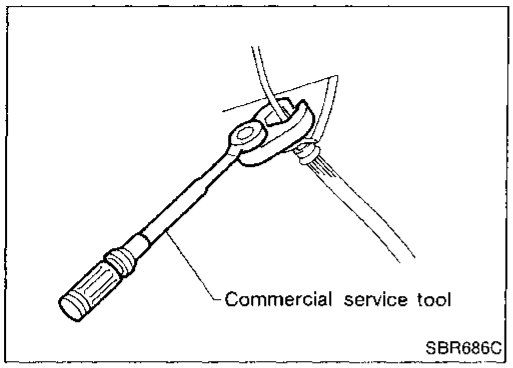
FRONT AXLE & FRONT SUSPENSION

SECTION FA

CONTENTS

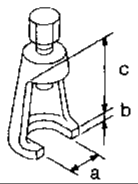
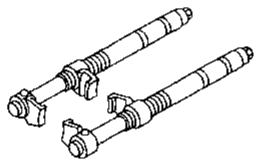
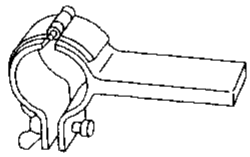
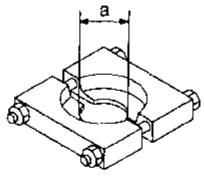


Precautions

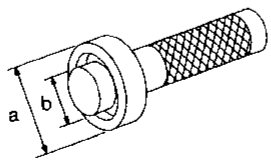
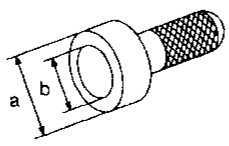
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  *** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**

Special Service Tools

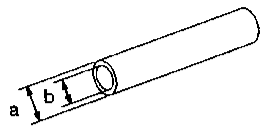
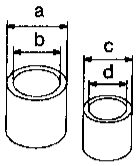
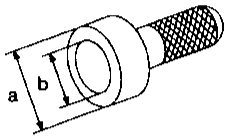
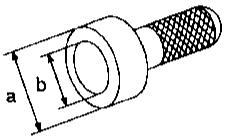
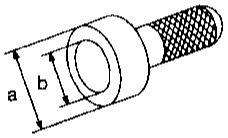
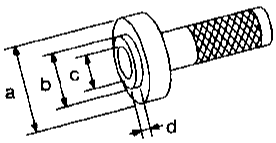
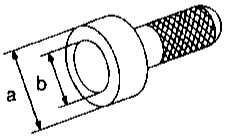
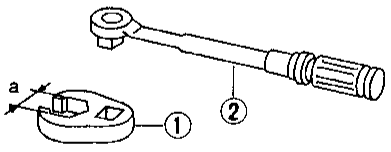
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Steering gear arm puller	 NT551	Removing tie-rod ball joint and lower ball joint **a: 34 mm (1.34 in) b: 6.5 mm (0.256 in) c: 61.5 mm (2.421 in)**
HT71780000 (—) Spring compressor	 NT144	Removing and installing coil spring
ST35652000 (—) Shock absorber attachment	 NT145	Fixing shock absorber
ST30031000 (J22912-01) Bearing inner race puller	 NT412	Removing bearing inner race **a: 50 mm (1.97 in) dia.**

Commercial Service Tools

Tool name	Description	
Wheel bearing drift	 NT084	Removing wheel bearing **a: 60 mm (2.36 in) dia. b: 37 mm (1.46 in) dia.**
Wheel bearing drift	 NT115	Installing wheel bearing **a: 75 mm (2.95 in) dia. b: 65 mm (2.56 in) dia.**

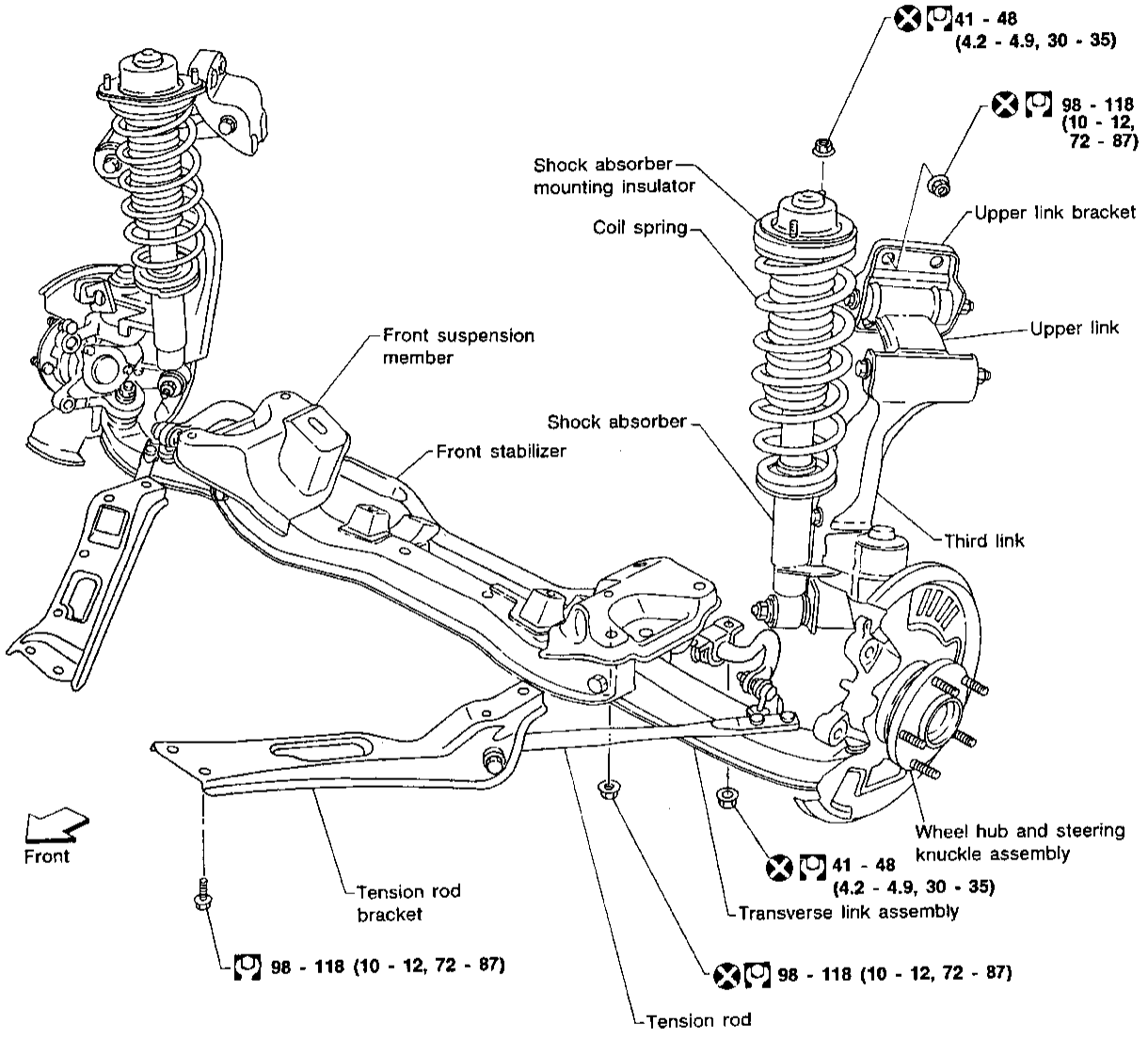
Commercial Service Tools (Cont'd)

Tool name	Description	
Baffle plate drift	 NT065	Installing baffle plate **a: 125 mm (4.92 in) dia.** **b: 106 mm (4.17 in) dia.**
Tension rod bushing drift	 NT155	Removing and installing tension rod bushing **a: 78 mm (3.07 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.**
Grease seal drift	 NT115	Installing wheel hub grease seal **a: 86 mm (3.39 in) dia.** **b: 76 mm (2.99 in) dia.**
Cap drift	 NT115	Installing kingpin cap **a: 60 mm (2.36 in) dia.** **b: 52 mm (2.05 in) dia.**
Bearing drift	 NT115	Installing kingpin lower bearing **a: 57 mm (2.24 in) dia.** **b: 50 mm (1.97 in) dia.**
Bearing drift	 NT156	Installing kingpin upper bearing **a: 57 mm (2.24 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 40 mm (1.57 in) dia.** **d: 2.5 mm (0.098 in)**
Grease seal drift	 NT115	Installing kingpin grease seal **a: 68 mm (2.68 in) dia.** **b: 58 mm (2.28 in) dia.**
① Flare nut crows foot ② Torque wrench	 NT360	Removing and installing brake piping **a: 10 mm (0.39 in)**

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.**



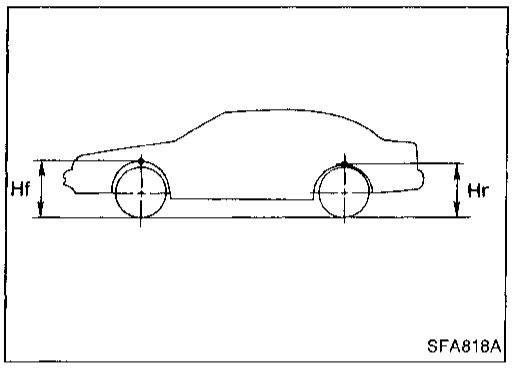
: N•m (kg-m, ft-lb)

SFA860AA

Front Axle and Front Suspension Parts

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

- Retighten all nuts and bolts to the specified torque.
  Tightening torque: Refer to FRONT SUSPENSION (FA-13).
- Make sure that cotter pin is inserted.

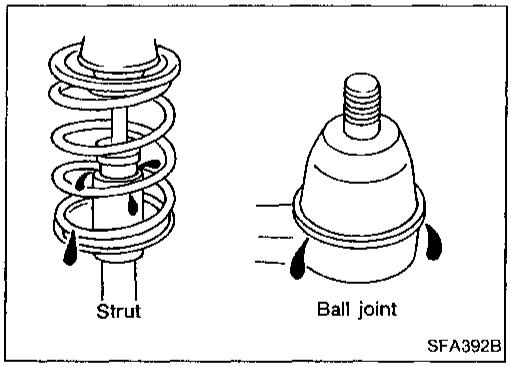


- Check wheelarch height from the ground.

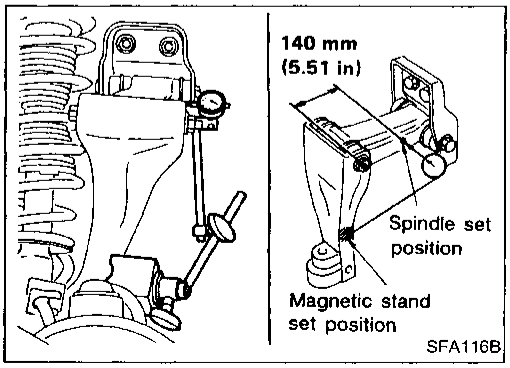
(1) Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).
* Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

(2) Bounce the vehicle up and down several times before measuring.
Standard height:
Front (Hf)
705 mm (27.76 in)
Rear (Hr)
696 mm (27.40 in)

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



- Check shock absorber for oil leakage or other damage.
- Check suspension lower ball joint and tie-rod ball joint for grease leakage, and dust cover for cracks or other damage.



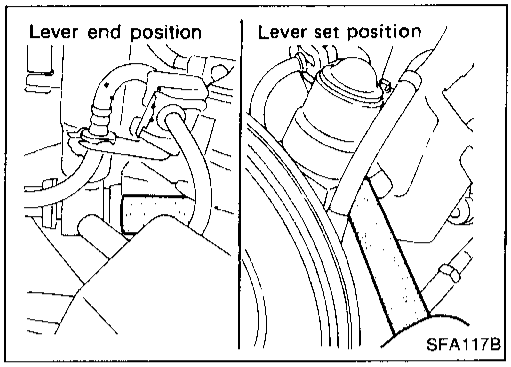
- Check upper link free play.

(1) Jack up front of vehicle and set stands.
(2) Set steering wheel in straight-forward direction and lock it using key lock.
(3) Remove front wheels.

On axle side

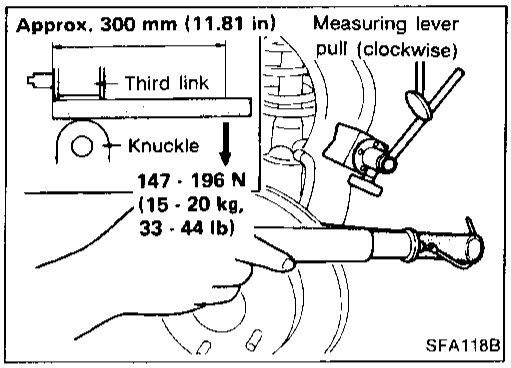
(4) Install dial gauge.
a. Install magnet stand on third link.
b. Set dial gauge in position.
Set dial gauge spindle in contact with flat surface of upper link. Set at 140 mm (5.51 in) from center of upper link retaining bolt on the third link side. (Reset the dial gauge.)

Front Axle and Front Suspension Parts (Cont'd)



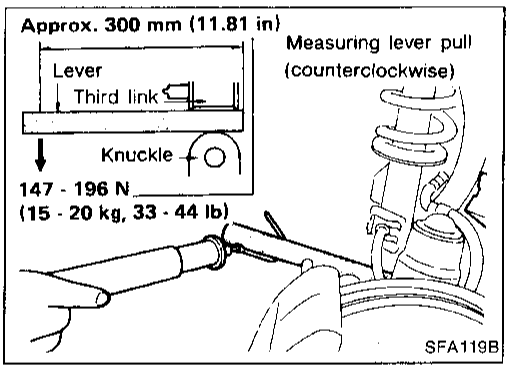
(5) Install lever.
Insert lever [30 mm (1.18 in) outside dia., 350 mm (13.78 in) long, approx.] between lower end of third link and kingpin location.

Make sure lever does not interfere with splash guard, brake hoses, etc., when set in position.



— Free play in direction "A" —

Attach spring scale to lever tip. Pull spring scale with a force of 147 to 196 N (15 to 20 kg, 33 to 44 lb) and then read dial gauge indication.

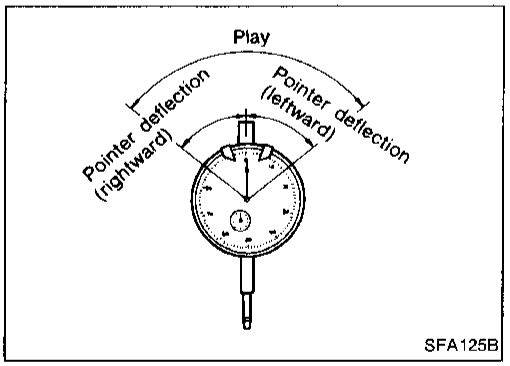


— Free play in direction "B" —

With dial gauge held in position, invert lever. Attach spring scale to lever tip. Pull spring scale with a force of 147 to 196 N (15 to 20 kg, 33 to 44 lb) and then read dial gauge indication.

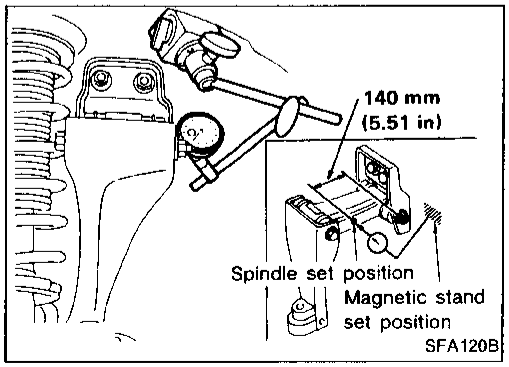
Free play = (Gauge pointer deflection in direction "A") + (Gauge pointer deflection in direction "B")

Allowable free play range:
5.0 mm (0.197 in), max.



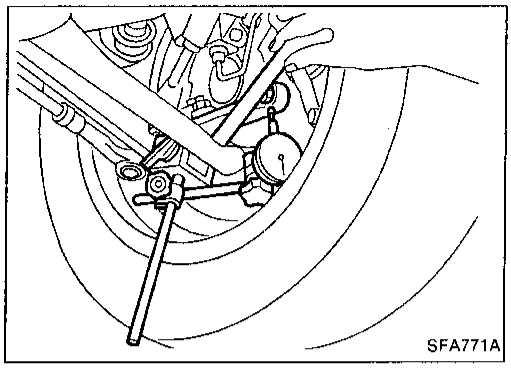
On body side

(6) Install dial gauge.
a. Install magnet stand on hoodledge wheelhouse side.
b. Set dial gauge in position.
Set dial gauge spindle in contact with flat surface of upper link. Set at 140 mm (5.51 in) from center of upper link retaining bolt on bracket side. (Reset the dial gauge.)



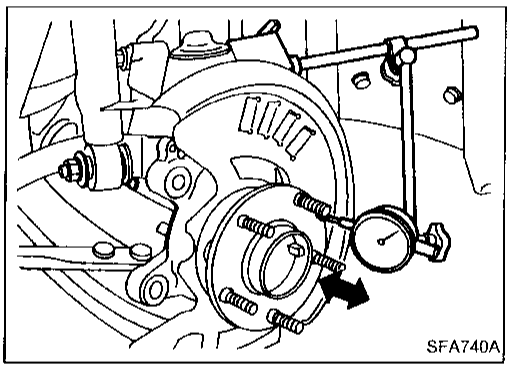
(7) Follow the same procedures for setting lever and measuring free play as those outlined under "On axle side" above.
Allowable free play range: 5.0 mm (0.197 in), max.
(8) If free play exceeds specifications, replace upper link assembly.

Front Axle and Front Suspension Parts (Cont'd)


SFA771A

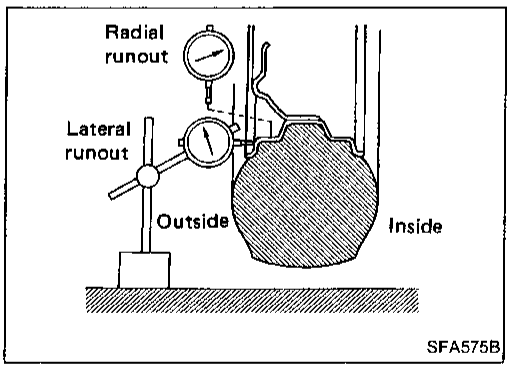
- Check suspension ball joint end play.

(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 pushing and releasing pry bar, observe maximum dial indicator value.
Vertical end play: 0 mm (0 in)
(6) If not to above specification, remove and recheck it.


SFA740A

Front Wheel Bearing

- Check wheel bearings for smooth operation.
- Check axial end play.
Axial end play: 0.05 mm (0.0020 in) or less
- If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to FRONT AXLE — Wheel Hub and Steering Knuckle (FA-9).



SFA575B

Front Wheel Alignment

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

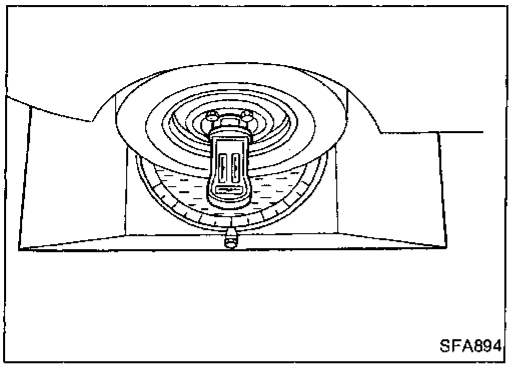
* "Unladen": Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

PRELIMINARY INSPECTION

Make the following checks. Adjust, repair or replace if necessary.

- Check tires for wear and improper inflation.
- Check front wheel bearings for looseness.
- Check wheel runout.
Wheel runout:
Refer to SDS (FA-20).
- Check front suspension for looseness.
- Check steering linkage for looseness.
- Check that front shock absorbers work properly.
- Check vehicle posture (Unladen).

Front Wheel Alignment (Cont'd)


SFA894

CAMBER, CASTER AND KINGPIN INCLINATION

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

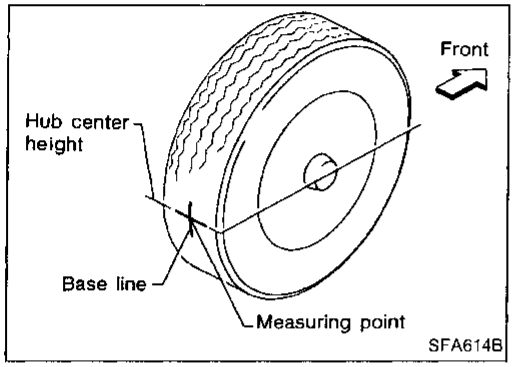
1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.
   Camber, Caster and Kingpin inclination:
   Refer to SDS (FA-20).
2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts.

TOE-IN

Measure toe-in using the following procedure.
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 front of vehicle up and down to stabilize the posture.
2. Push the vehicle straight ahead about 5 m (16 ft).
3. Put a mark on base line of tread (rear side) of both tires at the same height as hub center. These are measuring points.

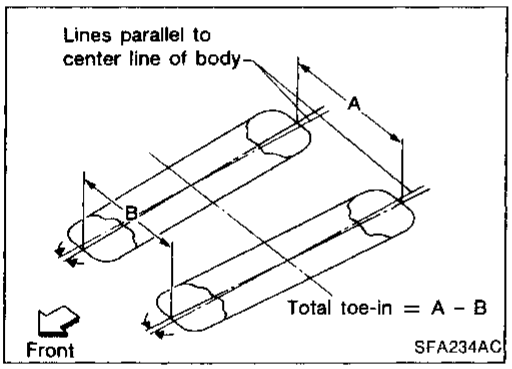


SFA614B

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 (FA-20).



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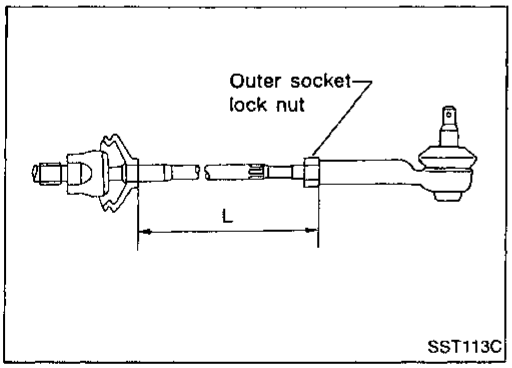
7. Adjust toe-in by varying length of steering tie-rods.
(1) Loosen lock nuts.
(2) Adjust toe-in by turning tie-rod forward or backward.

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

(3) Tighten lock nuts to the specified torque.
Lock nut tightening torque:
Refer to ST section



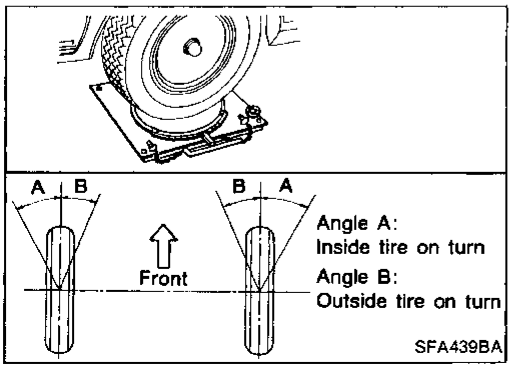
SST113C

FRONT WHEEL TURNING ANGLE

1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly.
2. Rotate steering wheel fully to the right or 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 (FA-20).



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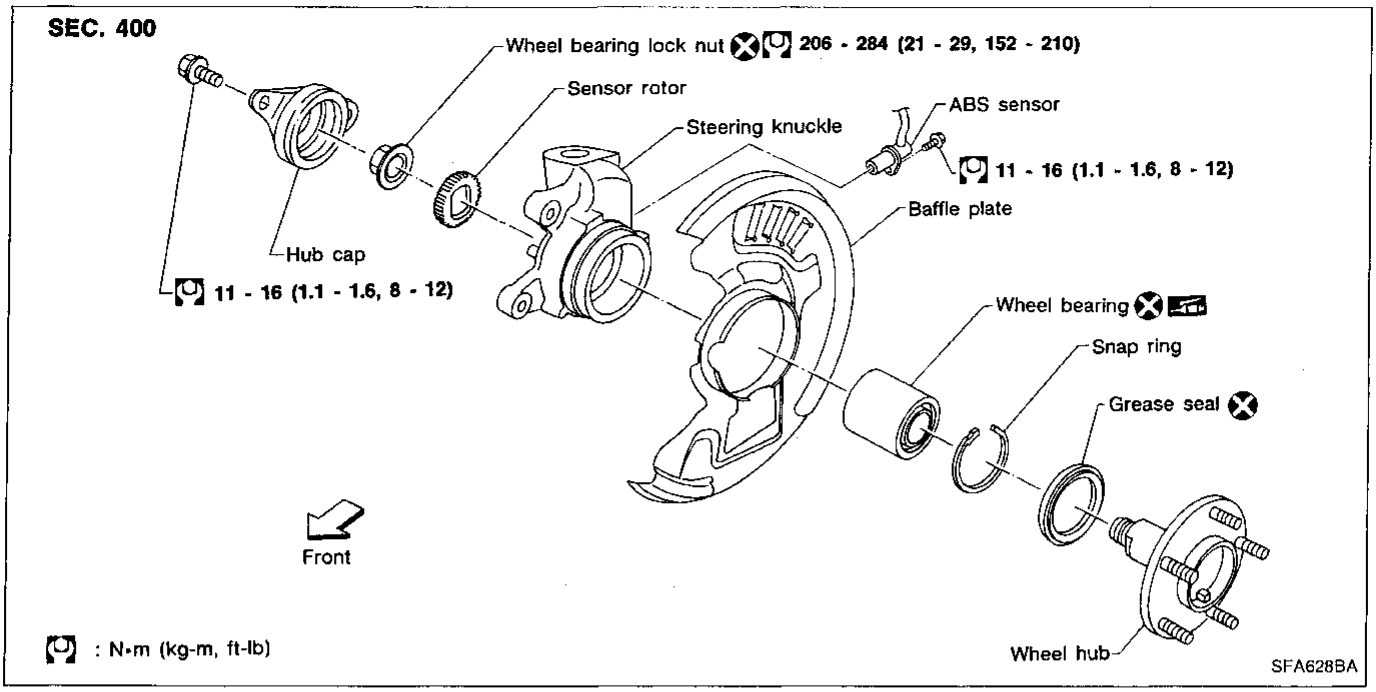


Wheel Hub and Steering Knuckle

REMOVAL

CAUTION:

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

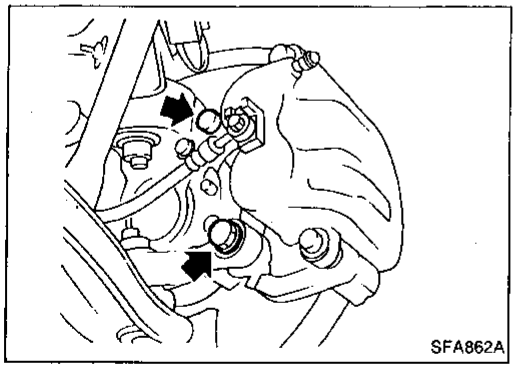
- **Growling noise is emitted from wheel bearing during operation.**
- **Wheel bearing drags or turns roughly when hub is turned by hand.**

Before removing the front axle assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the front axle assembly area. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.

- Remove brake caliper assembly and rotor.

Brake line need not be disconnected from brake caliper. In this case, suspend caliper assembly with wire so as not to stretch brake hose. Be careful not to depress brake pedal, or piston will pop out.

Make sure brake hose is not twisted.

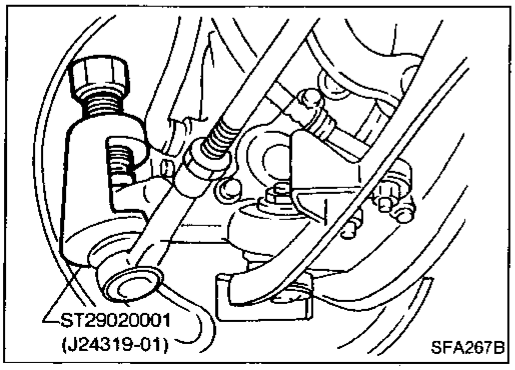


- Remove tie-rod ball joint and lower ball joint with Tool.

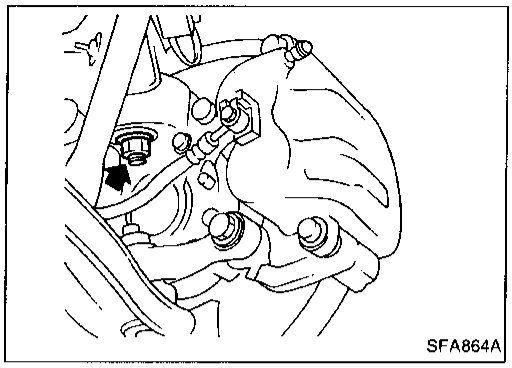
CAUTION:

Steering knuckle is made from aluminum alloy.

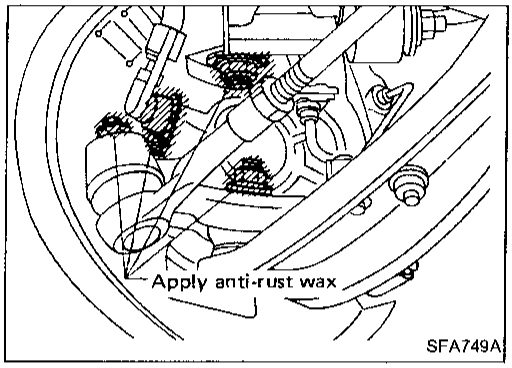
Be careful not to hit steering knuckle.



Wheel Hub and Steering Knuckle (Cont'd)

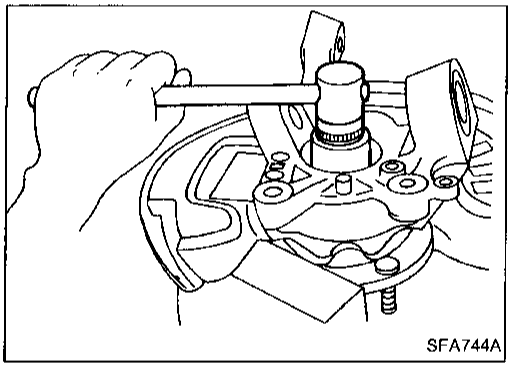


- Remove kingpin lower nut then remove steering knuckle assembly.



INSTALLATION

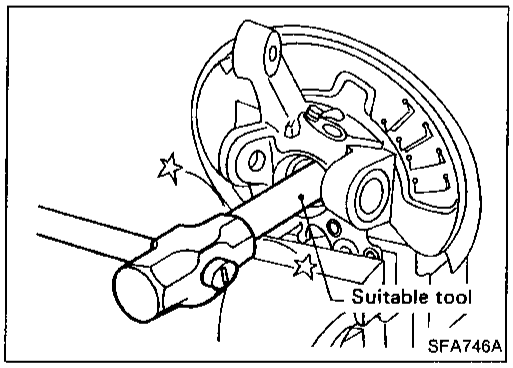
- Install steering knuckle assembly.
- Apply anti-rust wax as follows:
  - Portions around lower ball joint connections
  - Portions around tie-rod ball joint connections
  - Portions around kingpin lower nut location
  - Portions around ABS sensor connection



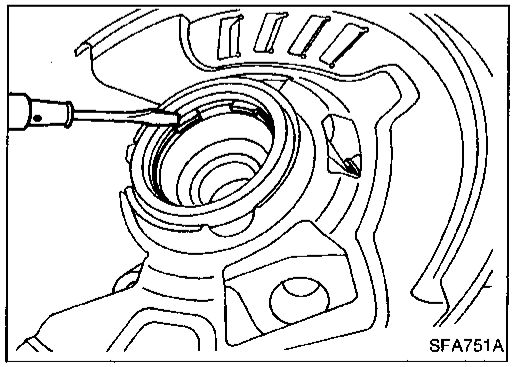
DISASSEMBLY

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

- Remove hub cap and wheel bearing lock nut.

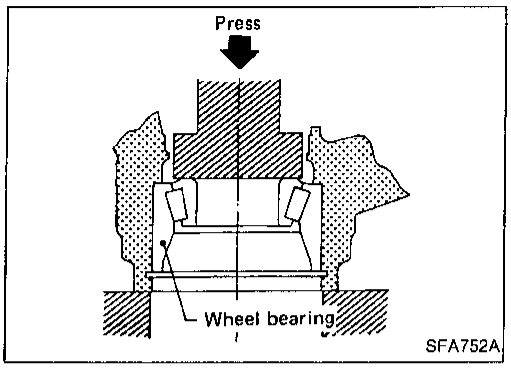


- Remove wheel hub with a suitable tool.

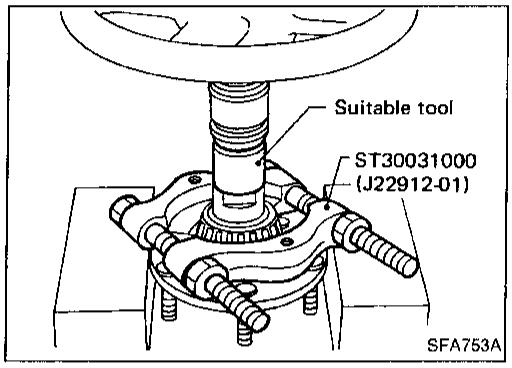


- Remove circular clip with a suitable tool.

Wheel Hub and Steering Knuckle (Cont'd)



- Press out wheel bearing assembly from steering knuckle.



- Drive out wheel bearing inner race (to outside) from wheel hub, then remove grease seal.

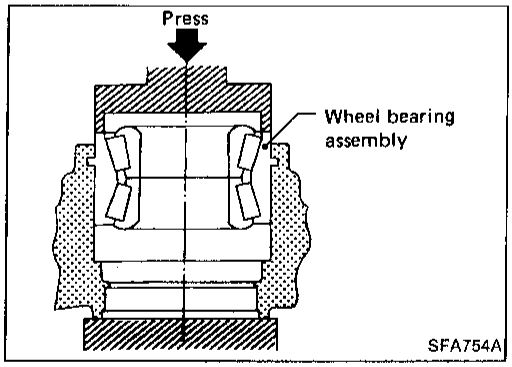
INSPECTION

Wheel hub and steering knuckle

Check wheel hub and steering knuckle for any cracks.

Circular clip

Check circular clip for wear or cracks.
Replace if necessary.

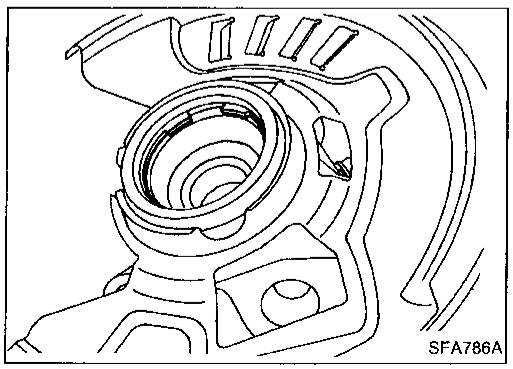


ASSEMBLY

1. Press new wheel bearing assembly into steering knuckle from outside of steering knuckle.
   Maximum load P:
   34.3 kN (3.5 ton, 3.9 US ton, 3.44 Imp ton)

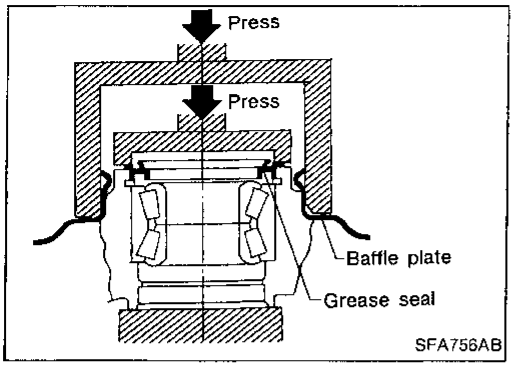
CAUTION:

- **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.**

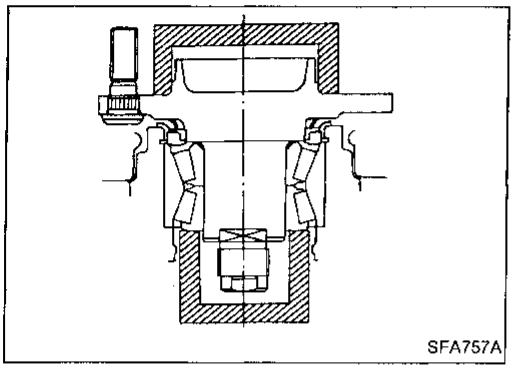


2. Install circular clip into groove of steering knuckle.

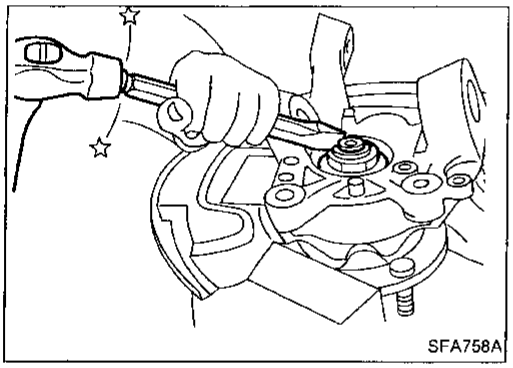
Wheel Hub and Steering Knuckle (Cont'd)



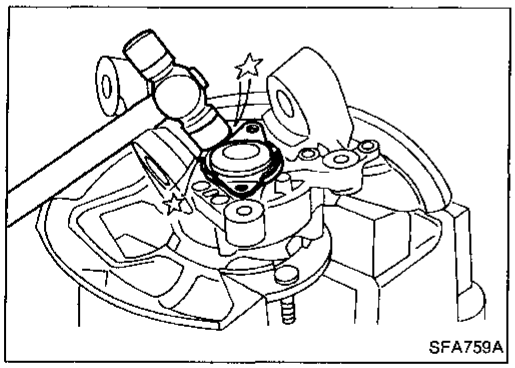
3. Apply multi-purpose grease to sealing lip.
4. Install grease seal.
   Maximum load P:
   10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)
5. Install baffle plate.



6. Press wheel hub into steering knuckle.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)
7. Tighten wheel bearing lock nut to the specified torque.
   [O]: 206 - 284 N·m (21 - 29 kg-m, 152 - 210 ft-lb)
8. Check that wheel bearings operate smoothly.



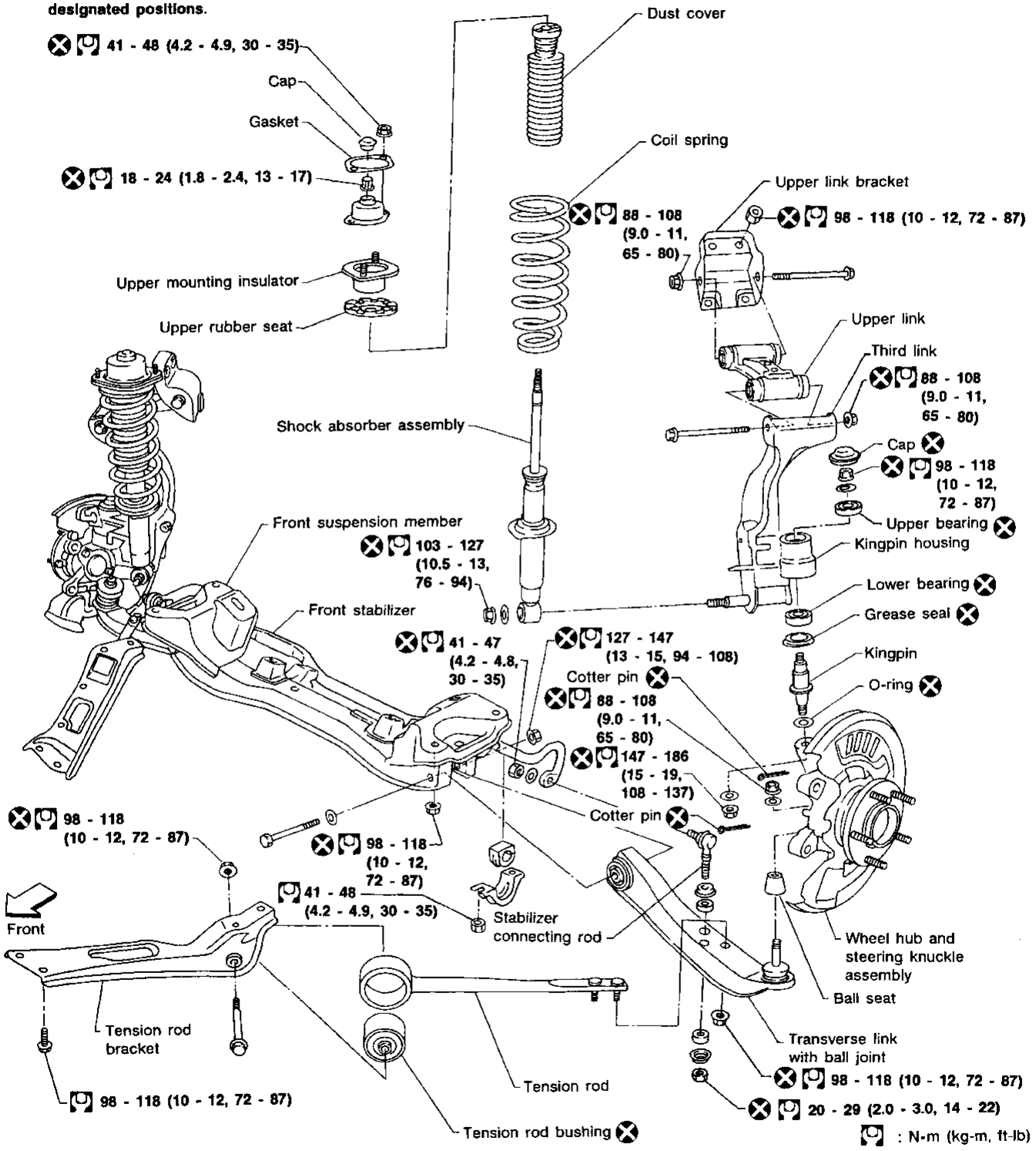
9. Stake wheel bearing lock nut.



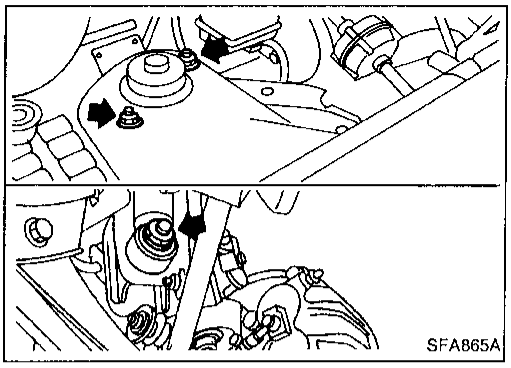
10. Install hub cap.
    Drive hub cap onto steering knuckle by lightly tapping with a plastic hammer. After hub cap is in close contact with steering knuckle, tighten bolts.

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.**



SFA629BA

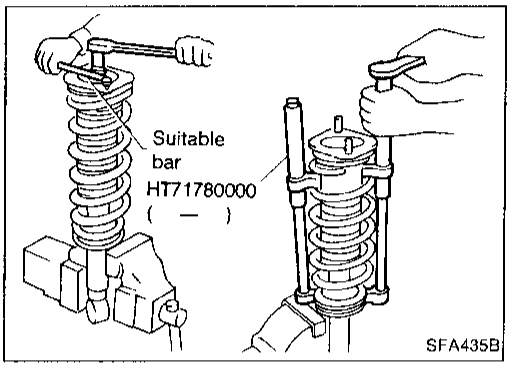


Coil Spring and Shock Absorber

REMOVAL

Remove shock absorber fixing nuts.

Do not remove piston rod lock nut on vehicle.

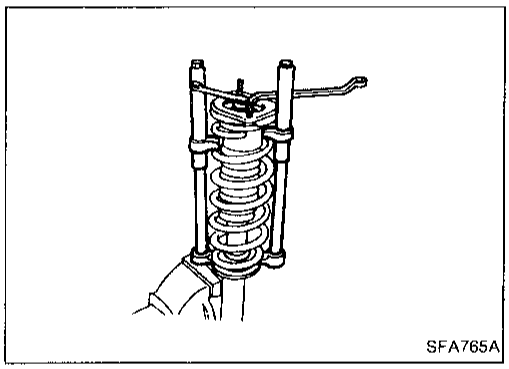


DISASSEMBLY

1. Set shock absorber on vise with Tool, then **loosen** piston rod lock nut.

Do not remove piston rod lock nut at this time.

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



3. Remove piston rod lock nut.

INSPECTION

Shock absorber assembly

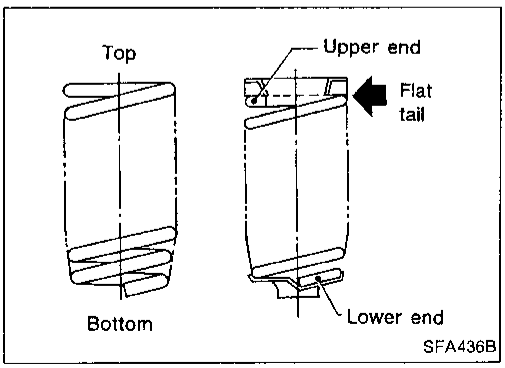
- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage occurring on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

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, be careful not to reverse top and bottom direction. (Top end is flat.)
- When installing coil spring on shock absorber, it must be positioned as shown in figure at left.

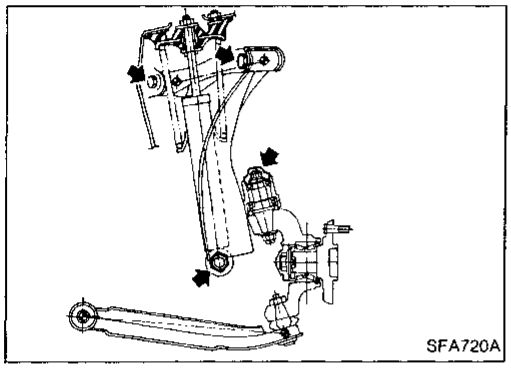
Third Link and Upper Link

REMOVAL

CAUTION:

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

- **Growling noise is emitted from kingpin bearing during operation.**
- **Kingpin bearing drags or turns roughly when steering knuckle is turned by hand.**


SFA720A

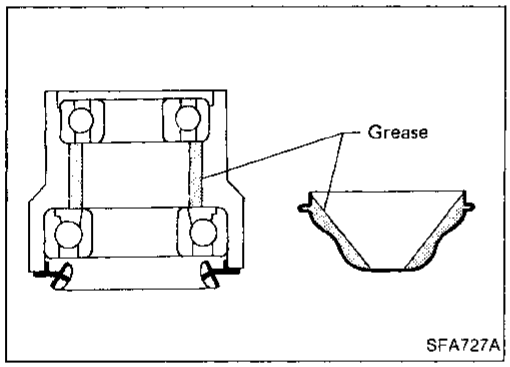
1. Remove cap and kingpin upper nut.

Do not remove kingpin lower nut.

2. Remove shock absorber fixing nut and upper link fixing bolts.
3. Remove third link and upper link.

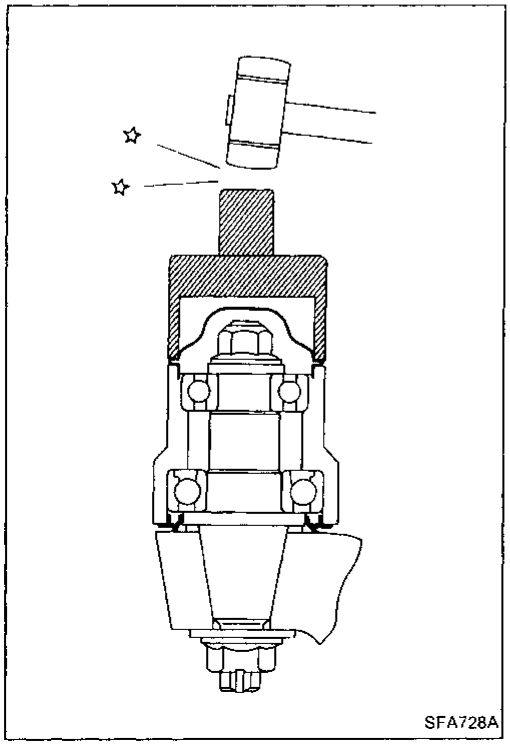
INSTALLATION

Third link



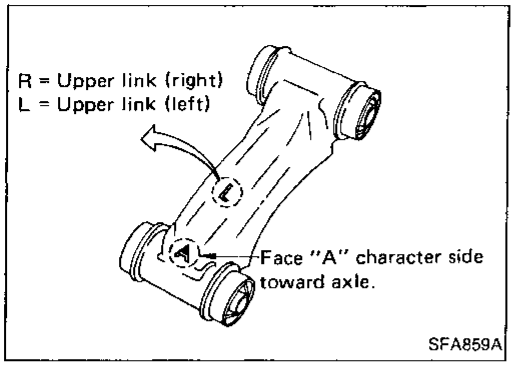
SFA727A

- Pack kingpin housing and cap with multi-purpose grease.
  Grease capacity:
  Kingpin housing: 10 g (0.35 oz)
  Cap: 5 g (0.18 oz)


SFA728A

- Install third link and cap.

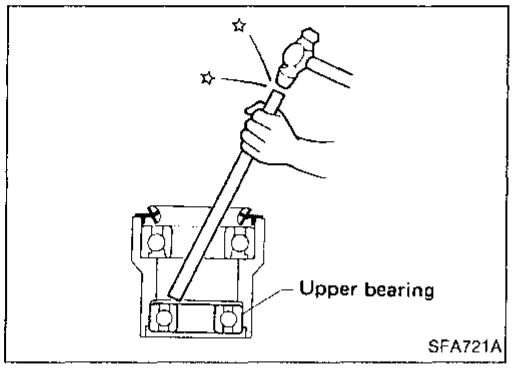
Third Link and Upper Link (Cont'd)



Upper link

- Upper link has characters "A" and "L" (or "R") on it as shown. Always install upper link with "A" side facing axle and side without a character facing vehicle body.

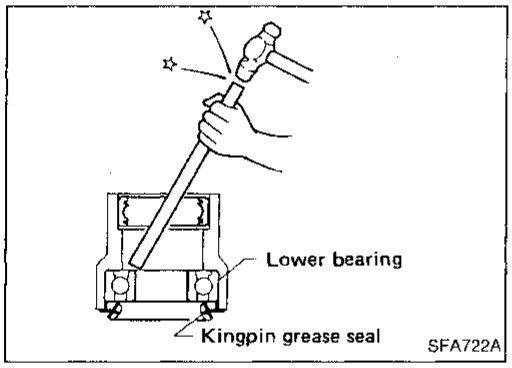
Upper link bushings cannot be disassembled.



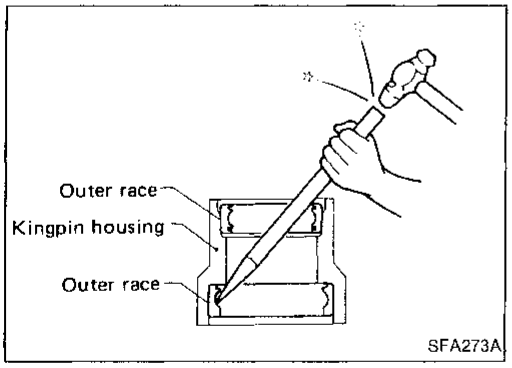
DISASSEMBLY

Third link

1. Remove upper bearing (inner race and ball).

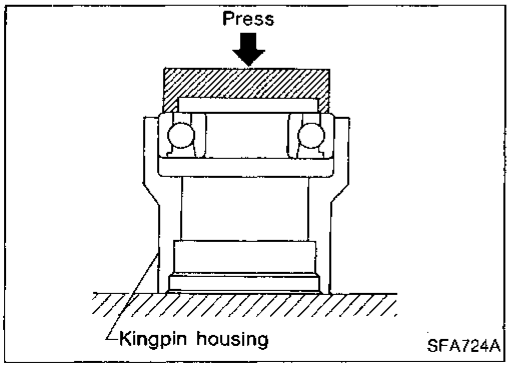


2. Remove kingpin grease seal.
3. Remove lower bearing (inner race and ball).



4. Remove upper and lower outer race.

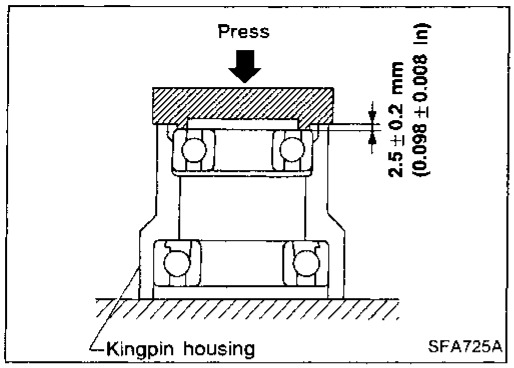
Be careful not to damage kingpin housing.



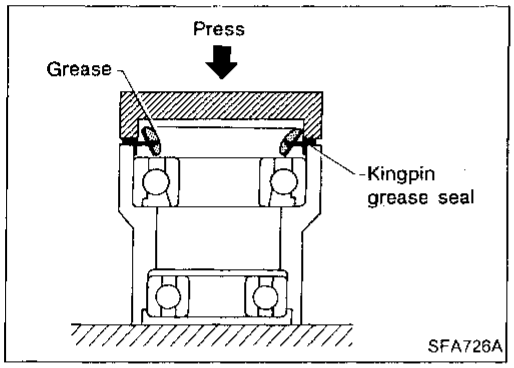
ASSEMBLY

1. Press new lower bearing into kingpin housing.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

Third Link and Upper Link (Cont'd)



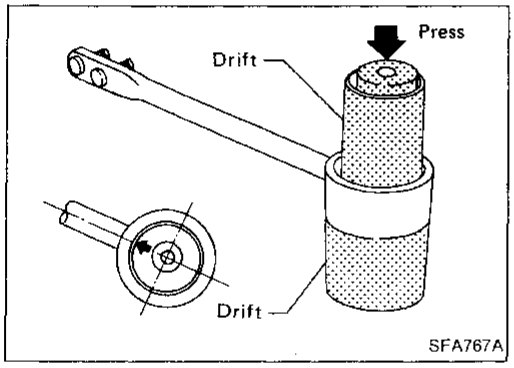
2. Press new upper bearing into kingpin housing.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)



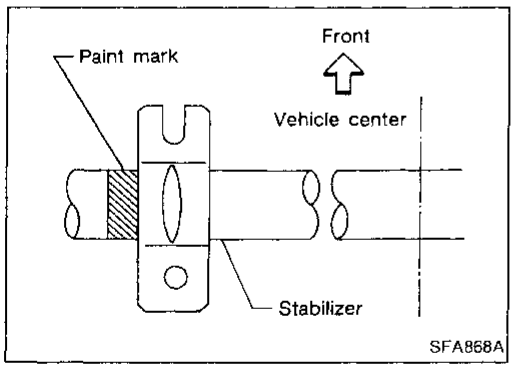
3. Install grease seal.
   Maximum load P:
   10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)
4. Apply multi-purpose grease to oil seal lip.

Tension Rod and Stabilizer Bar

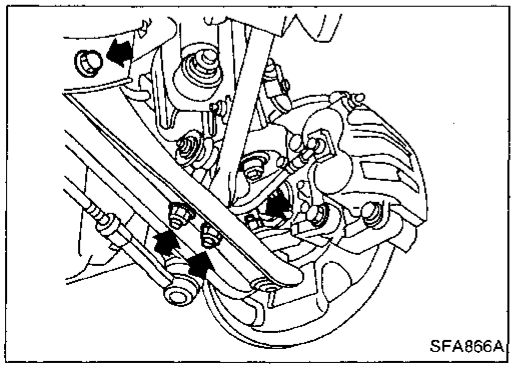
REMOVAL AND INSTALLATION



- 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, 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 the correct direction.



Transverse Link and Lower Ball Joint

REMOVAL AND INSTALLATION

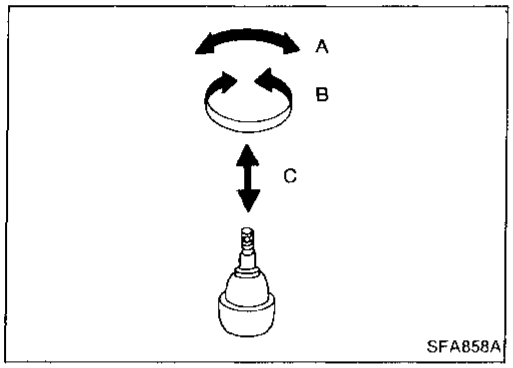
- Disconnect tension rod, stabilizer connecting rod and knuckle. Then remove transverse link assembly.
- During installation, final tightening must be done at curb weight with tires on ground.
- After installation, check wheel alignment.
  Refer to "Front Wheel Alignment" of ON-VEHICLE SERVICE (FA-7).

Transverse Link and Lower Ball Joint (Cont'd)

INSPECTION

Transverse link

- Check transverse link for damage, cracks or 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 transverse link 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.

Swing force "A":
(measuring point: cotter pin hole of ball stud)
7.8 - 53.0 N (0.8 - 5.4 kg, 1.8 - 11.9 lb)
Turning torque "B":
0.49 - 3.43 N·m (5.0 - 35 kg-cm, 4.3 - 30.4 in-lb)
Vertical end play limit "C":
0 mm (0 in)

General Specifications

COIL SPRING

Applied model	Conventional suspension
Identification color	Yellow x 2

SHOCK ABSORBER

Applied model		Conventional suspension
Piston rod diameter	mm (in)	12.5 (0.492)

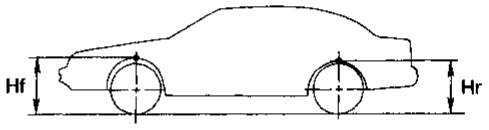
FRONT STABILIZER BAR

Applied model		Conventional suspension
Stabilizer diameter	mm (in)	29 (1.14)

TENSION ROD

Applied model		Conventional suspension
Rod diameter	mm (in)	20.0 (0.787)

WHEELARCH HEIGHT (Unladen*)



SFA818A

Applied model		Conventional suspension
Front (Hf)	mm (in)	705 (27.76)
Rear (Hr)	mm (in)	696 (27.40)

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

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Camber	Minimum	–1°35′ (–1.58°)
	Nominal	–0°50′ (–0.83°)
	Maximum	–0°05′ (–0.08°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Caster	Minimum	5°45′ (5.75°)
	Nominal	6°30′ (6.50°)
	Maximum	7°15′ (7.25°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Kingpin inclination	Minimum	12°00′ (12.00°)
Degree minute (Decimal degree)	Nominal	12°45′ (12.75°)
	Maximum	13°30′ (13.50°)
Total toe-in	Minimum	0 (0)
Distance (A - B) mm (in)	Nominal	1 (0.04)
	Maximum	2 (0.08)
Angle (left plus right) Degree minute (Decimal degree)	Minimum	0′ (0.00°)
	Nominal	5′ (0.08°)
	Maximum	10′ (0.17°)
Wheel turning angle Full turn*2	Minimum	35°30′ (35.50°)
Inside Degree minute (Decimal degree)	Nominal	38°30′ (38.50°)
	Maximum	39°30′ (39.50°)
Outside Degree minute (Decimal degree)	Nominal	32°00′ (32.00°)

*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.

WHEEL BEARING

Wheel bearing axial end play limit mm (in)	0.05 (0.0020)
Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	206 - 284 (21 - 29, 152 - 210)

LOWER BALL JOINT

Swing force (Measuring point: cotter pin hole of ball stud) N (kg, lb)	7.8 - 53.0 (0.8 - 5.4, 1.8 - 11.9)
Turning torque N·m (kg-cm, in-lb)	0.49 - 3.43 (5.0 - 35, 4.3 - 30.4)
Vertical end play mm (in)	0 (0)

WHEEL RUNOUT (Radial and lateral)

Unit: mm (in)

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