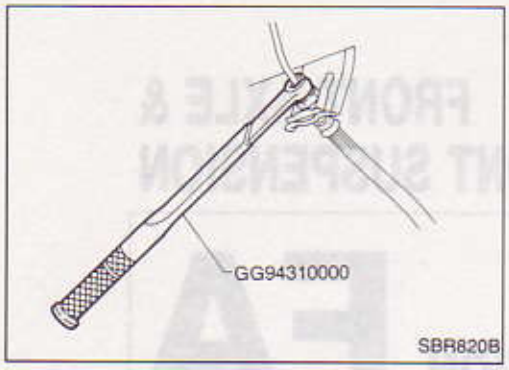
FRONT AXLE & FRONT SUSPENSION

SECTION FA

CONTENTS



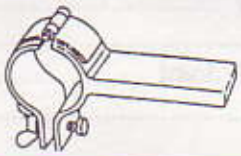
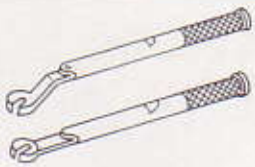
Precautions

- **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.**
- **When removing each suspension part, check wheel alignment and adjust if necessary.**
- **Use Tool when removing or installing brake lines.**

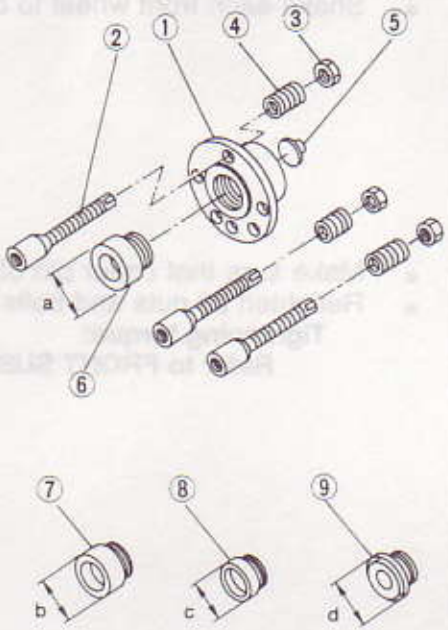
Preparation

SPECIAL SERVICE TOOLS

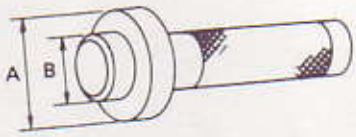
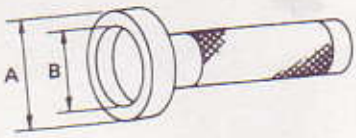
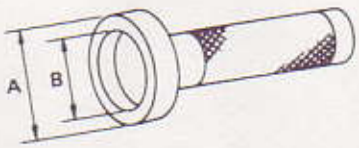
*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST27850000* Ball joint remover		Removing tie-rod outer end and lower ball joint
HT71780000* Spring compressor		Removing and installing coil spring
ST35652000* Strut attachment		Fixing strut assembly
GG94310000* Flare nut torque wrench		Removing and installing brake piping

Preparation (Cont'd)

Tool number Tool name	Description	
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		Attaching wheel alignment gauge **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.**

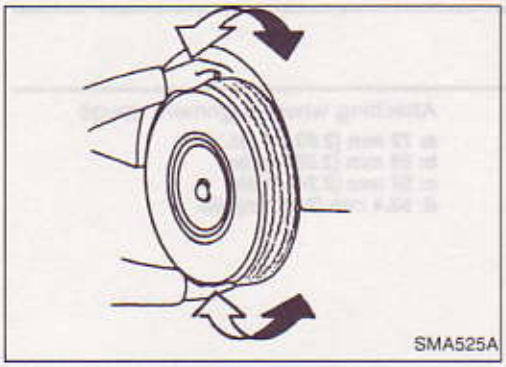
COMMERCIAL SERVICE TOOLS

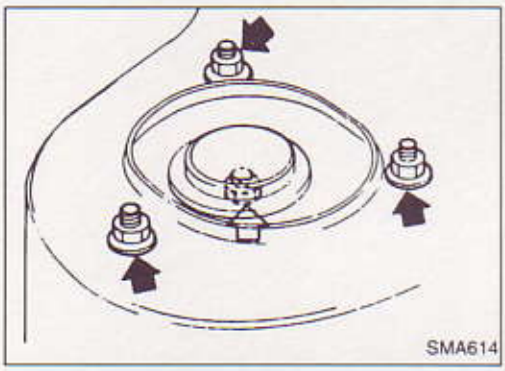
Tool name	Description	
Wheel bearing drift		Removing wheel bearing **A: 49 mm (1.93 in) dia.** **B: 37 mm (1.46 in) dia.**
Wheel bearing drift		Installing wheel bearing **A: 76 mm (2.99 in) dia.** **B: 68.5 mm (2.697 in) dia.**
Baffle plate drift		Installing baffle plate **A: 117 mm (4.61 in) dia.** **B: 98 mm (3.86 in) dia.**
Grease seal drift		Installing wheel hub grease seal **A: 76 mm (2.99 in) dia.** **B: 68.5 mm (2.697 in) dia.**

Front Axle and Front Suspension Parts

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

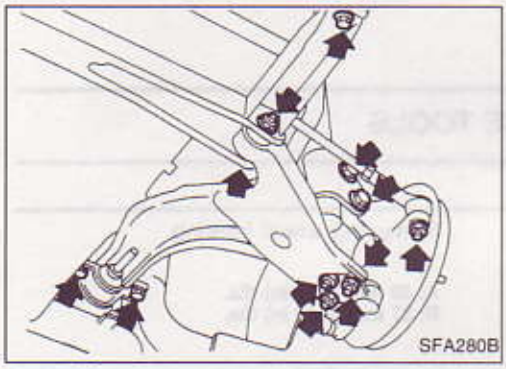
- Shake each front wheel to check for excessive play.

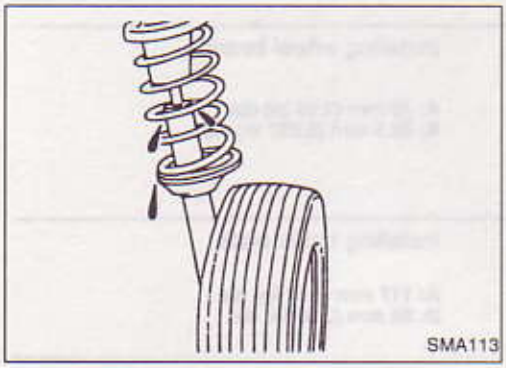

SMA525A


SMA614

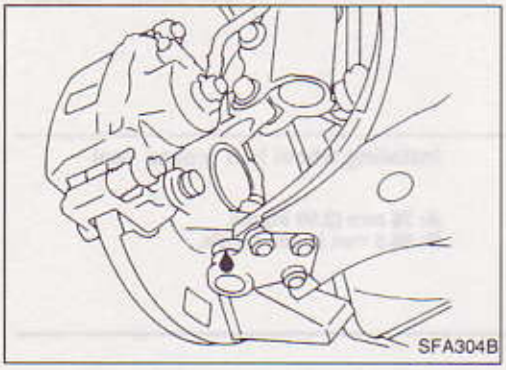
- Make sure that cotter pin of lower ball joint is inserted.
- Retighten all nuts and bolts to the specified torque.

Tightening torque:
Refer to FRONT SUSPENSION.


SFA280B

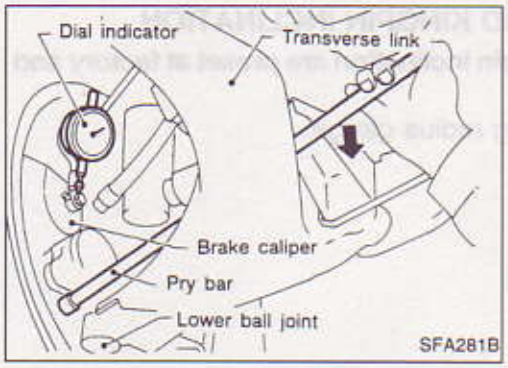

SMA113

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


SFA304B

- Check lower ball joint for grease leakage and ball joint dust cover for cracks or other damage.

Front Axle and Front Suspension Parts (Cont'd)

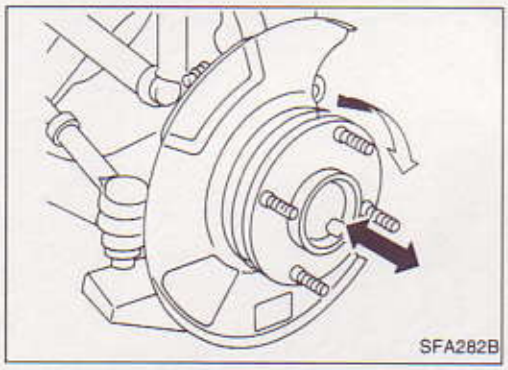


- Check lower ball joint end play.

a. Jack up front of vehicle and place vehicle on safety stands.
b. Clamp dial indicator onto transverse link and place indicator tip on upper 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 inner rim of road wheel.
e. While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play:
0 mm (0 in)

f. If vertical end play is not within specification, replace ball joint and recheck end play.

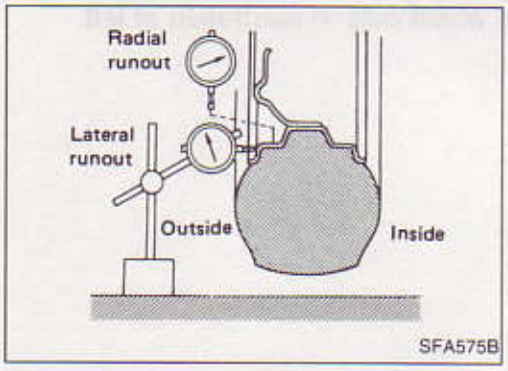


Front Wheel Bearing

- Check that wheel bearings operate smoothly.
- Check axial end play.

Axial end play:
0.05 mm (0.0020 in) or less

- If axial end play is not within specification or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to FRONT AXLE — Wheel Hub and Knuckle.



Front Wheel Alignment

Before checking front wheel alignment, be sure to make a preliminary inspection.

PRELIMINARY INSPECTION

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

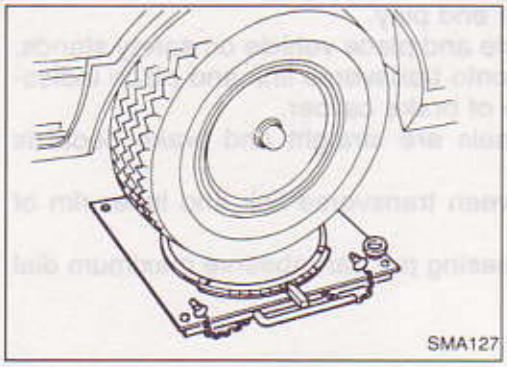
Wheel runout:
Refer to S.D.S.

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.
7. Check vehicle posture (Unladen*).

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

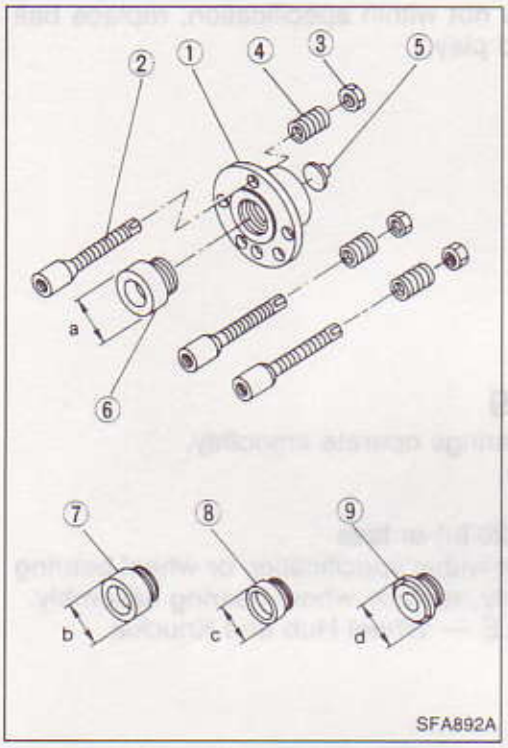
Front Wheel Alignment (Cont'd)

CAMBER, CASTER AND KINGPIN INCLINATION


SMA127

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

1. Set vehicle on turning radius gauge.

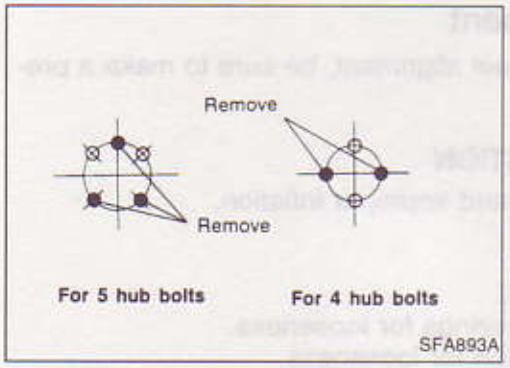


SFA892A

2. Mount Tool as follows.

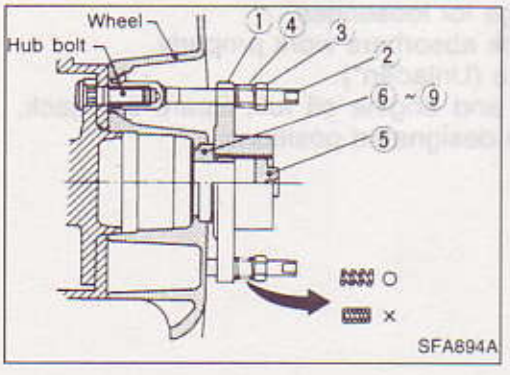
Tool number:
KV991040S0
KV99104010 ① to ⑤
KV99104020 ⑥
KV99104030 ⑦
KV99104040 ⑧
KV99104050 ⑨

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.



SFA893A

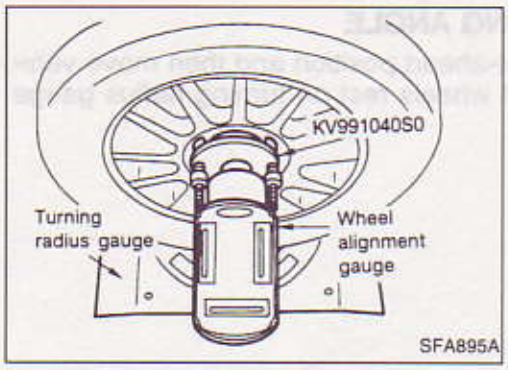
c. Remove the indicated wheel nuts in illustration at left.



SFA894A

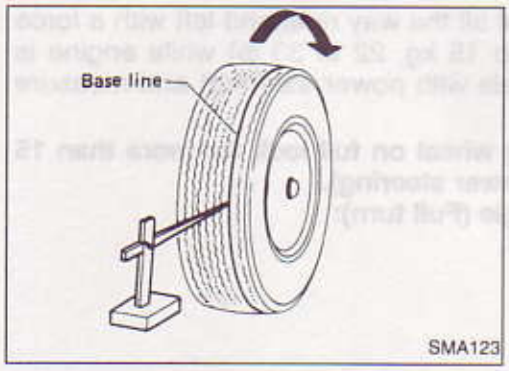
d. Install guide bolts ② to where wheel nuts were removed and tighten them by hand.
e. Install plate and adapter assembly to guide bolts ②.
f. Install springs ④ onto guide bolts ②. Then tighten nuts ③ evenly until a little before springs ④ are completely compressed.
g. Install center plate ⑤.
h. Mount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

Front Wheel Alignment (Cont'd)

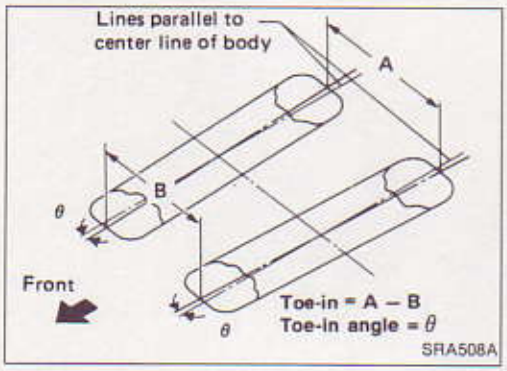


3. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.
   Camber, Caster and Kingpin inclination:
   Refer to S.D.S.
4. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.

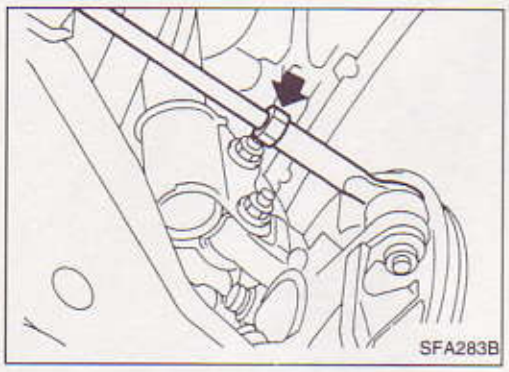
TOE-IN



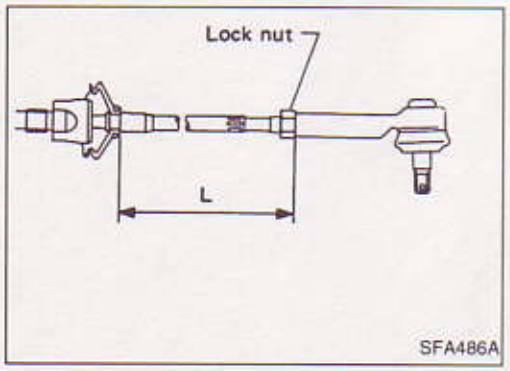
1. Draw a base line on tread surface of tires.
- After lowering front of vehicle, move it up and down to eliminate friction, and set wheels in straight-ahead position.



2. Measure toe-in.
- Measure distance "A" and "B" at same height as hub center.
  Toe-in:
  Refer to S.D.S.



3. Adjust toe-in by varying length of steering tie-rods.
a. Loosen lock nuts.
b. Adjust toe-in by turning tie-rod forward or backward.

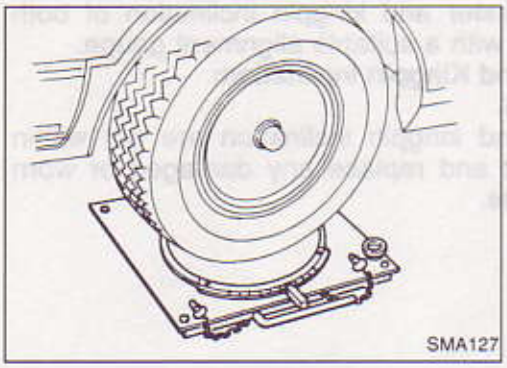


Make sure both tie-rods are the same length.
Standard length "L":
Refer to ST section.

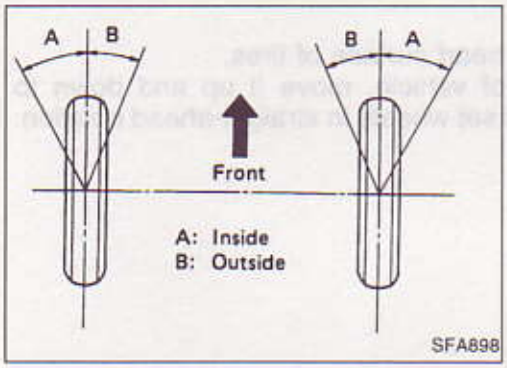
c. Tighten lock nuts to specified torque.
   Lock nut tightening torque:
   Refer to ST section.

Front Wheel Alignment (Cont'd)

FRONT WHEEL TURNING ANGLE



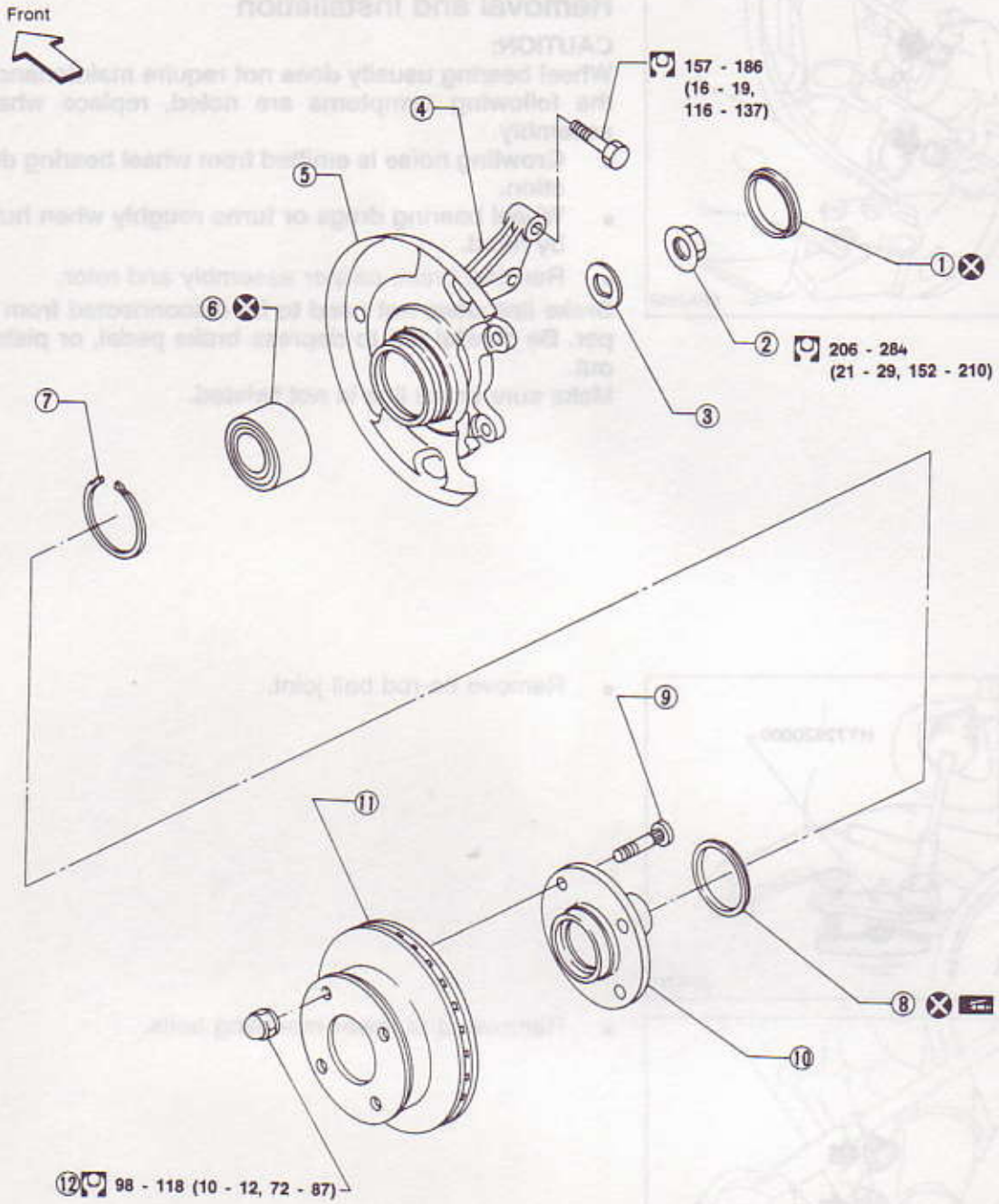
1. Set wheels in straight-ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.



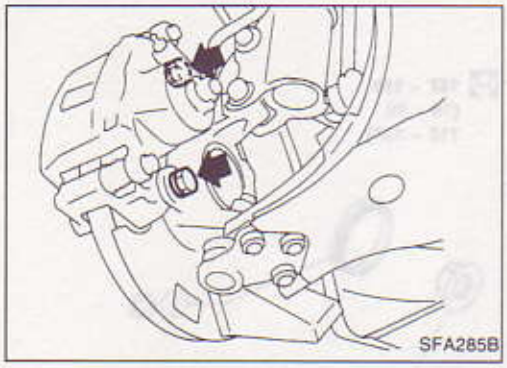
2. Rotate steering wheel all the way right and left with a force of 98 to 147 N (10 to 15 kg, 22 to 33 lb) while engine is running at idle (models with power steering) and measure turning angle.

Do not hold the steering wheel on full lock for more than 15 seconds (models with power steering).

Wheel turning angle (Full turn):
Refer to S.D.S.



① Hub cap
② Wheel bearing lock nut
③ Plain washer
④ Knuckle
⑤ Baffle plate
⑥ Wheel bearing assembly
⑦ Snap ring
⑧ Grease seal
⑨ Wheel bolt
⑩ Wheel hub
⑪ Disc rotor
⑫ Wheel nut



Removal and Installation

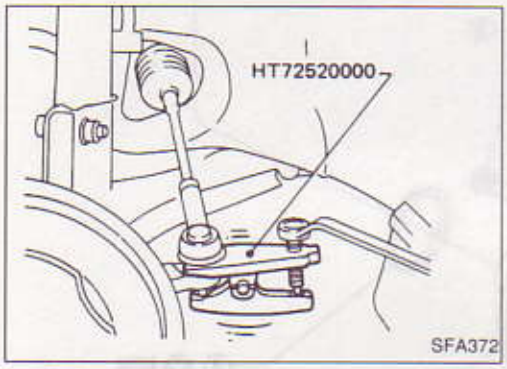
CAUTION:

Wheel bearing usually does not require maintenance. If any of the following symptoms are noted, replace wheel bearing assembly.

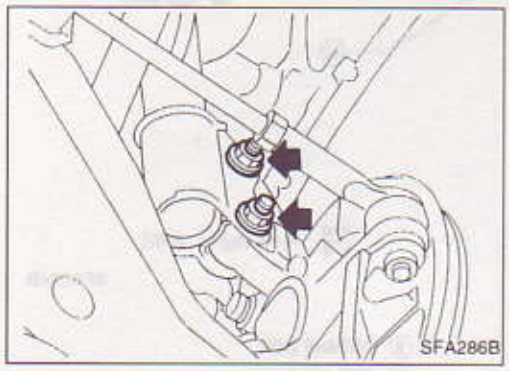
- **Growling noise is emitted from wheel bearing during operation.**
- **Wheel bearing drags or turns roughly when hub is turned by hand.**
- Remove brake caliper assembly and rotor.

Brake line does not need to be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out.

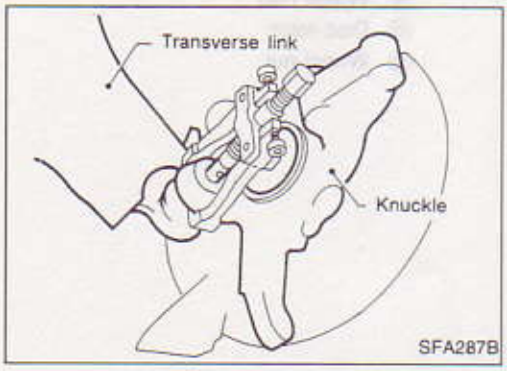
Make sure brake line is not twisted.



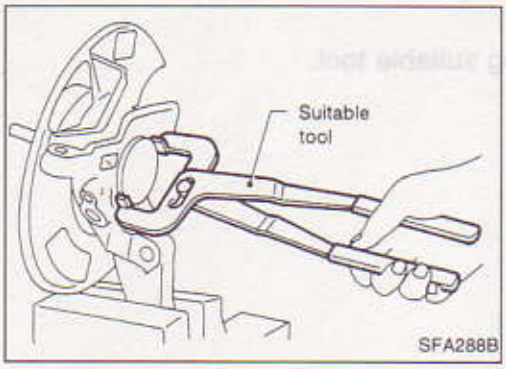
- Remove tie-rod ball joint.



- Remove strut lower mounting bolts.



- Loosen lower ball joint tightening nut.
- Separate knuckle from lower ball joint stud with Tool.
- Remove knuckle from transverse link.



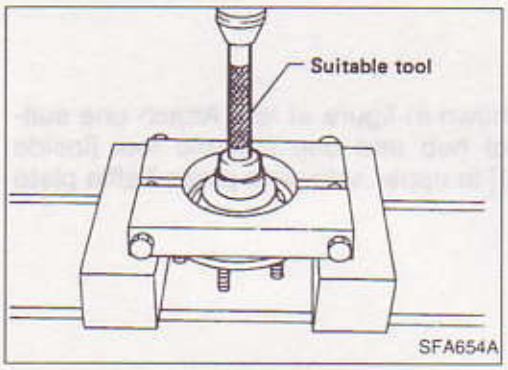
Disassembly

CAUTION:
When removing wheel hub or wheel bearing from knuckle, replace wheel bearing assembly (outer race, inner races and grease seal) with a new one.

- Remove hub cap and wheel bearing lock nut.

WHEEL HUB

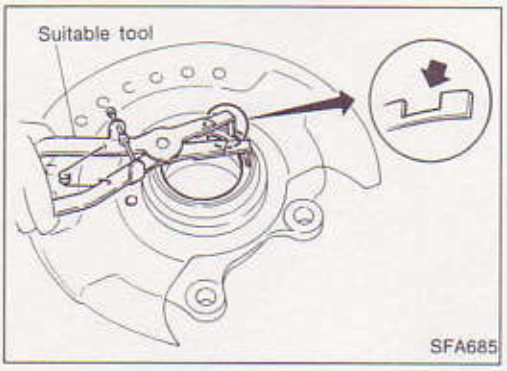
Drive out hub with bearing inner race (outside) from knuckle with a suitable tool.



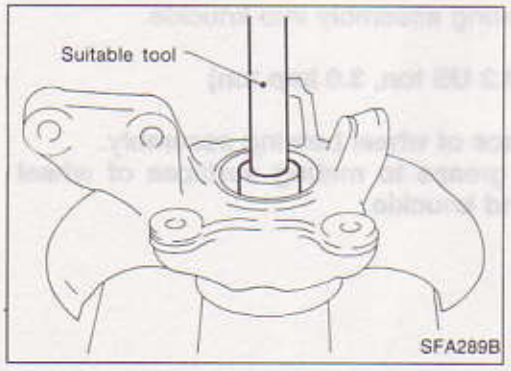
WHEEL BEARING

When replacing wheel bearing, replace wheel bearing assembly (including inner and outer races).

- Remove bearing inner race (outside), then remove outer grease seal.

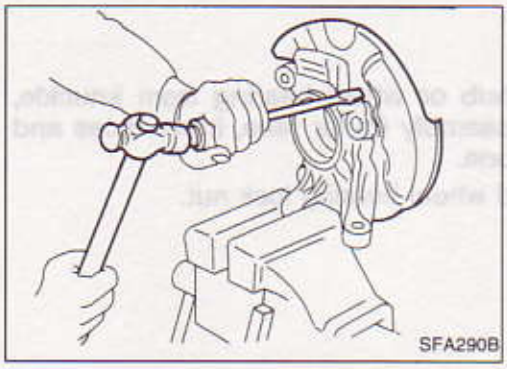


- Remove snap ring.



- Press out bearing outer race.

Disassembly (Cont'd)



BAFFLE PLATE

Remove baffle plate using suitable tool.

Inspection

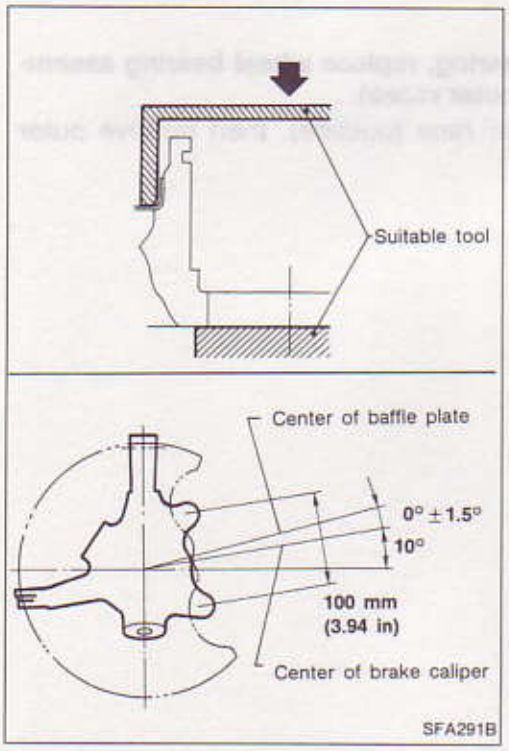
WHEEL HUB AND KNUCKLE

Check wheel hub and knuckle for cracks by using a magnetic exploration or dyeing test.

SNAP RING

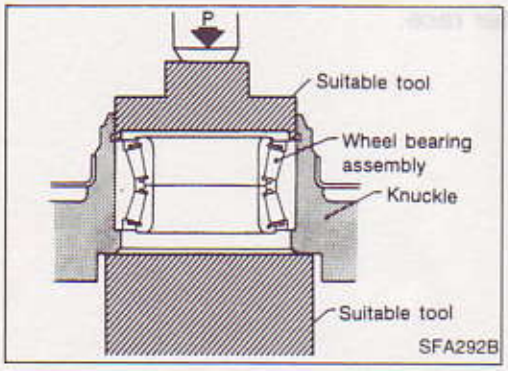
Check snap ring for wear or cracks. Replace if necessary.

Assembly



BAFFLE PLATE

Position baffle plate as shown in figure at left. Attach one suitable tool to lower side of hub and one suitable tool [inside diameter: 98 mm (3.86 in)] to upper side, and press baffle plate into place.

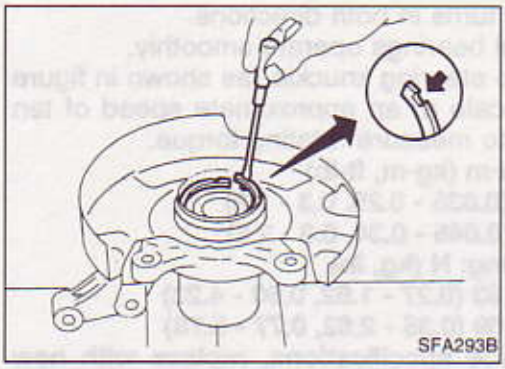


1. Press new wheel bearing assembly into knuckle.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

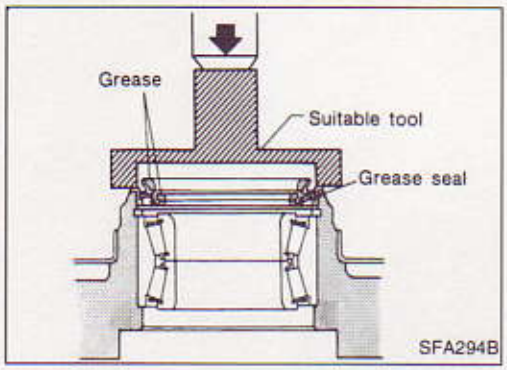
CAUTION:

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

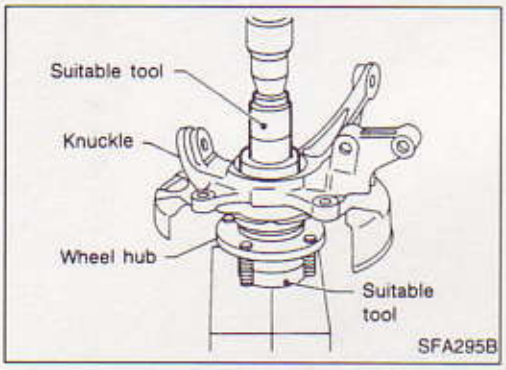
Assembly (Cont'd)



2. Install snap ring into groove of knuckle.



3. Apply multi-purpose grease to grease seal lip.
4. Install grease seal.

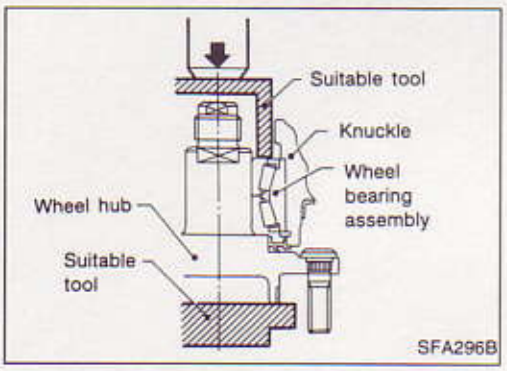


5. Place wheel hub upside-down on a suitable tool.
6. Position knuckle on wheel hub, and press bearing inner race (already fitted to knuckle) on wheel hub by using a suitable tool, as shown at left.

A retainer is installed on wheel bearing to prevent inner race from becoming loose. Always remove retainer before pressing inner race into place.

Maximum load P:
29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

Be careful not to damage grease seal.



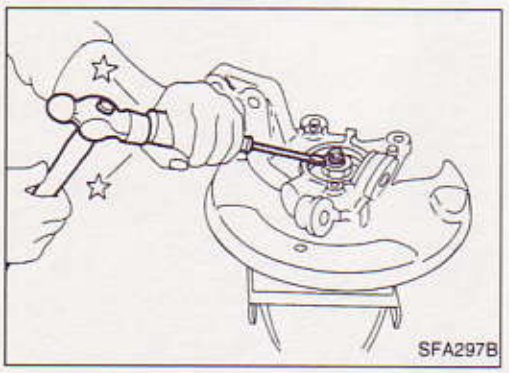
7. Check bearing operation.

a. Add load P with press.

Load P:
34.3 - 49.0 kN
(3.5 - 5.0 ton, 3.9 - 5.5 US ton, 3.44 - 4.92 Imp ton)

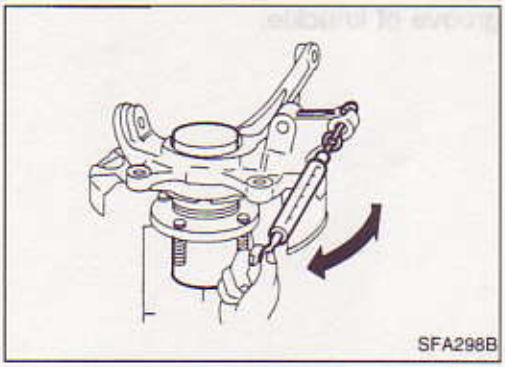
- Install washer on wheel hub and tighten hub nut.

Hub nut tightening torque:
206 - 284 N·m (21 - 29 kg-m, 152 - 210 ft-lb)



- Lock clinch nut using suitable tool as shown in figure at left.
- Install hub cap.

Assembly (Cont'd)

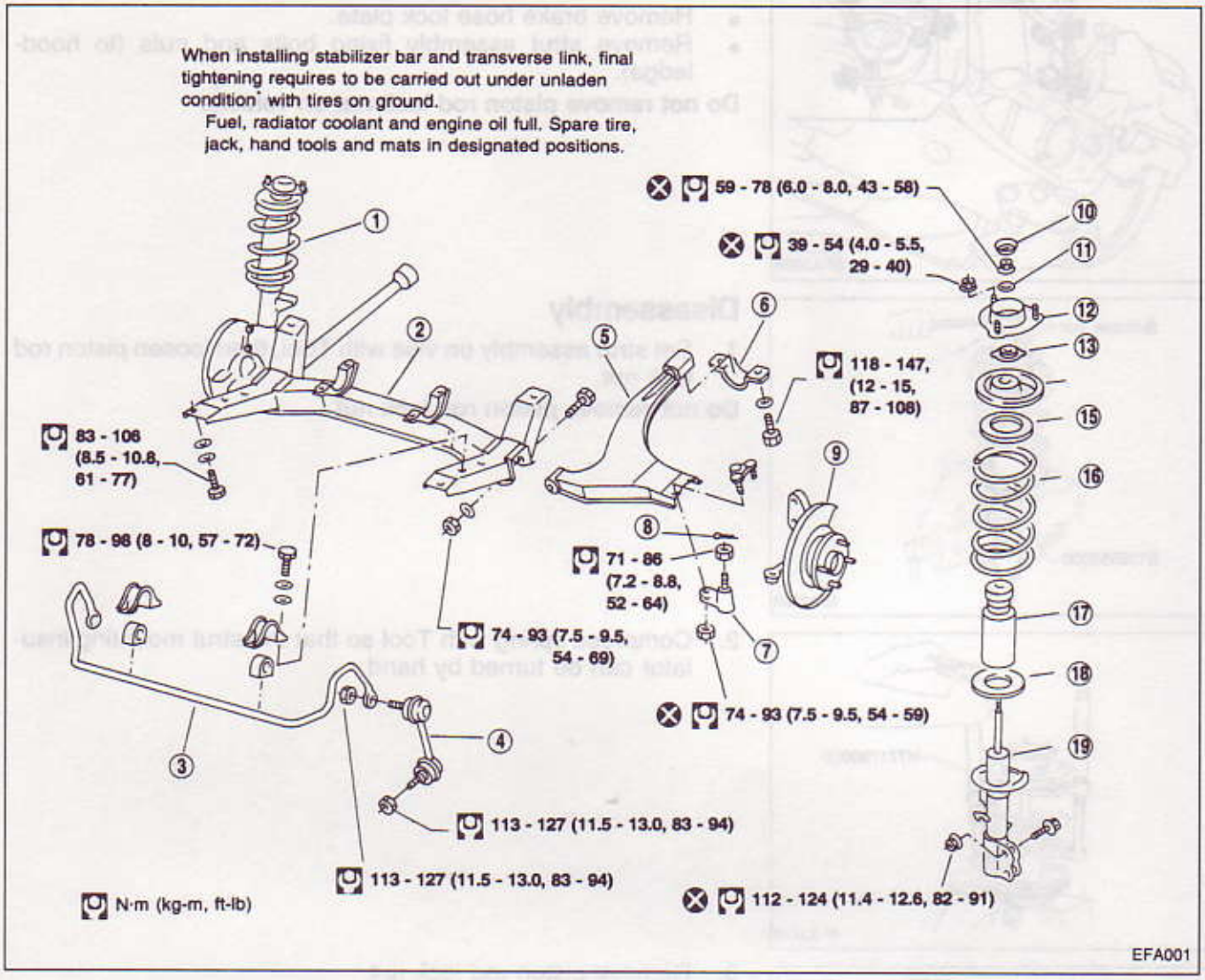

SFA298B

b. Spin knuckle several turns in both directions.
c. Make sure that wheel bearings operate smoothly.
Attach spring scale to steering knuckle (as shown in figure at left). Pull spring scale at an approximate speed of ten rotations per minute to measure rotating torque.

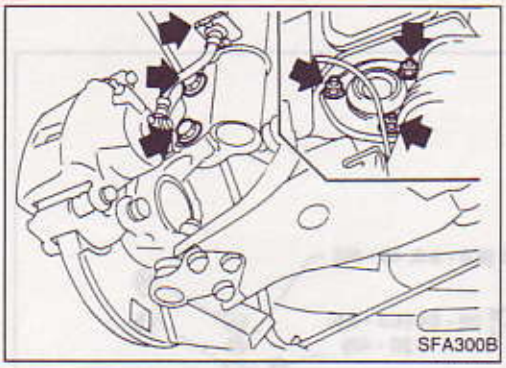
Rotating torque: N·m (kg-m, ft-lb)
NSK 0.3 - 2.5 (0.035 - 0.25, 0.3 - 1.8)
NTN 0.4 - 3.3 (0.045 - 0.34, 0.3 - 2.5)
Spring scale reading: N (kg, lb)
NSK 2.65 - 18.83 (0.27 - 1.92, 0.60 - 4.23)
NTN 3.43 - 25.69 (0.35 - 2.62, 0.77 - 5.78)

If scale reading is outside specifications, replace with new bearing.

Assembly



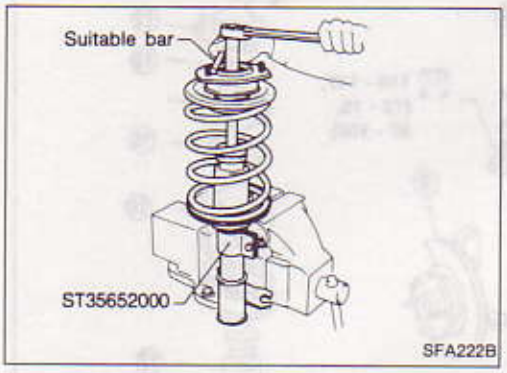
① Strut assembly
② Front suspension member
③ Stabilizer bar
④ Connecting rod
⑤ Transverse link
⑥ Transverse link bushing clamp
⑦ Lower ball joint
⑧ Cotter pin
⑨ Wheel hub assembly
⑩ Cap
⑪ Washer
⑫ Strut mounting insulator
⑬ Lock washer
⑭ Upper spring seat
⑮ Rubber seat
⑯ Coil spring
⑰ Bumper rubber
⑱ Rubber seat
⑲ Strut assembly


SFA300B

Removal and Installation

- Remove brake hose lock plate.
- Remove strut assembly fixing bolts and nuts (to hood-ledge).

Do not remove piston rod lock nut on vehicle.

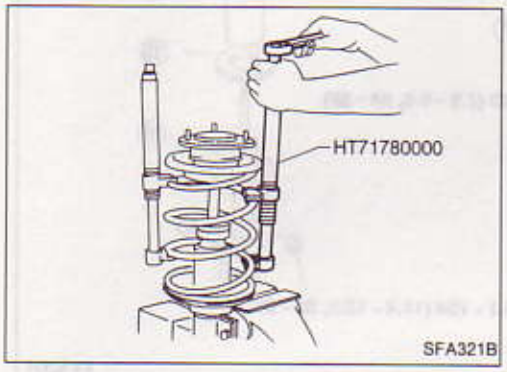


SFA222B

Disassembly

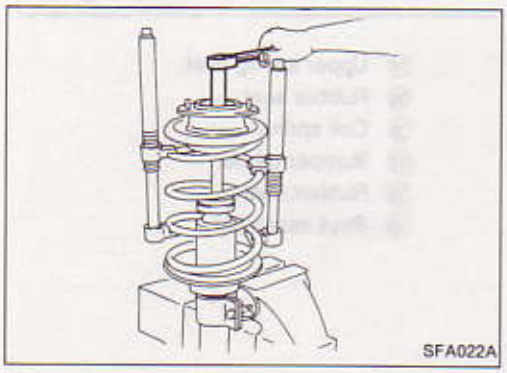
1. Set strut assembly on vise with Tool, then loosen piston rod lock nut.

Do not remove piston rod lock nut.



SFA321B

2. Compress spring with Tool so that the strut mounting insulator can be turned by hand.


SFA022A

3. Remove piston rod lock nut.

Inspection

SHOCK ABSORBER ASSEMBLY

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

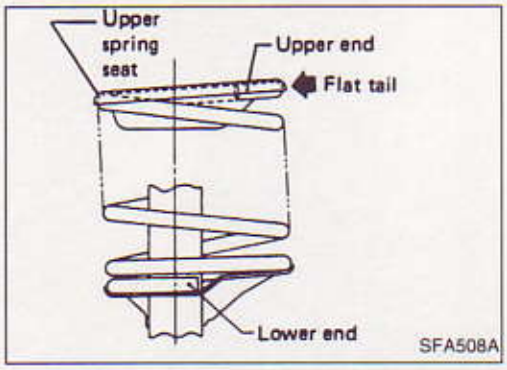
Inspection (Cont'd)

MOUNTING INSULATOR AND RUBBER PARTS

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

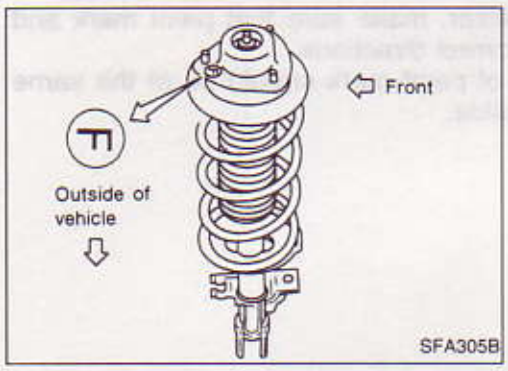
COIL SPRING

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

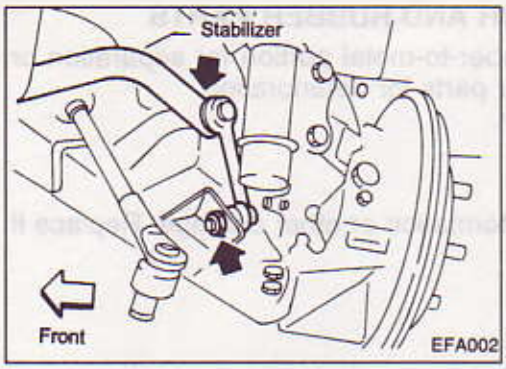


Assembly

- When installing coil spring on strut, it must be positioned as shown in the figure at left.

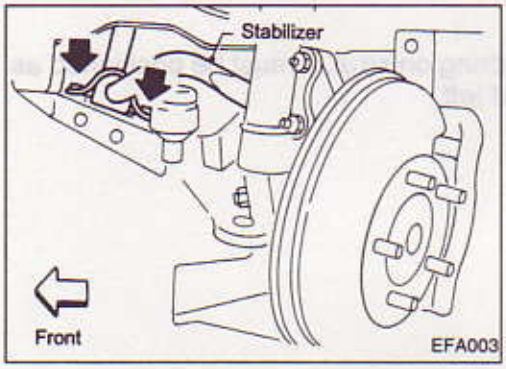


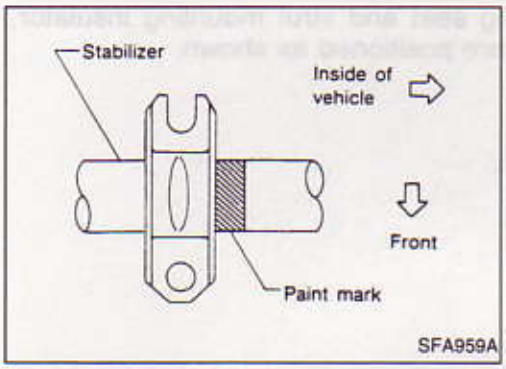
- When installing spring seat and strut mounting insulator, make sure that they are positioned as shown.



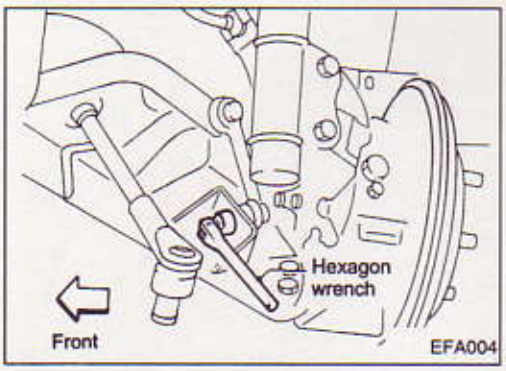
Removal and Installation

- Remove stabilizer bar.

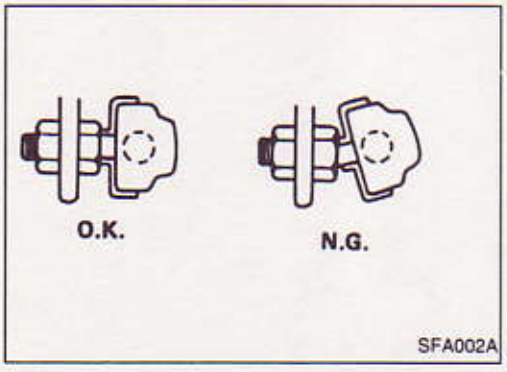




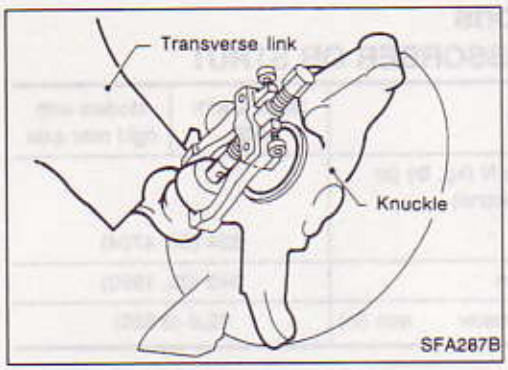
- When installing stabilizer, make sure that paint mark and clamp face in their correct directions.
  Also the visible part of paint mark should be of the same size at left and right side.



- When removing and installing stabilizer bar, fix ball joint with hexagon wrench, as shown at left.

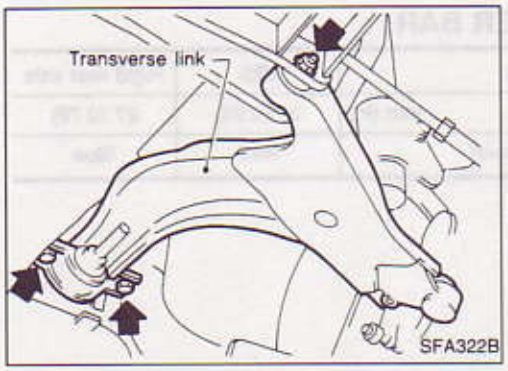


- Install stabilizer bar with ball joint socket properly placed.

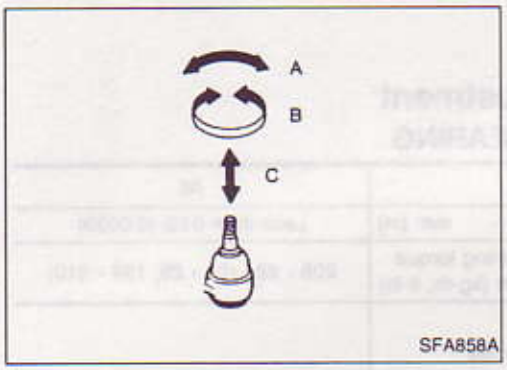


Removal and Installation

1. Separate lower ball joint stud from knuckle with Tool. Refer to FRONT AXLE — Wheel Hub and Knuckle.



2. Remove bolts and nuts as shown at left.



Inspection

- Check ball joint for play. See also "Front Axle and Front Suspension Parts" in "ON-VEHICLE SERVICE". 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 "A":
  (measuring point: cotter pin hole of ball stud):
  7.8 - 57.9 N (0.8 - 5.9 kg, 1.8 - 13.0 lb)
  Turning torque "B":
  0.5 - 3.4 N·m (5 - 35 kg-cm, 4.3 - 30.4 in-lb)
  Vertical end play "C":
  0 mm (0 in)
- Check dust cover for damage. Replace it together with cover clamp if necessary.

General Specifications

SUSPENSION

Suspension type	Strut type independent suspension

COIL SPRING

Applied model	SR20DE	LD20-II		GA16DE
	I.R.S.		Rigid rear axle	
Wire diameter mm (in)	14.2 (0.559)	14.7 (0.579)	14.2 (0.559)	14.0 (0.551)
Coil outer diameter mm (in)	173 (6.811)	173 (6.811)	173 (6.811)	173 (6.811)
Free length mm (in)	294.0 (11.575)	309.0 (12.165)	315.5 (12.421)	304.5 (14.350)
Spring constant N/mm (kg/mm, lb/in)	29.8 (3.04, 170)-33.0 (3.37, 188)	29.8 (3.04, 170)-33.0 (3.37, 188)	27.5 (2.80, 157) - 30.5 (3.11, 174)	27.5 (2.80, 157) - 30.5 (3.11, 174)
Identification color	Orange x 1 Pink x 1	Pink x 1 Pink x 1	Blue x 1 Pink x 1	White x 1 Pink x 1

SHOCK ABSORBER OR STRUT

Applied model	Models with IRS	Models with rigid rear axle
Damping force N (kg, lb) {at 0.3m (1.0ft)/second}		
Expansion	824 (84, 4704)	
Compression	343 (35, 1960)	
Piston rod diameter mm (in)	22.0 (0.866)	

STABILIZER BAR

Applied model	IRS	Rigid rear axle
Bar diameter mm (in)	30 (0.98)	27 (0.79)
Identification color	Red	Blue

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Applied model	IRS (SR20)	IRS (LD20)	Rigid	
Camber degree	−0°30′ to 1°00′			
Caster degree	2°05′ to 3°35′			
Kingpin inclination degree	12°45′ - 14°15′			
Toe-in				
A − B mm (in)	3.1 - 5.1 (0.122 - 0.201)	2.8 - 4.8 (0.110 - 0.189)	3.5 - 5.5 (0.138 - 0.216)	
Angle θ degree	8′ - 14′	7′ - 13′	9′ - 15′	
Front wheel turning angle			P/S	M/S
Full turn*2 degree			37°30′ to 39°30′	40° to 42°
Inside	37°30′ to 39°30′			
Outside	32° - 34°		32° to 34°	34° to 36°

*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) is 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine at idle.

WHEEL BEARING

Applied model	All
Axial end play mm (in)	Less than 0.05 (0.0020)
Lock nut tightening torque N·m (kg-m, ft-lb)	206 - 284 (21 - 29, 152 - 210)
Preload	
Rotating torque N·m (kg-m, ft-lb)	
NSK	0.3 - 2.5 (0.035 - 0.25, 0.3 - 1.8)
NTN	0.4 - 3.3 (0.045 - 0.34, 0.3 - 2.5)
Spring scale reading N (kg, lb)	
NSK	2.65 - 18.83 (0.27 - 1.92, 0.60 - 4.23)
NTN	3.43 - 25.69 (0.35 - 2.62, 0.77 - 5.78)

LOWER BALL JOINT

Applied model	All
Axial end play mm (in)	0 (0)
Swinging force N (kg, lb)	
At cotter pin hole	7.8 - 57.9 (0.8 - 5.9, 1.8 - 13.0)
Rotating torque N·m (kg-cm, in-lb)	0.5 - 3.4 (5 - 35, 4.3 - 30.4)

WHEEL RUNOUT

Wheel type		Steel wheel
Maximum radial runout limit	mm (in)	0.5 (0.020)
Maximum lateral runout limit	mm (in)	0.8 (0.031)