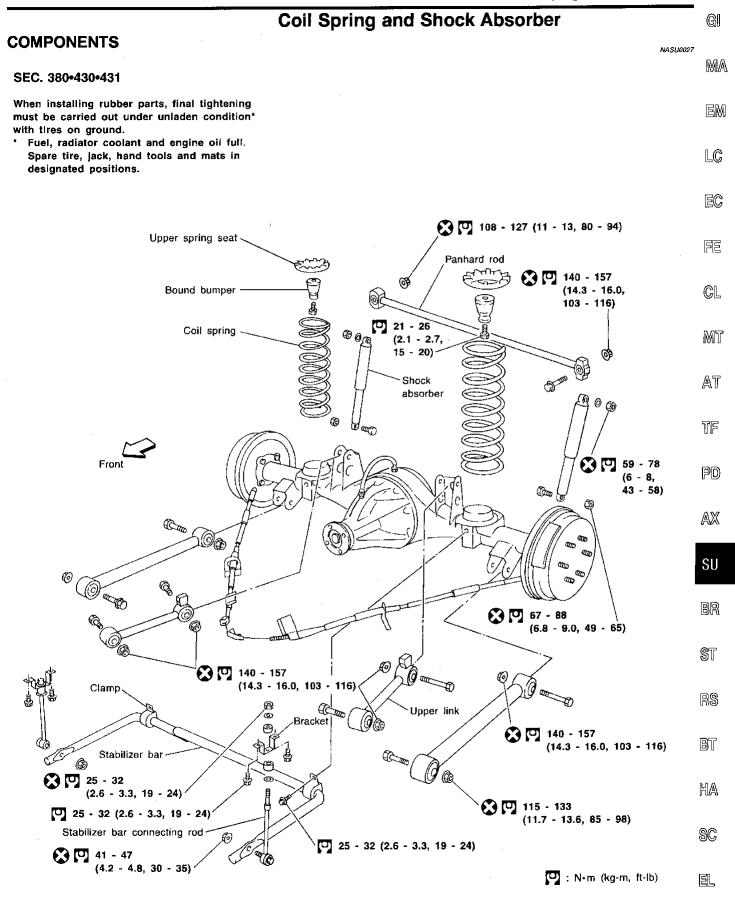
#### **REAR SUSPENSION**

# so may result in damage to the sensor wires and the sensor becoming inoperative.

- 3. Remove stabilizer bar from body.
- 4. Remove upper links and lower links from body.
- 5. Remove panhard rod from body.
- 6. Disconnect rear end of propeller shaft. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
- 7. Remove upper end nuts of shock absorber.

Final tightening for rubber parts requires to be carried out under unladen condition with tires on ground.





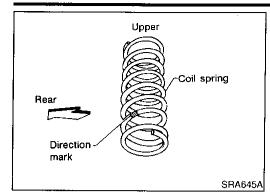
**SU-19** 

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#### Coil Spring and Shock Absorber (Cont'd)



## REAR SUSPENSION

#### **REMOVAL AND INSTALLATION**

Refer to "Removal and Installation", "REAR SUSPENSION", SU-17.

When installing coil spring, pay attention to its direction. Be sure spring rubber seat is not twisted and has not slipped off when installing coil spring.

#### **INSPECTION**

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NASU0029

- Check coil spring for yield, deformation and cracks. Check shock absorber for oil leakage, cracks and deformation.
- Check all rubber parts for wear, cracks and deformation. Replace if necessary.

#### Upper Link, Lower Link and Panhard Rod INSPECTION

NASU0030 Check for cracks, distortion and other damage. Replace if necessary.

# Press Suitable tool Upper and lower links Suitable tool SRA898 Press Suitable tool Upper and lower links Suitable tool SRA900

#### **BUSHING REPLACEMENT**

Check for cracks and other damage. Replace with suitable tool if necessary.

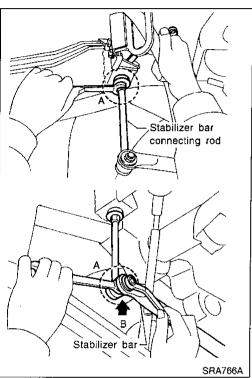
Remove bushing with suitable tool.

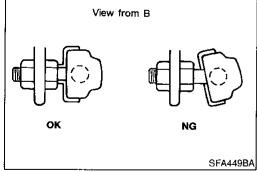
When installing bushing, apply a coat of 1% soapy water to outer wall of bushing. Always install new bushing. Do not tap end face of bushing directly with a hammer.

# **REAR SUSPENSION**

Upper Link, Lower Link and Panhard Rod (Cont'd)

	INSTALLATION When installing each link, pay attention to direction of nuts and bolts. When installing each rubber part, final tightening must be car- ried out under unladen condition with tires on ground.	gi Ma
		EM
		LC
	Stabilizer Bar REMOVAL AND INSTALLATION	EC
	• When removing and installing stabilizer bar, fix portion A.	FE
		CL
		MT
		AT
		TF
		PD
		AX
36A		SU
	<ul> <li>Install stabilizer bar with ball joint socket properly placed.</li> </ul>	BR
		ST
		I RS
9BA		BT
		HA
		sc
		EL
		<b>ت</b> انـــ





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# SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications (Front)

# General Specifications (Front)

		NASU0016
Suspension type	Independent macpherson strut with coil spring	
Strut type	Double-acting hydraulic	
Stabilizer bar	Standard equipment	

# Wheel Alignment (Unladen\*1)

NASU0017 Unit: Degree minute (Decimal degree)

NASU0018

Applied model				265/70 R15 tire	235/70 R15 tire		
			Minimum	-0°35′ (-0.58°)			
			Nominal	0°10′	(0.17°)		
Camber			Maximum	0°55′	(0.92°)		
			Left and right differ- ence	45′ (0.7	5°) or less		
		<u></u>	Minimum	2°15′	(2.25°)		
			Nominal	3°00′	(3.00°)		
Caster			Maximum	3°45′	(3.75°)		
			Left and right differ- ence	45′ (0.75	45' (0.75°) or less		
			Minimum	13°35′ (13.58°)			
Kingpin inclination			Nominal	14°20′ (14.33°)			
			Maximum	15°05′ (15.08°)			
			Minimum	1 mm (	0.04 in)		
	Distance (A - B)		Nominal	2 mm (0.08 in)			
Total toe-in			Maximum	3 mm (0.12 in)			
Total toe-In			Minimum	5′ (0.08°)			
	Angle (left plus right)		Nominal	10′ (0.17°)			
			Maximum	15' (0	).25°)		
			Minimum	30°00′ (30.00°)	32°00′ (32.00°)		
		Inside	Nominal	33°00′ (33.00°)	35°00′ (35.00°)		
	Full turn*2		Maximum	34°00′ (34.00°)	36°00′ (36.00°)		
Wheel turning angle			Minimum	28°00′ (28.00°)	30°00′ (30.00°)		
		Outside	Nominal	31°00′ (31.00°) 33°00′ (33.00°)			
			Maximum	32°00′ (32.00°)	34°00′ (34.00°)		

\*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

Swinging force "A" (Measuring point: cotter pin hole of ball stud)	7.8 - 76.5 N (0.8 - 7.8 kg, 1.8 - 17.2 lb)
Turning torque "B"	0.5 - 4.9 N⋅m (5 - 50 kg-cm, 4.3 - 43.4 in-lb)
Vertical end play "C"	0 mm (0 in)

# SERVICE DATA AND SPECIFICATIONS (SDS) Wheelarch Height (Unladen\*)

				V	Vheelarch Height (Unladen		
		Wheela	rch Height (U	nladen*)	۸۹۶۵۵۵ Unit: mm (in		
	- + -		Hr				
		,	·				
				*.	SFA746B		
				4WD			
Applied model		2WD	265/70 R15 ti (With over fend		235/70 R15 tire		
Front (Hf)		818 (32.20)	815 (32.09)		815 (32.09)		
Rear (Hr)		856 (33.70)	846 (33.31)		855 (33.66)		
Fuel, radiator coolant and	engine oil full. S	pare tire, jack, hand t	tools and mats in desig	nated positions.			
		Wheel R	lunout Averag	je*	ALA 61/0000		
					NASU0020 Unit: mm (in)		
Wheel type		Alun	ninum		Steel		
Radial runout limit		0.3 (	0.012)		0.8 (0.031)		
Lateral runout limit		0.3 (	0.012)		0.8 (0.031)		
Wheel runout average = (C	Jutside fundut vi		Specification	s (Rear)	NASU0034		
Suspension type				Double-acting hyd			
Shock absorber type					······································		
Stabilizer				Standard equipm			

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