

# FRONT AXLE & FRONT SUSPENSION

## SECTION **FA**

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## CONTENTS

<b>PRECAUTIONS AND PREPARATION</b> .....	2	Removal and Installation.....	15	FE
Precautions.....	2	Disassembly.....	16	
Preparation.....	2	Inspection.....	17	AT
<b>FRONT AXLE AND FRONT SUSPENSION</b> .....	4	Assembly.....	17	
<b>ON-VEHICLE SERVICE</b> .....	5	<b>FRONT SUSPENSION — Tension Rod and</b>		
Front Axle and Front Suspension Parts.....	5	<b>Stabilizer Bar</b> .....	20	PD
Front Wheel Bearing.....	6	Removal and Installation.....	20	
Front Wheel Alignment.....	7	<b>FRONT SUSPENSION — Transverse Link</b>		
<b>FRONT AXLE</b> .....	10	<b>Assembly</b> .....	21	<b>FA</b>
Removal.....	10	Removal and Installation.....	21	
Inspection.....	11	Inspection.....	21	RA
Installation.....	11	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	22	
<b>FRONT SUSPENSION</b> .....	14	General Specifications.....	22	BR
<b>FRONT SUSPENSION — Coil Spring and Strut</b>		Inspection and Adjustment.....	22	
<b>Assembly</b> .....	15			

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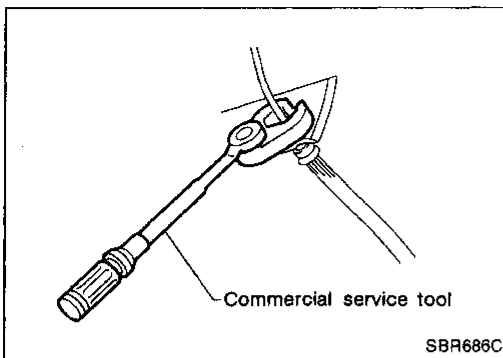
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# PRECAUTIONS AND PREPARATION

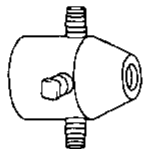
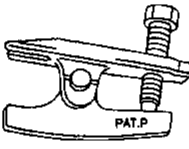
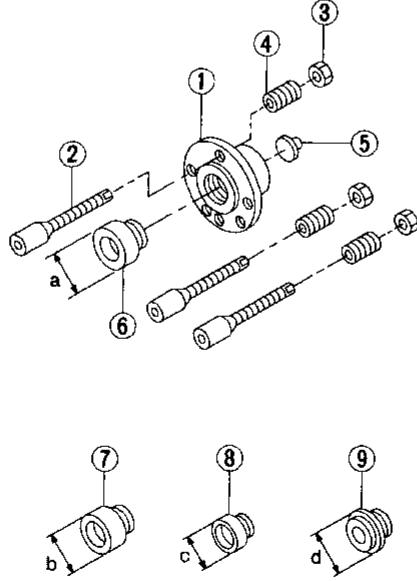


## Precautions

- 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.
- 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.

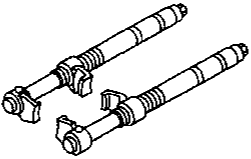
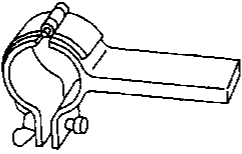
## Preparation

### SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
KV401021S0 ( - - ) Bearing race drift	 <p>Installing wheel bearing outer race</p>
HT72520000 (J25730-A) Ball joint remover	 <p>Removing tie-rod outer end and lower ball joint</p>
KV991040S0 C.C.K. holder KV99104010 Attachment set ① Plate ② Guide bolts ③ Nuts ④ Springs ⑤ Center plate ⑥ KV99104020 Adapter A ⑦ KV99104030 Adapter B ⑧ KV99104040 Adapter C ⑨ KV99104050 Adapter D	 <p>Attaching wheel alignment gauge</p> <p>a: 72 mm (2.83 in) dia. b: 65 mm (2.56 in) dia. c: 57 mm (2.24 in) dia. d: 53.4 mm (2.102 in) dia.</p>

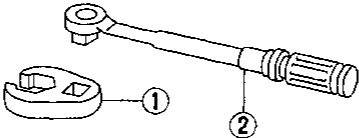
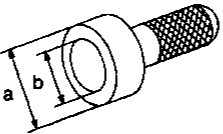
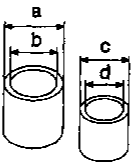
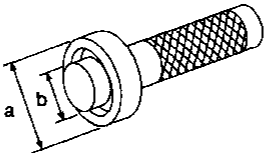
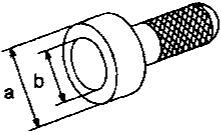
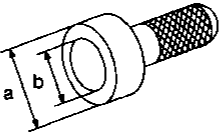
# PRECAUTIONS AND PREPARATION

## Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
HT71780000 ( — ) Spring compressor		Removing and installing coil spring
ST35652000 ( — ) Strut attachment		Fixing strut assembly

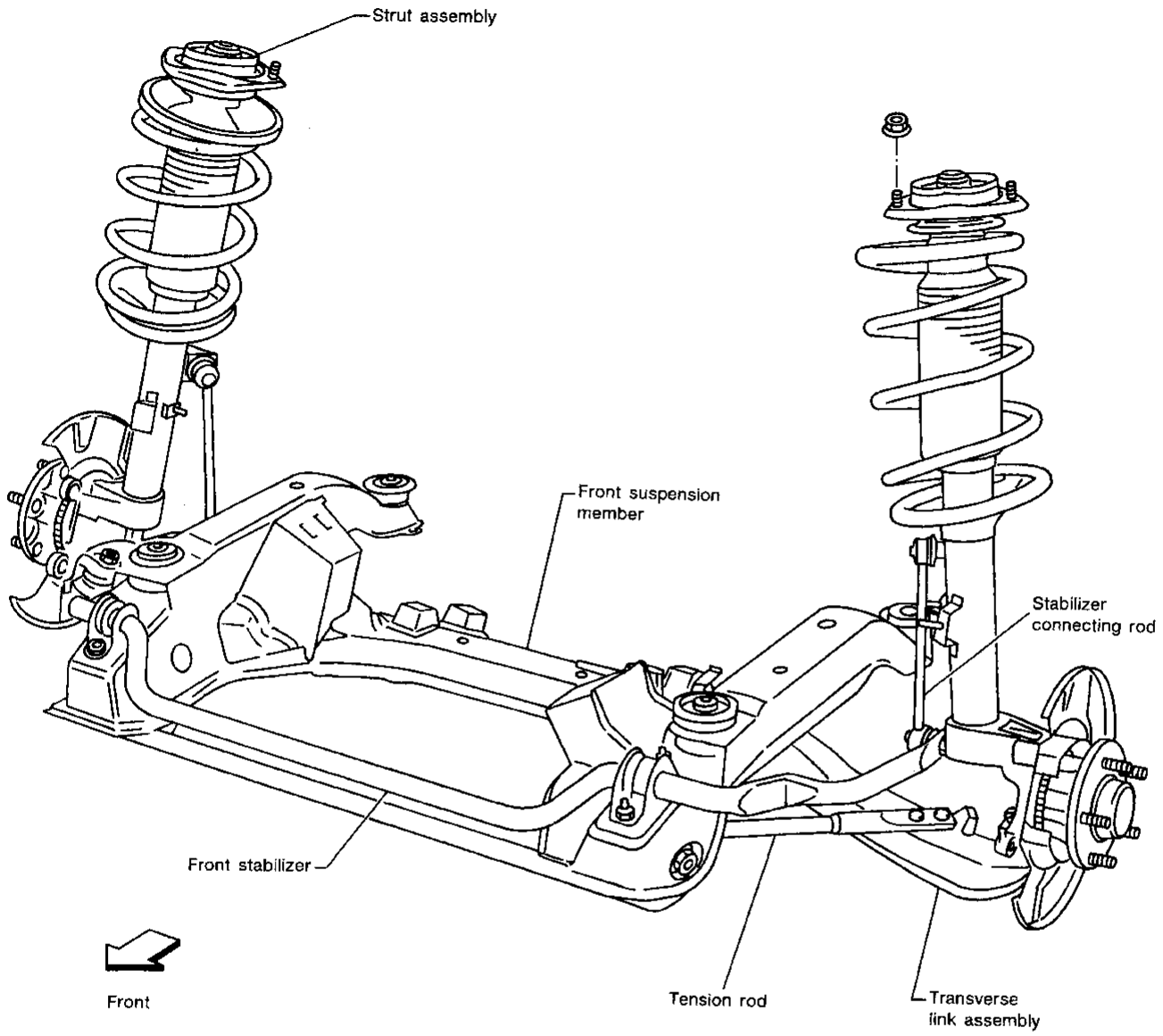
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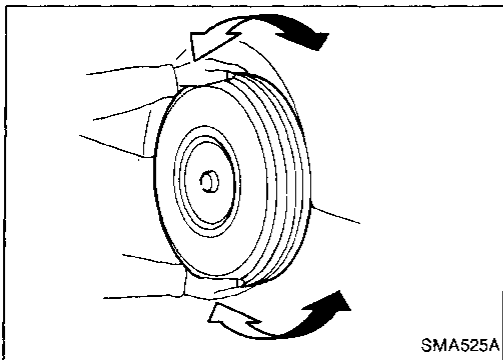
## COMMERCIAL SERVICE TOOLS

Tool name	Description	
① Flare nut crows foot ② Torque wrench		Removing and installing each brake piping
Front axle grease seal drift		Installing front axle grease seal a: 70 mm (2.76 in) dia. b: 60 mm (2.36 in) dia.
Tension rod bushing drift		Removing and installing tension rod bushing a: 75 mm (2.95 in) dia. b: 66 mm (2.60 in) dia. c: 62 mm (2.44 in) dia. d: 25 - 55 mm (0.98 - 2.17 in) dia.
Wheel bearing drift		Removing wheel bearing a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.
Wheel bearing drift		Installing wheel bearing a: 79 mm (3.11 in) dia. b: 59 mm (2.32 in) dia.
Cap drift		Installing hub cap a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.

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# FRONT AXLE AND FRONT SUSPENSION

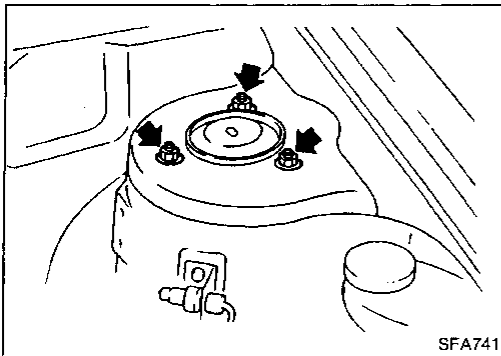




## Front Axle and Front Suspension Parts

Check front axle and front suspension parts for looseness, cracks, wear or other damage.

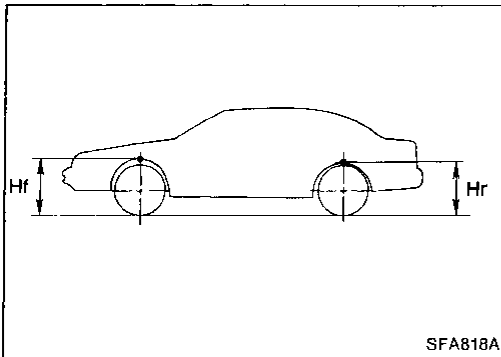
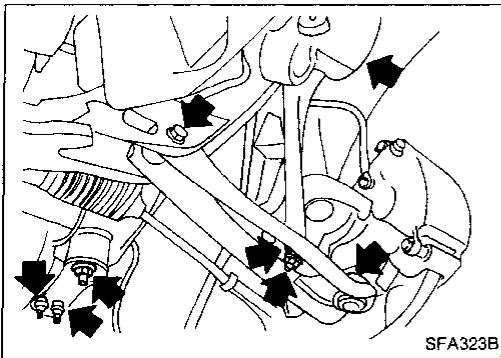
- Shake each front wheel to check for excessive play.



- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.

**Tightening torque:**

**Refer to FRONT SUSPENSION (FA-14).**



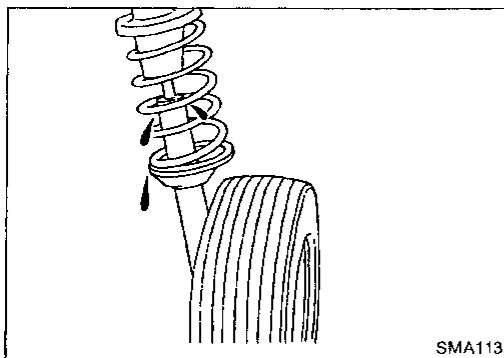
- Check spring height from top of wheelarch to ground.
- (1) Vehicle must be unladen\*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).

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

- (2) Bounce vehicle up and down several times before measuring.

**Standard height: Refer to SDS (FA-22).**

- (3) Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.



- Check strut (Shock absorber) for oil leakage or damage.

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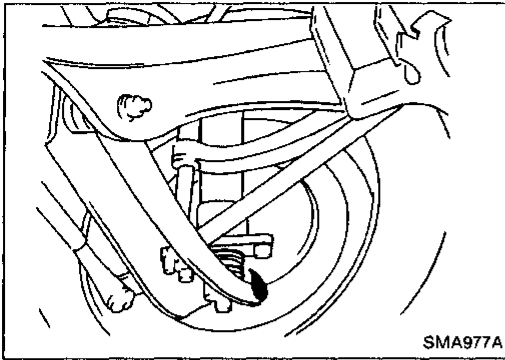
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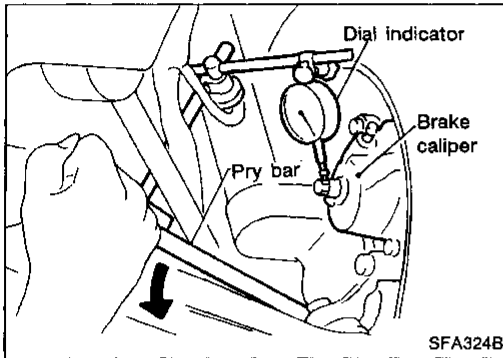
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## ON-VEHICLE SERVICE

### Front Axle and Front Suspension Parts (Cont'd)



- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage. If ball joint dust cover is cracked or damaged, replace transverse link.

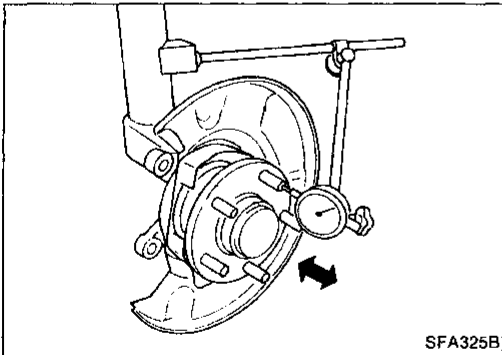


- Check suspension ball joint end play.
  - (1) Jack up front of vehicle and set the stands.
  - (2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
  - (3) Make sure front wheels are straight and brake pedal is depressed.
  - (4) Place a pry bar between transverse link and inner rim of road wheel.
  - (5) While raising and releasing pry bar, observe maximum dial indicator value.

#### Vertical end play:

0.1 - 1.3 mm (0.004 - 0.051 in)

- (6) If ball joint movement is beyond specifications, remove and recheck it.



### Front Wheel Bearing

Check that wheel bearings operate smoothly, as well as axial end play and grease leakage.

**Axial end play limit: 0 mm (0 in)**

### PRELOAD ADJUSTMENT

Be sure to adjust wheel bearing preload as described below after wheel bearing has been replaced or front axle has been reassembled.

1. Before adjustment, thoroughly clean all parts to prevent dirt entry.

Front Wheel Alignment

CAMBER, CASTER AND KINGPIN INCLINATION

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

1. Set vehicle on turning radius gauge.

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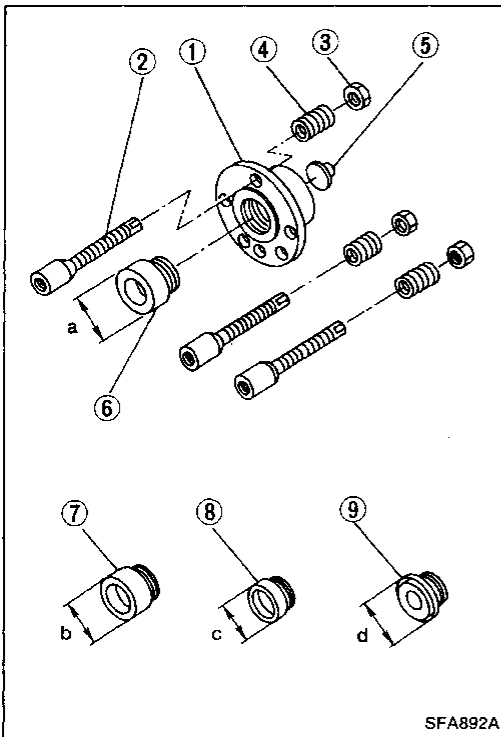
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2. Mount Tool as follows.

Tool number:

KV991040S0

KV99104010 ① to ⑤

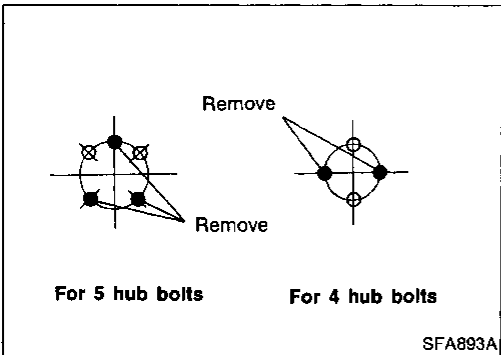
KV99104020 ⑥

KV99104030 ⑦

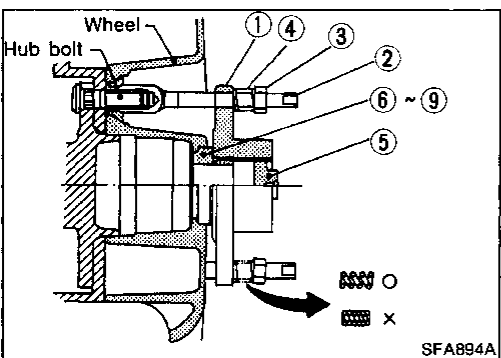
KV99104040 ⑧

KV99104050 ⑨

- a. Select adapter which corresponds with wheel or hub shape from four types ⑥ to ⑨.
- b. Screw selected adapter in until it contacts plate ①.



- c. Remove wheel nuts.



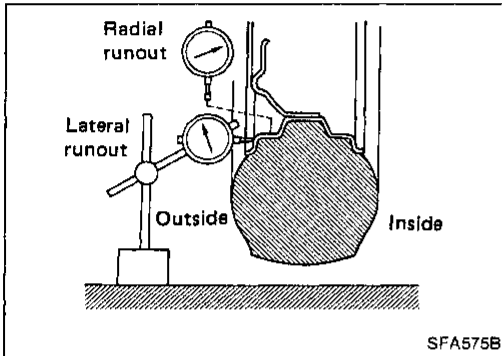
- d. Install guide bolts ② to where wheel nuts were removed and tighten them by hand.
- e. Install plate and adapter assembly to guide bolts ②.
- f. Install springs ④ onto guide bolts ②. Then tighten nuts ③ evenly until a little before springs ④ are completely compressed.
- g. Install center plate ⑤.
- h. Mount wheel alignment gauge on attachment plate.

## ON-VEHICLE SERVICE

### Front Wheel Alignment (Cont'd)

Before checking 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.



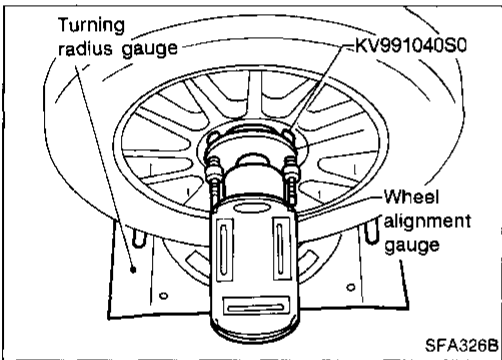
#### PRELIMINARY INSPECTION

1. Check tires for wear and improper inflation.
2. Check wheel runout.

##### Wheel runout:

Refer to SDS (FA-22).

3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly by using the standard bounce test.
7. Check vehicle posture (Unladen).



#### CAMBER, CASTER AND KINGPIN INCLINATION

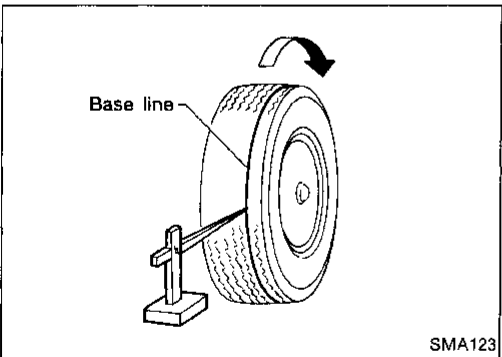
Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

##### Camber, Caster and Kingpin inclination:

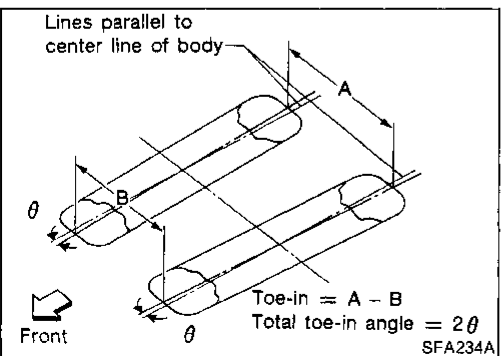
Refer to SDS (FA-22).

2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.



#### TOE-IN

1. Draw a base line across the tread.
  - After lowering front of vehicle, move it up and down to eliminate friction, and set steering wheel in straight-ahead position.



2. Measure toe-in.

- Measure distance "A" and "B" at the same height as hub center.

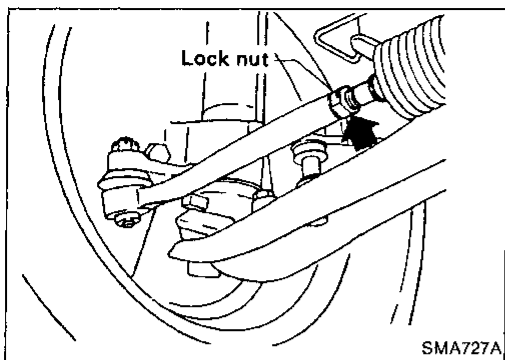
##### Toe-in:

Refer to SDS (FA-22).



# ON-VEHICLE SERVICE

## Front Wheel Alignment (Cont'd)



3. Adjust toe-in by varying the length of steering tie-rods.
  - (1) Loosen lock nuts.
  - (2) Adjust toe-in by screwing tie-rods in and out.

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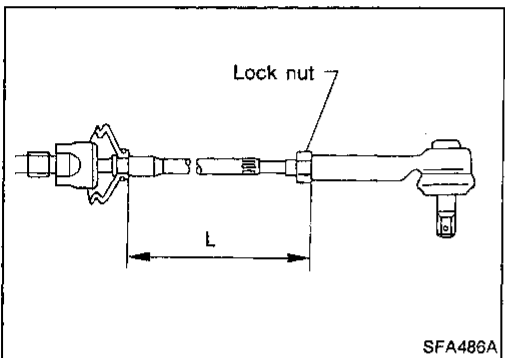
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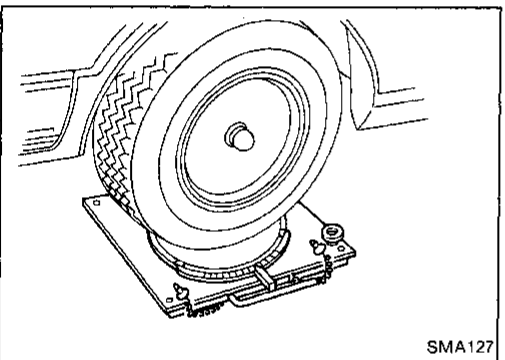
### Standard length "L":

Refer to SDS in ST section.

- (3) Tighten lock nuts to specified torque.

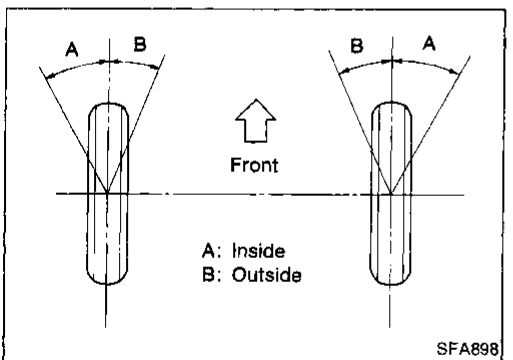
### Lock nut tightening torque:

Refer to POWER STEERING GEAR AND LINKAGE in ST section.



## FRONT WHEEL TURNING ANGLE

1. Set wheels in straight-ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.



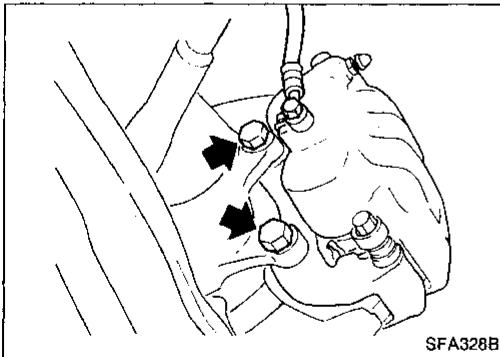
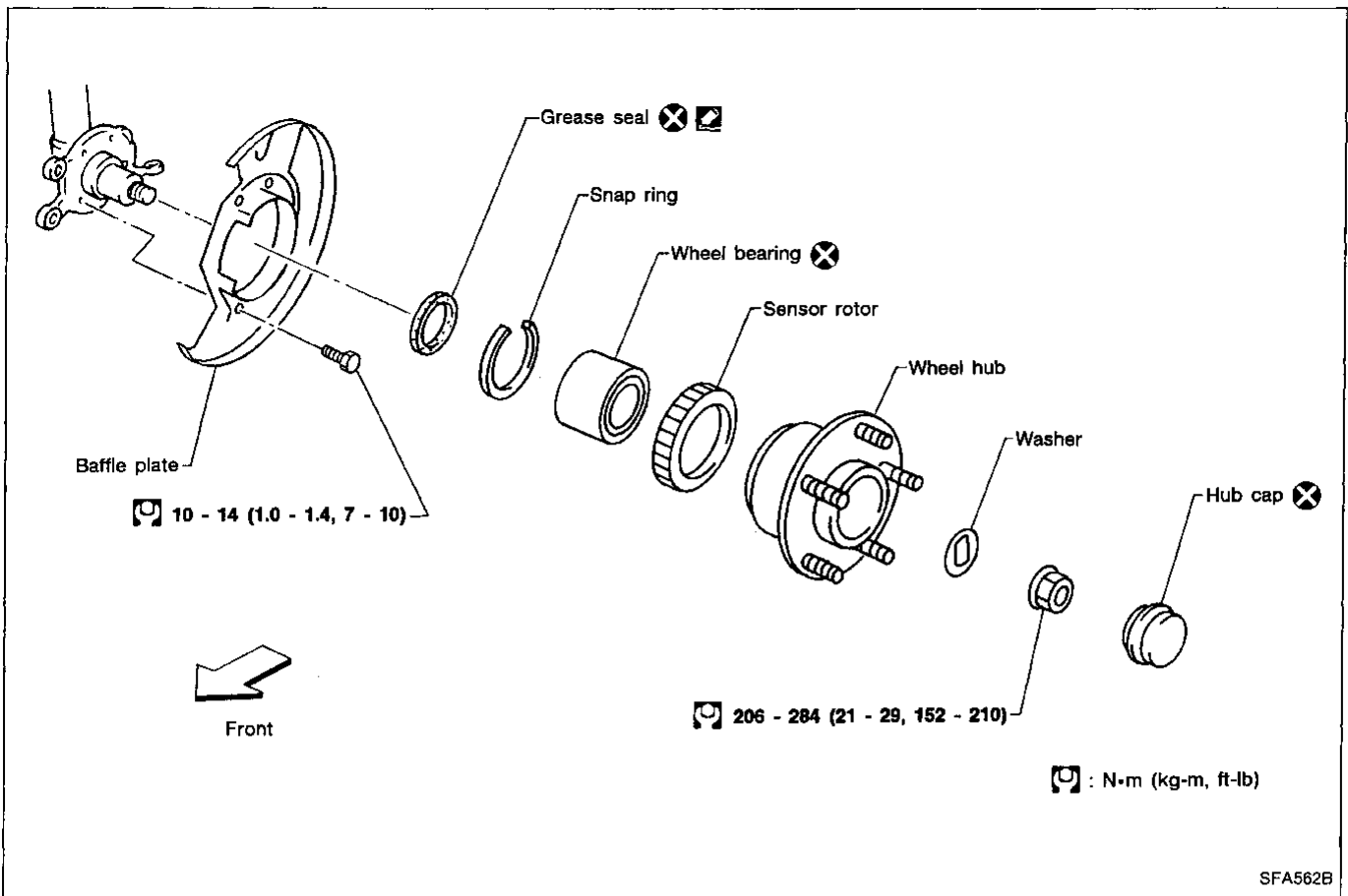
2. Rotate steering wheel all the way right and left; measure turning angle.

### Wheel turning angle (Full turn):

Inside wheel:  $35^{\circ}20'$  -  $39^{\circ}20'$

Outside wheel:  $31^{\circ}50'$

# FRONT AXLE

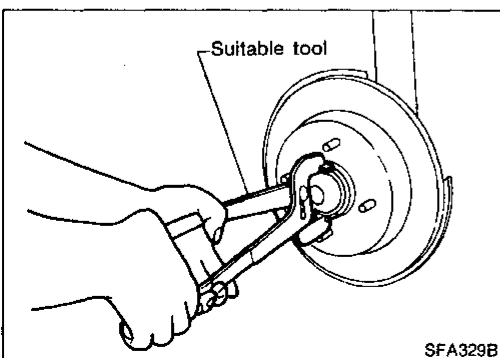


## Removal

- Remove brake caliper assembly and rotor.

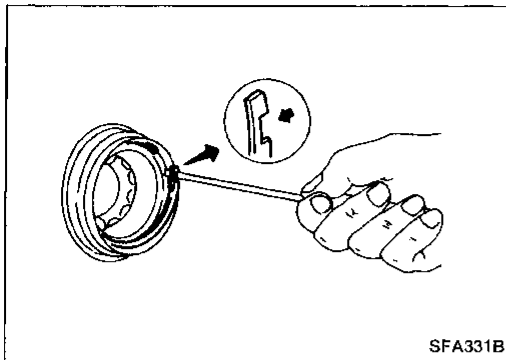
### CAUTION:

- Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.
- Before removing the front wheel hub and steering knuckle, disconnect the ABS wheel sensor from the assembly and move it away from the hub and steering knuckle. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.
- Remove wheel hub from spindle.



## FRONT AXLE

### Removal (Cont'd)



- Remove grease seal.
- Remove snap ring.

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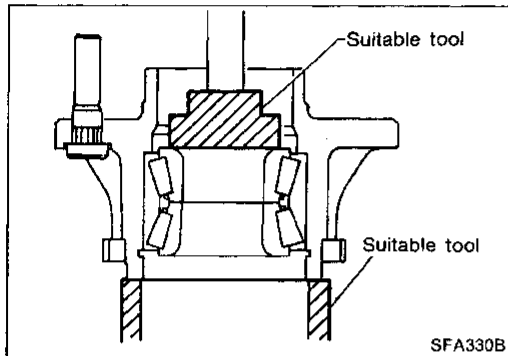
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- Press out bearing and race as a set.

### Inspection

#### WHEEL BEARING

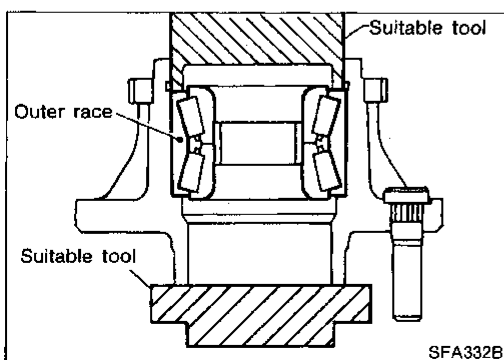
Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear, and replace if damaged.

#### WHEEL HUB

Check wheel hub for crack by a magnetic exploration or dyeing test, and replace if cracked.

#### KNUCKLE SPINDLE

Check knuckle spindle for deformation, tapping mark, or cracks (by magnetic or dyeing test) and replace if damaged.



### Installation

- Press new wheel bearing assembly into wheel hub.

Maximum load P:

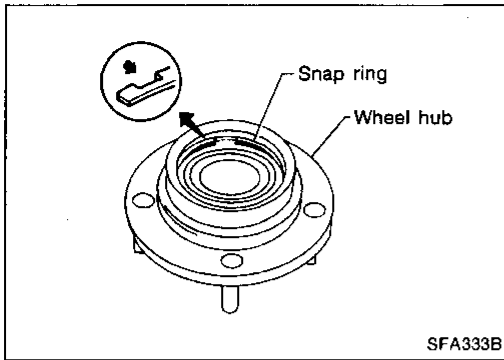
29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

#### CAUTION:

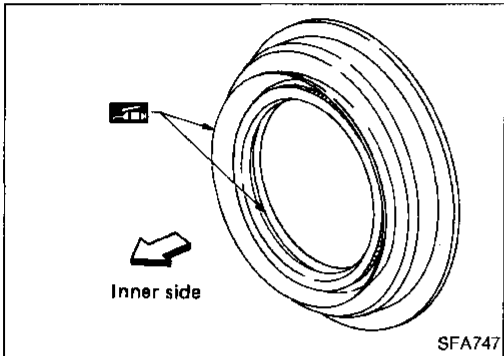
- Do not press inner race of wheel bearing assembly.
- Do not apply oil or grease to mating surfaces of wheel bearing outer race and wheel hub.

## FRONT AXLE

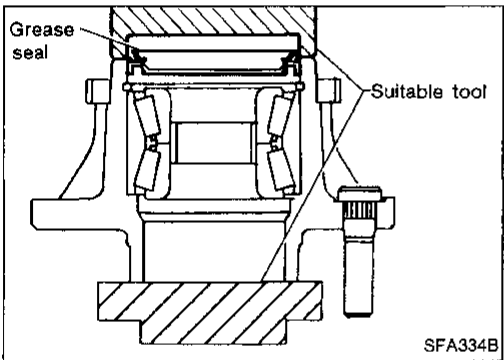
### Installation (Cont'd)



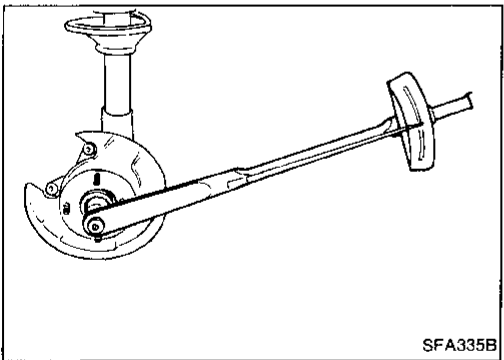
- Install snap ring.



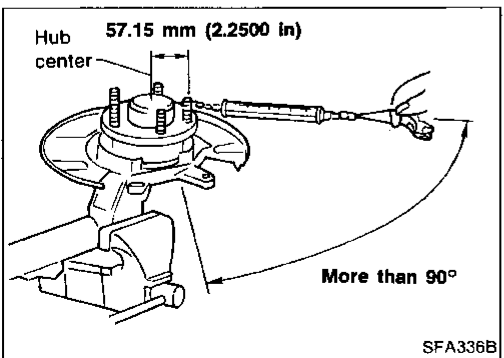
- Pack grease seal lip with recommended multi-purpose grease.



- Install grease seal.



- Install wheel hub.
- Tighten wheel bearing lock nut to the specified torque.



- Turn wheel hub several times in both directions to seat wheel bearing correctly.
- Attach spring balance to wheel hub bolt (as shown at left) and pull it at a speed of 10 rpm to measure rotation torque.

#### Rotation torque:

0.25 - 2.11 N·m (2.5 - 21.5 kg-cm, 2.2 - 18.7 in-lb)

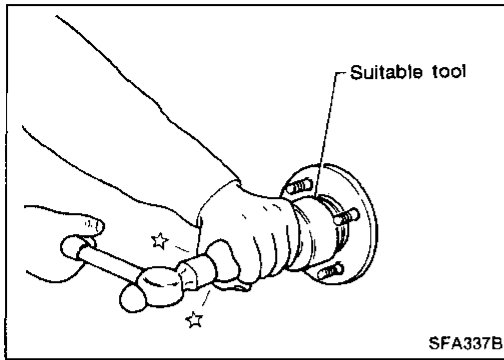
#### Spring balance indication:

3.9 - 37.3 N (0.4 - 3.8 kg, 0.9 - 8.4 lb)

If bearing preload does not meet the specification, replace wheel bearing assembly.

## FRONT AXLE

### Installation (Cont'd)



- Clinch lock nut using standard screwdriver and install hub cap using a suitable tool.
- Install strut.  
Refer to "FRONT SUSPENSION — Coil Spring and Strut Assembly" (FA-15).

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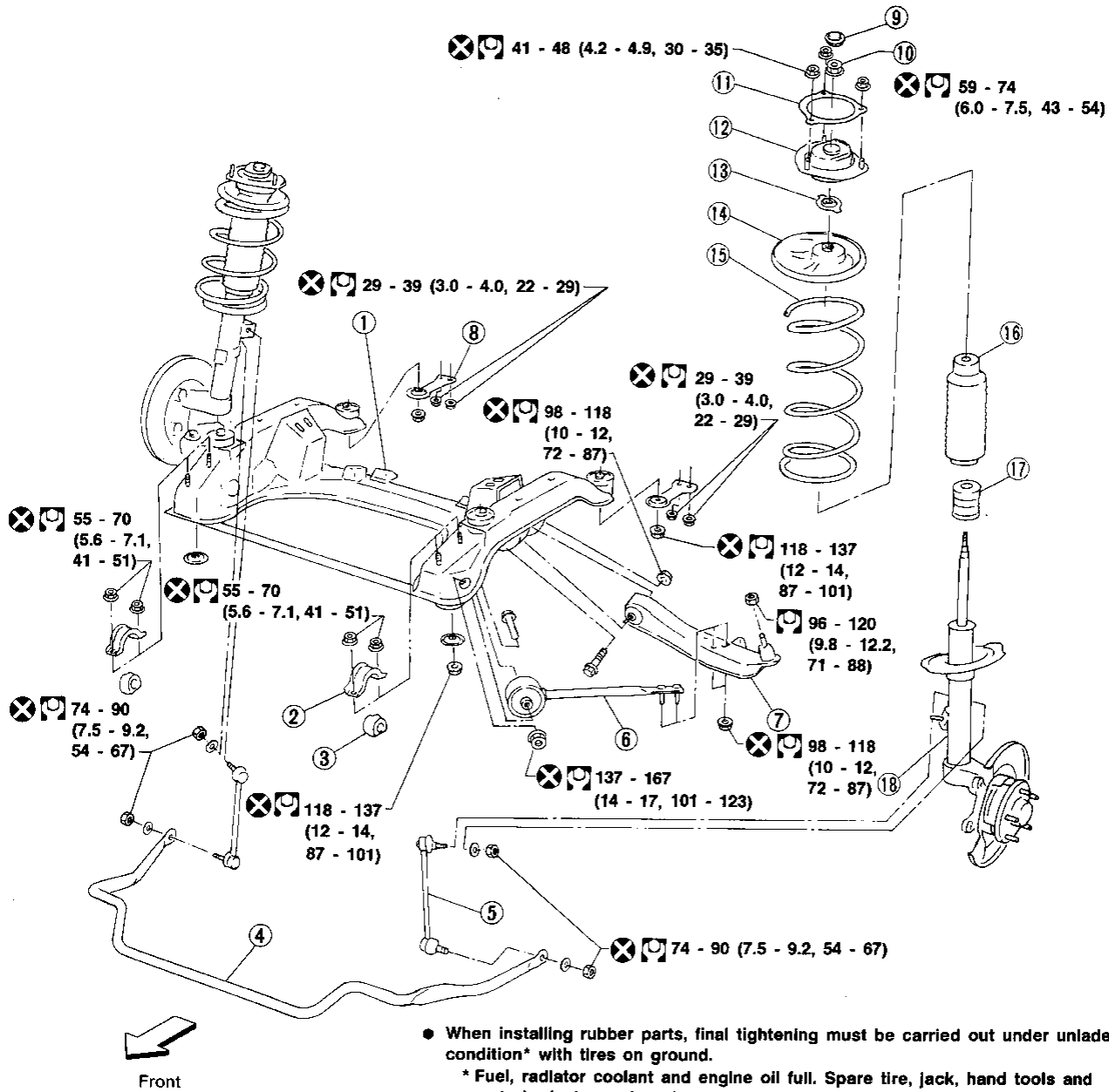
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# FRONT SUSPENSION



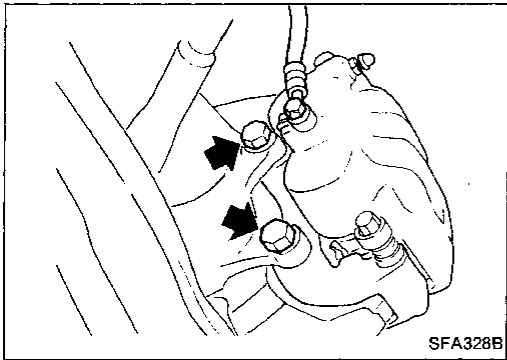
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- ① Front suspension member
- ② Stabilizer bar clamp
- ③ Bushing
- ④ Stabilizer bar
- ⑤ Stabilizer connecting rod
- ⑥ Tension rod

- ⑦ Transverse link
- ⑧ Member stay
- ⑨ Cap
- ⑩ Lock nut
- ⑪ Gasket
- ⑫ Strut mounting insulator

- ⑬ Upper plate
- ⑭ Spring upper seat
- ⑮ Coil spring
- ⑯ Dust cover
- ⑰ Bound bumper
- ⑱ Strut assembly

# FRONT SUSPENSION — Coil Spring and Strut Assembly



## Removal and Installation

- Remove brake caliper assembly and rotor.  
**Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.**

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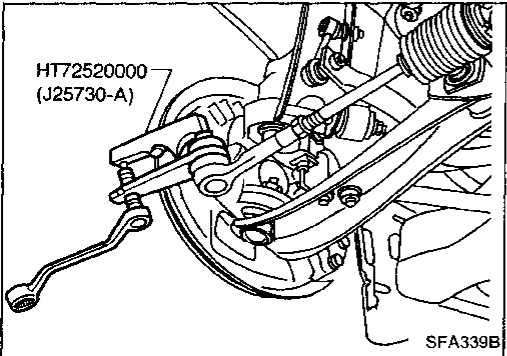
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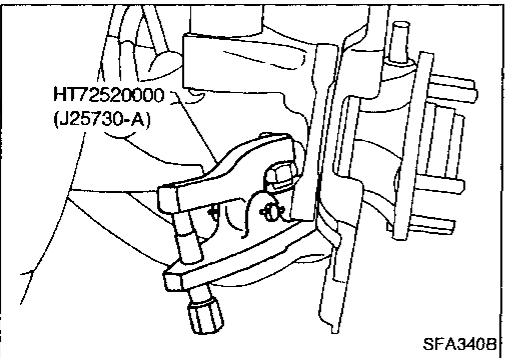
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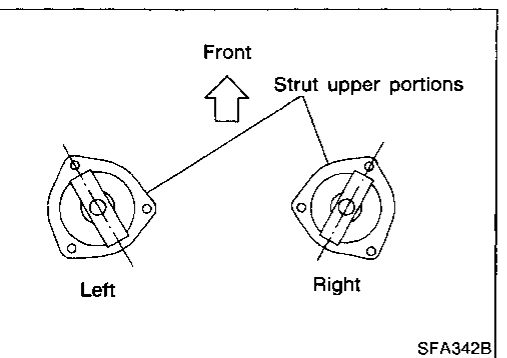
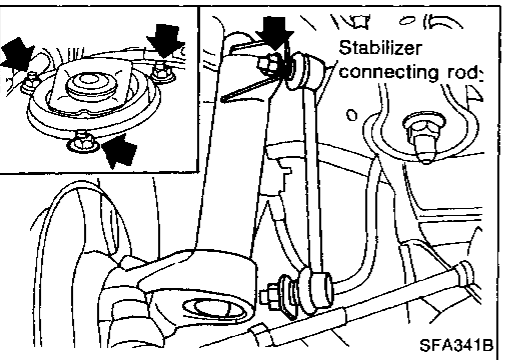
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- Remove tie-rod ball joint and lower ball joint with Tool.

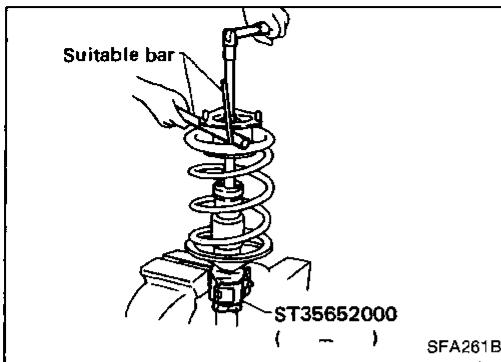


- Remove stabilizer connecting rod upper nut, separate strut assembly and stabilizer connecting rod.
- Remove strut assembly upper nuts.



- To install, reverse above removal procedures. Installation position of upper end of strut is shown at left.

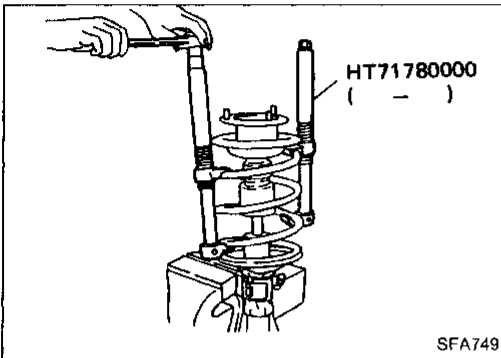
## FRONT SUSPENSION — Coil Spring and Strut Assembly



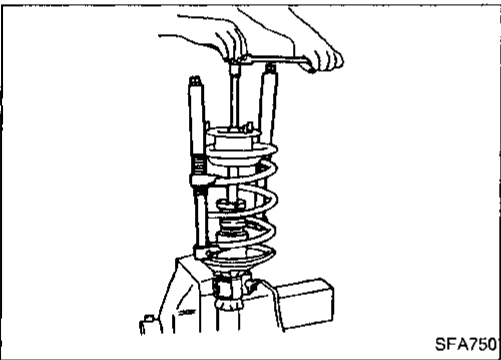
### Disassembly

1. Set strut assembly on vice with attachment, then loosen piston rod lock nut.

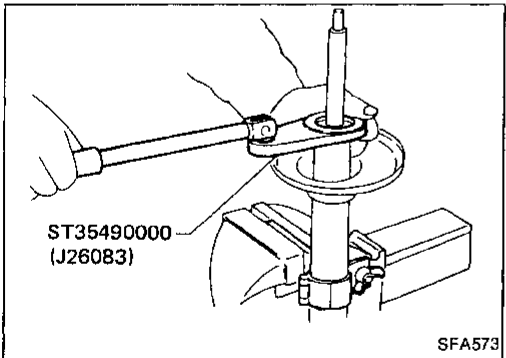
**Do not remove piston rod lock nut.**



2. Compress spring with Tool so as to permit turning of strut mounting insulator by hand.



3. Remove piston rod lock nut. Then remove coil spring.



4. Remove gland packing with Tool.
- **Avoid dirt and dust getting into gland packing portion.**
5. Retract piston rod by pushing it down until it bottoms. Then, slowly withdraw piston rod from cylinder together with piston guide.



## Inspection

Wash all parts, except for nonmetallic parts, clean with suitable solvent and dry with compressed air.

Blow dirt and dust off of nonmetallic parts using compressed air.

## STRUT ASSEMBLY

- Oil oozing out around gland packing does not need strut replacement.

If oil leakage is evident on spring seat, check piston rod gland packing and O-ring.

If oil leakage occurs on welded portion of outer strut casing, replace strut assembly.

- If shock absorber itself is malfunctioning, replace as shock absorber kit.

## GLAND PACKING

Check gland packing for oil leakage. Replace gland packing if necessary.

## STRUT MOUNTING INSULATOR

Check cemented rubber-to-metal portion for melting or cracks. Check rubber parts for deterioration. Replace if necessary.

## THRUST SEAT

Check for cracks, deformation or other damage. Replace if necessary.

## COIL SPRING

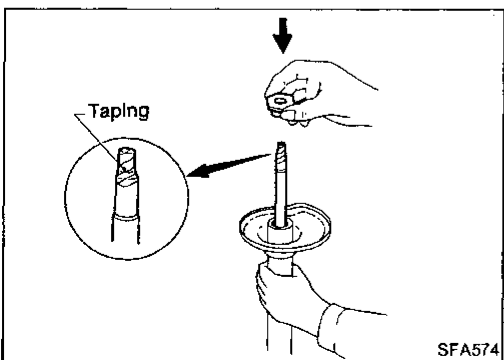
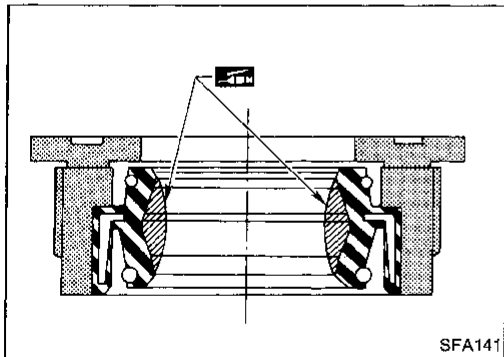
Check for cracks, deformation or other damage. Replace if necessary.

## Assembly

- Lubricate sealing lip of gland packing.

- Install gland packing.

**Cover piston rod with tape so as not to damage oil sealing lip.**



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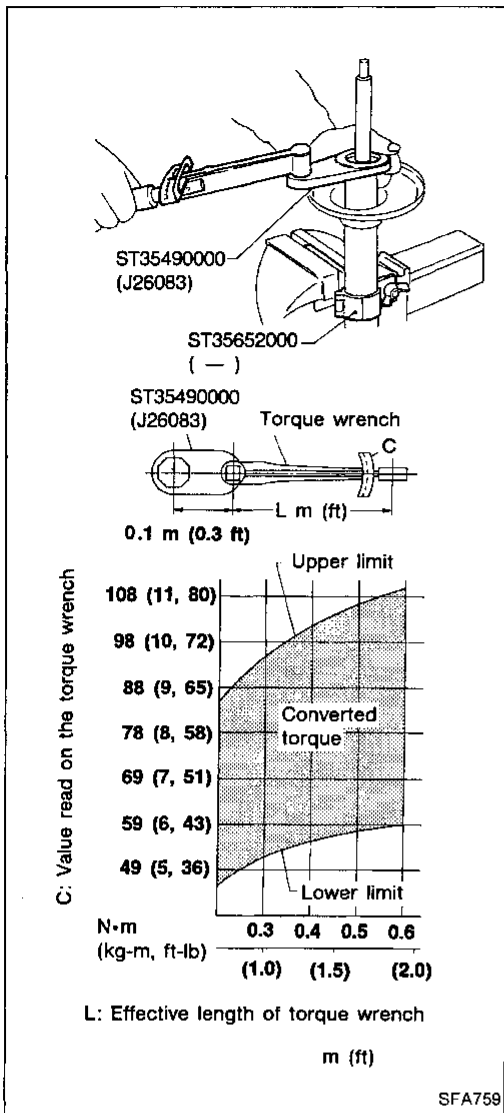
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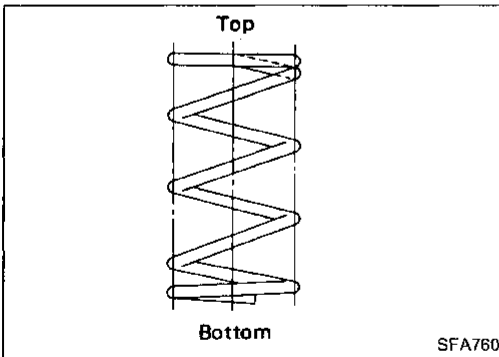
# FRONT SUSPENSION — Coil Spring and Strut Assembly

## Assembly (Cont'd)

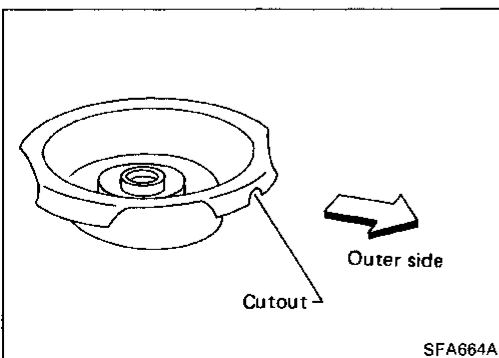
- Tighten gland packing to the specified torque (refer to chart at left) with Tool.



- When installing coil spring, be careful not to reverse top and bottom direction. (top end is flat.)



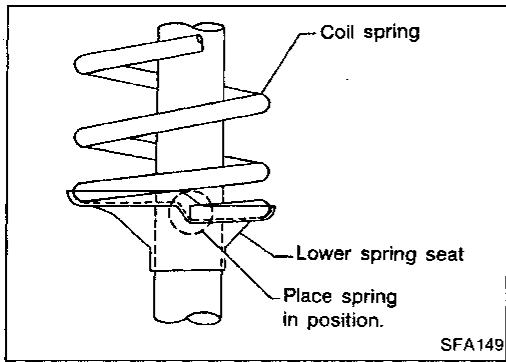
- Install upper spring seat with its cutout facing the outer side of vehicle.



# FRONT SUSPENSION — Coil Spring and Strut Assembly

## Assembly (Cont'd)

After placing spring in position on lower spring seat, release spring compressor gradually.



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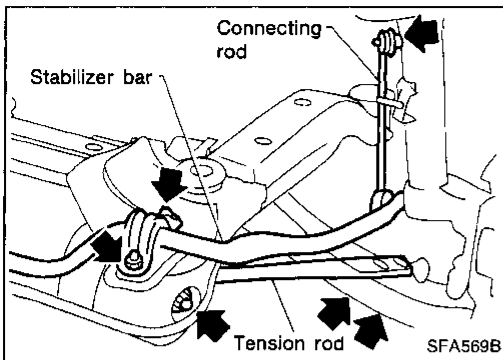
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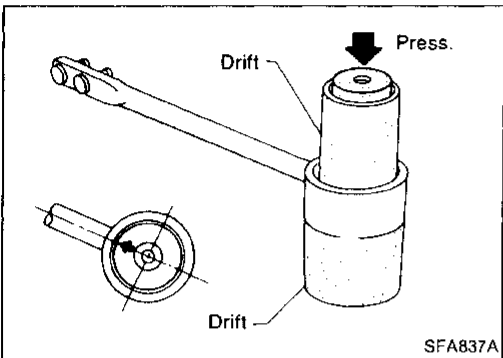
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## FRONT SUSPENSION — Tension Rod and Stabilizer Bar

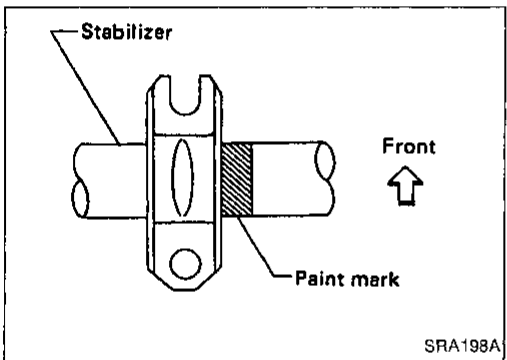


### Removal and Installation

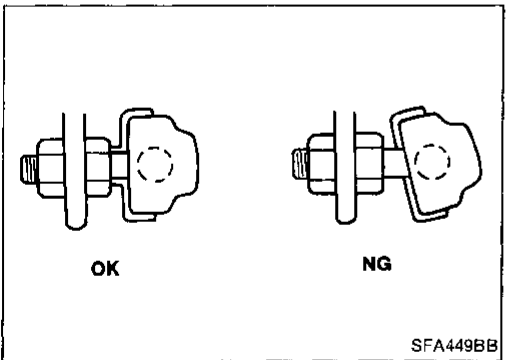
- Remove tension rod and stabilizer bar.



- When removing tension rod bushing, place one drift on lower side of bushing and the other on upper side, as shown at left, and press bushing out.
- Place arrow mark on bushing facing tension rod before installing bushing.

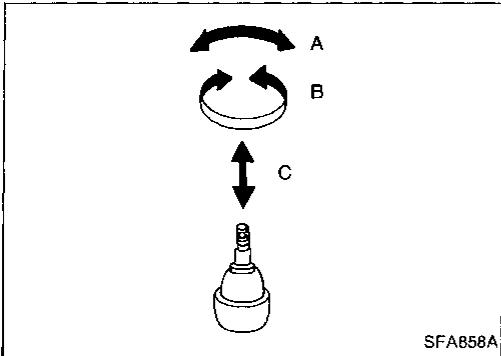
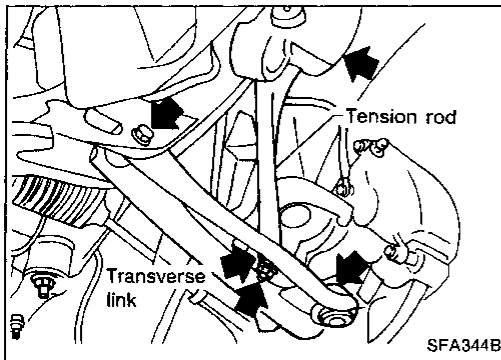


- When installing stabilizer, make sure that paint mark and clamp face in their correct directions.



- Install stabilizer bar with ball joint socket properly placed.

# FRONT SUSPENSION — Transverse Link Assembly



## Removal and Installation

- Separate suspension ball joint from knuckle arm.
- Remove tension rod and transverse link assembly.

## Inspection

- Check tension rod, stabilizer bar and transverse link for damage, cracks, deformation; replace transverse link assembly if necessary.
  - Check rubber bushing for damage, cracks and deformation; replace tension rod or transverse link assembly if necessary.
  - Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace lower ball joint.
- Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

### Swinging force:

Refer to SDS (FA-22).

### Turning torque:

Refer to SDS (FA-22).

### Vertical end play:

Refer to SDS (FA-22).

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

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

### COIL SPRING

Applied model	Without HICAS	With HICAS
Wire diameter mm (in)	14.6 (0.575)	14.2 (0.559)
Coil diameter mm (in)	170.1 (6.70)	169.7 (6.68)
Free length mm (in)	430.0 (16.93)	410.0 (16.14)
Spring constant N/mm (kg/mm, lb/in)	19.6 (2.0, 112)	21.6 (2.2, 123)
Identification color	Red x 1, Blue x 1	Orange x 1, Purple x 1

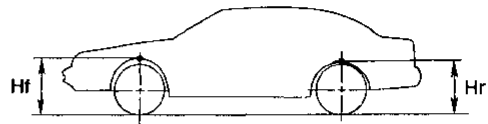
### SHOCK ABSORBER (STRUT)

Applied model	All
Piston rod diameter mm (in)	25.0 (0.984)
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)	
Expansion	618 - 853 (63 - 87, 139 - 192)
Compression	196 - 314 (20 - 32, 44 - 71)

### FRONT STABILIZER BAR

Applied model	Without HICAS	With HICAS
Stabilizer diameter mm (in)	25 (0.98)	24 (0.94)
Identification color	Blue	Red

### WHEELARCH HEIGHT (Unladen\*)



SFA818A

Applied model	Without HICAS	With HICAS
Front (Hf) mm (in)	697 (27.44)	696 (27.40)
Rear (Hr) mm (in)	681 (26.81)	680 (26.77)

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

### TENSION ROD

Rod diameter mm (in)	20 (0.79)
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## Inspection and Adjustment

### WHEEL ALIGNMENT (Unladen\*1)

Camber degree	-1°30' to 0°
Caster degree	5°50' - 7°20'
Kingpin inclination degree	12°40' - 14°10'
Toe-in	
A - B mm (in)	0 - 2 (0 - 0.08)
Total angle 2θ degree	0° - 10°
Front wheel turning angle*2 degree	
Inside	35°20' - 39°20'
Outside	31°50'

\*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 at idle.

### WHEEL BEARING

Wheel bearing end play limit mm (in)	0 (0)
Wheel bearing lock nut	
Tightening torque N·m (kg·m, ft·lb)	206 - 284 (21 - 29, 152 - 210)
Maximum wheel bearing preload measured at wheel hub bolt N (kg, lb)	37.3 (3.8, 8.4)

### LOWER BALL JOINT

Swinging force at cotter pin hole N (kg, lb)	8.8 - 59.8 (0.9 - 6.1, 2.0 - 13.5)
Turning torque N·m (kg·cm, in·lb)	0.5 - 3.4 (5 - 35, 4.3 - 30.4)
Vertical end play mm (in)	0 (0)

### WHEEL RUNOUT (Radial and lateral)

Wheel type	Aluminum wheel
Radial runout limit mm (in)	0.3 (0.012)
Lateral runout limit mm (in)	0.3 (0.012)