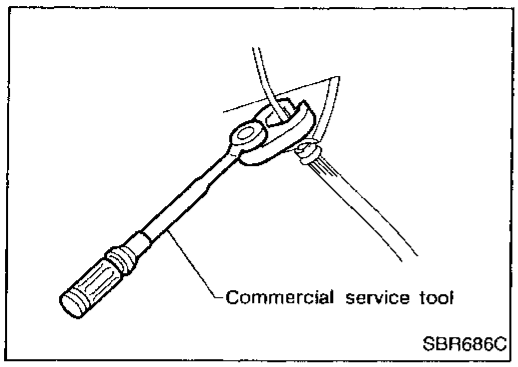
FRONT AXLE & FRONT SUSPENSION

SECTION FA

CONTENTS

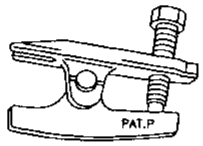
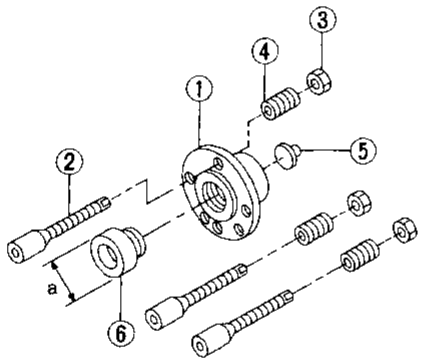
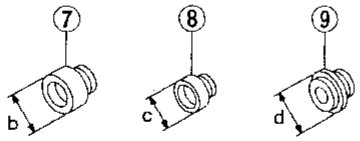
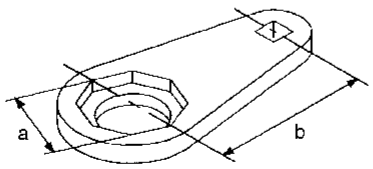
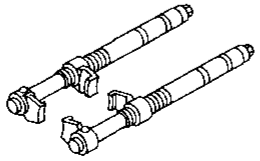


Precautions

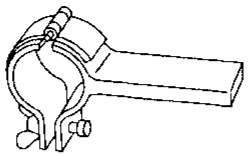
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  ***: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **After installing removed suspension parts, check wheel alignment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

Special Service Tools

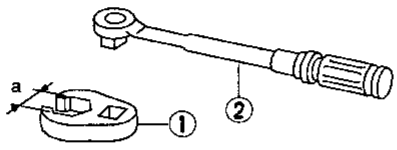
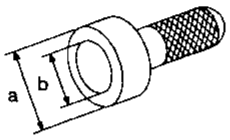
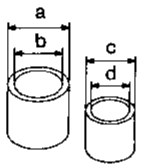
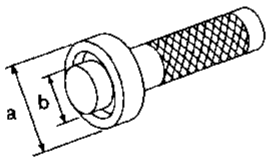
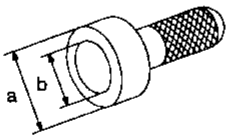
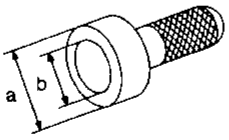
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
HT72520000 (J25730-A) Ball joint remover	 NT146	Removing tie-rod outer end and lower ball joint
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	  NT498	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.**
ST35490001 (J26083) Gland packing wrench	 NT383	Removing and installing gland packing **a: 58 mm (2.28 in)** **b: 100 mm (3.94 in)**
HT71780000 (—) Spring compressor	 NT144	Removing and installing coil spring

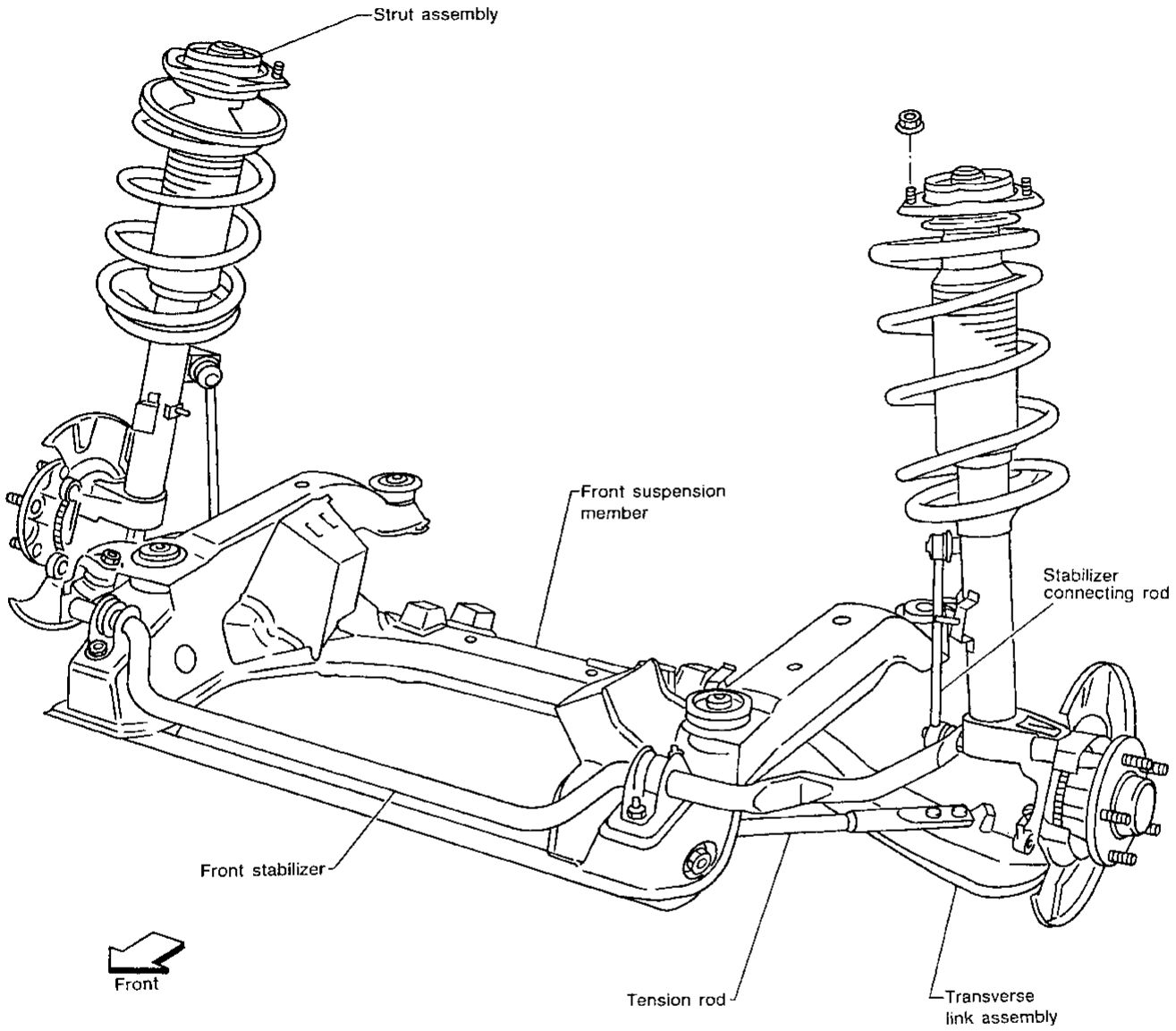
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST35652000 (—) Strut attachment	 NT145	Fixing strut assembly

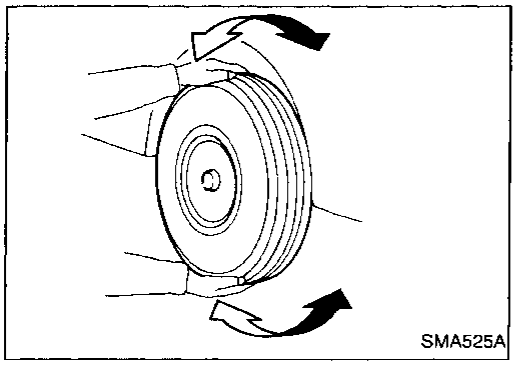
Commercial Service Tools

Tool name	Description	
① Flare nut crows foot ② Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Front axle grease seal drift	 NT115	Installing front axle grease seal **a: 75 mm (2.95 in) dia.** **b: 65 mm (2.56 in) dia.**
Tension rod bushing drift	 NT155	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	 NT084	Removing wheel bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
Wheel bearing drift	 NT115	Installing wheel bearing **a: 66 mm (2.60 in) dia.** **b: 60 mm (2.36 in) dia.**
Cap drift	 NT115	Installing hub cap **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**

SEC. 400•401



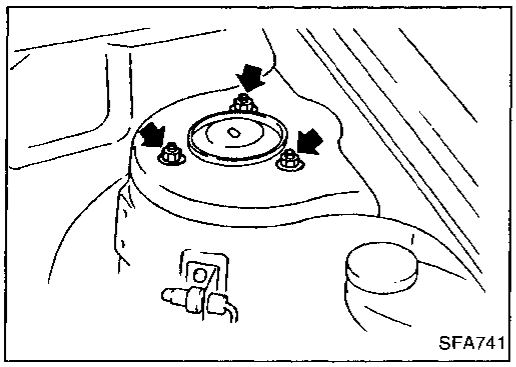
SFA354BA


SMA525A

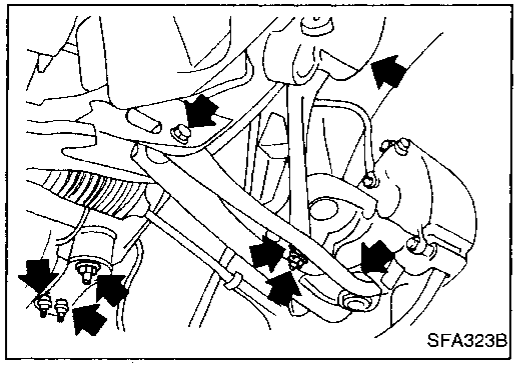
Front Axle and Front Suspension Parts

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

- Shake each front wheel to check for excessive play.

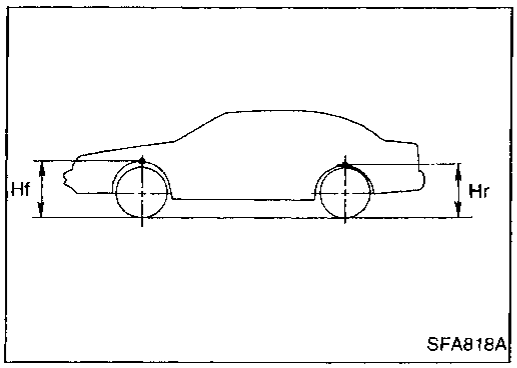

SFA741

- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.
  Tightening torque:
  Refer to FRONT SUSPENSION (FA-14).


SFA323B

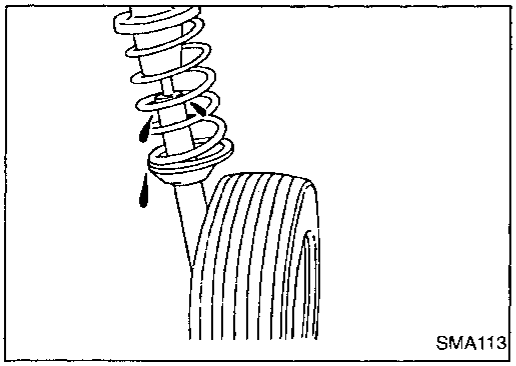
- Check spring height from top of wheelarch to ground.

a. 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.



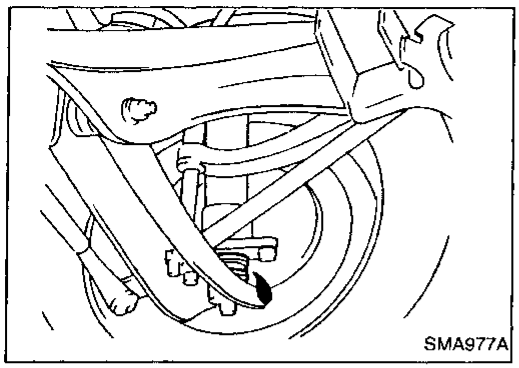
SFA818A

b. Bounce vehicle up and down several times before measuring.
   Standard height: Refer to SDS (FA-22).
c. Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.

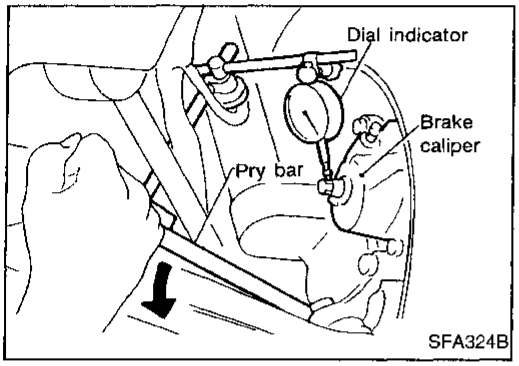

SMA113

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

Front Axle and Front Suspension Parts (Cont'd)


SMA977A

- 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.



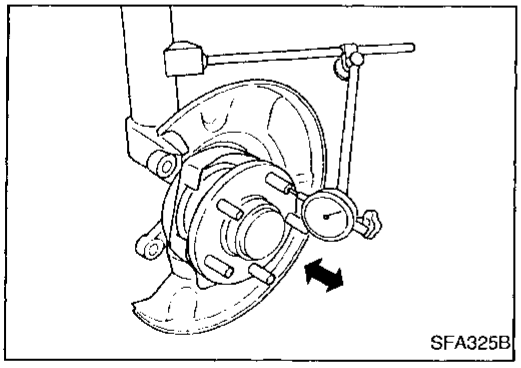
SFA324B

- Check suspension ball joint end play.

a. Jack up front of vehicle and set the stands.
b. Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
c. Make sure front wheels are straight and brake pedal is depressed.
d. Place a pry bar between transverse link and inner rim of road wheel.
e. While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play:
0 mm (0 in)

If ball joint vertical end play exists, remove transverse link and recheck the ball joint. Refer to FA-21.


SFA325B

Front Wheel Bearing

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

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

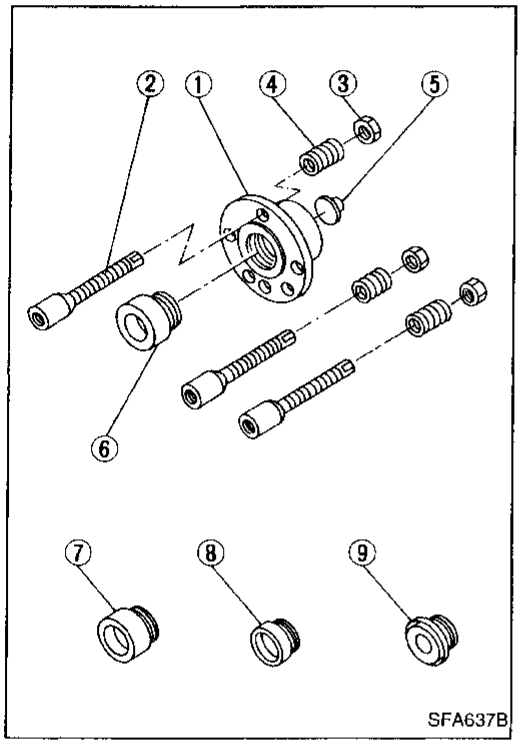
- If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly.
  Refer to FRONT AXLE (FA-10).

Front Wheel Alignment

CAMBER, CASTER AND KINGPIN INCLINATION

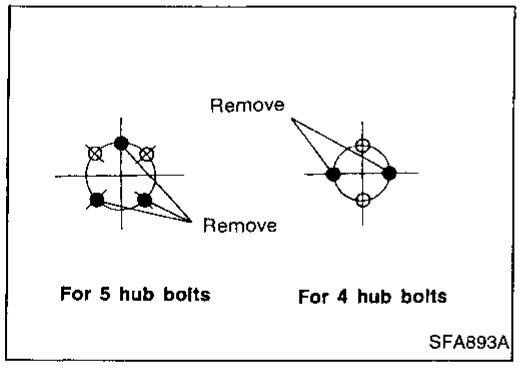
Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Set vehicle on turning radius gauge.

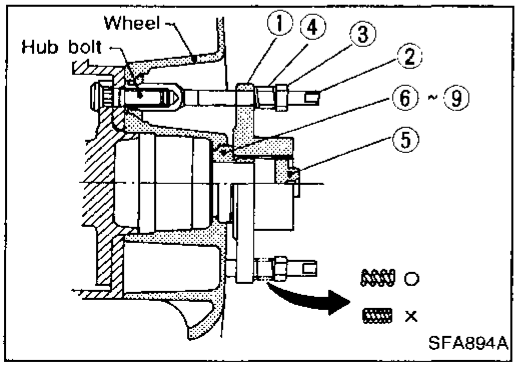


2. Mount Tool as follows.
   Tool number:
   KV991040S0 (—)
   KV99104010 ① to ⑤
   KV99104020 ⑥
   KV99104030 ⑦
   KV99104040 ⑧
   KV99104050 ⑨

a. Select adapter which corresponds with wheel or hub shape from four types⑥ to ⑨.
b. Screw selected adapter in until it contacts plate ①.



c. Remove wheel nuts.

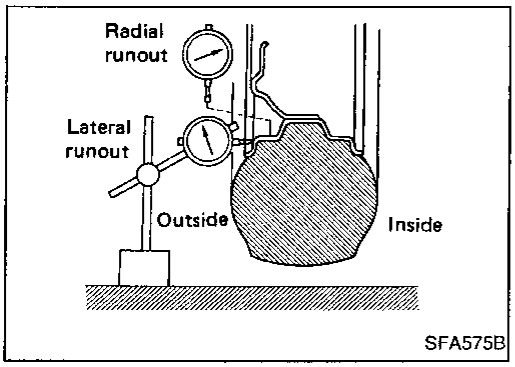


d. Install guide bolts ② to where wheel nuts were removed and tighten them by hand.
e. Install plate and adapter assembly to guide bolts ②.
f. Install springs ④ onto guide bolts ②. Then tighten nuts ③ evenly until a little before springs ④ are completely compressed.
g. Install center plate ⑤.
h. Mount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

Front Wheel Alignment (Cont'd)

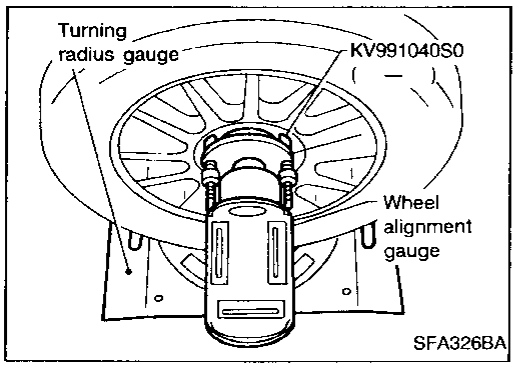
Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*).

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



PRELIMINARY INSPECTION

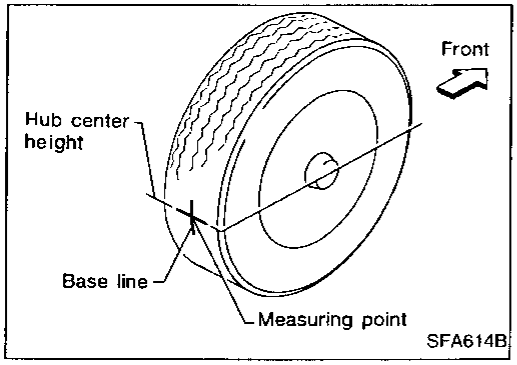
1. Check tires for wear and improper inflation.
2. Check wheel runout.
   Wheel runout:
   Refer to SDS (FA-23).
3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that struts work properly by using the standard bounce 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-23).
2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.



TOE-IN

Measure toe-in using following procedure. If out of specification, inspect and replace any damaged or worn front suspension parts.

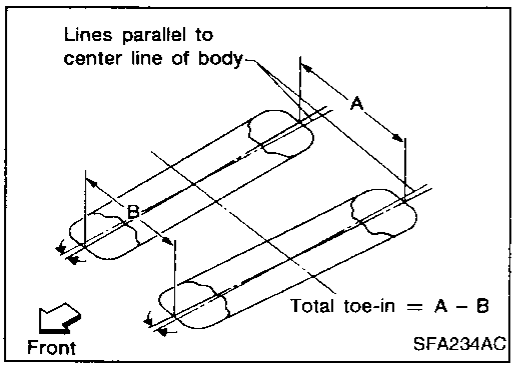
WARNING:

- **Always perform the following procedure on a flat surface.**
- **Make sure that no person is in front of the vehicle before pushing it.**

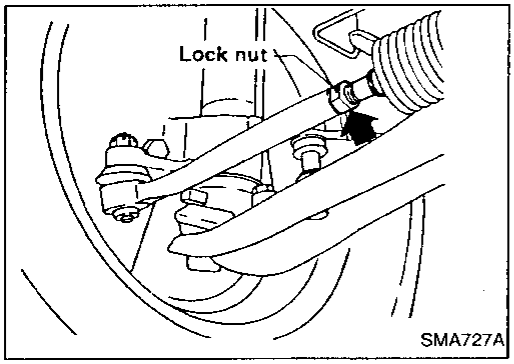
1. Bounce front of vehicle up and down to stabilize the posture.
2. Push the vehicle straight ahead about 5 m (16 ft).
3. Put a mark on base line of tread (rear side) of both tires at the same height as hub center. These are measuring points.
4. Measure distance "A" (rear side).
5. Push the vehicle slowly 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.

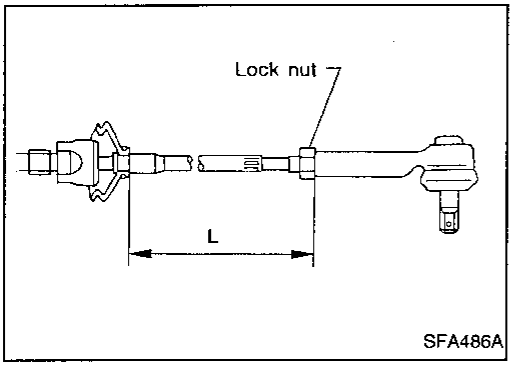
6. Measure distance "B" (front side).
   Total toe-in: Refer to SDS (FA-23).



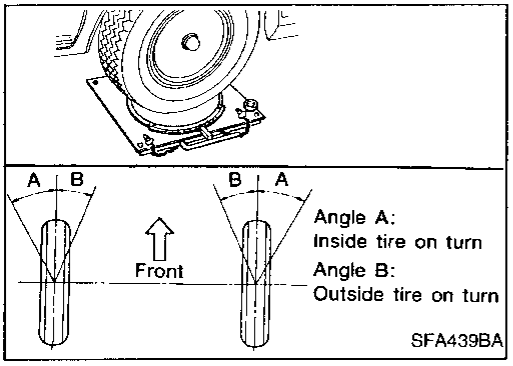
Front Wheel Alignment (Cont'd)



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

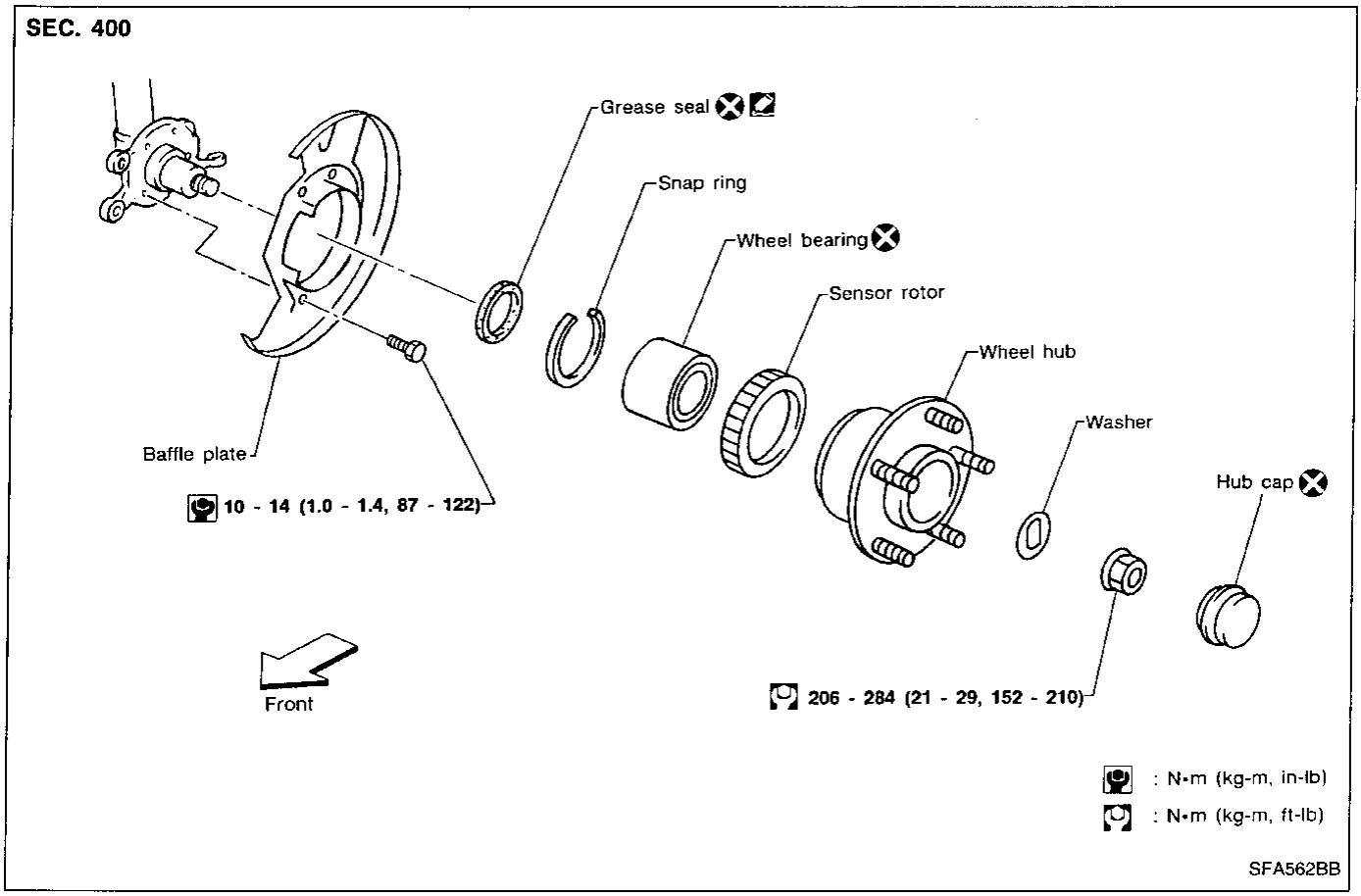


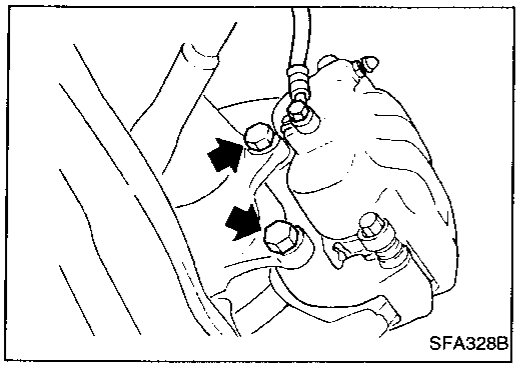
b. Adjust toe-in by screwing tie-rods in and out.
Standard length "L":
Refer to SDS in ST section.
c. Tighten lock nuts to specified torque.
Lock nut tightening torque:
Refer to POWER STEERING GEAR AND LINKAGE in ST section.

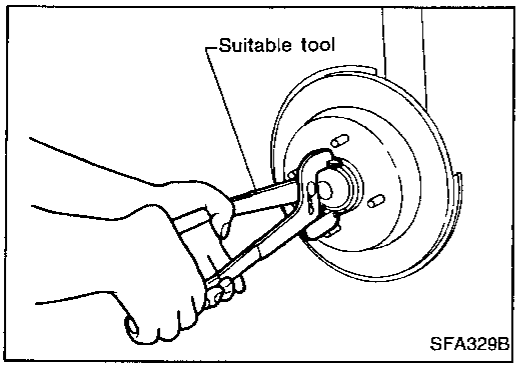


FRONT WHEEL TURNING ANGLE

1. Set wheels in straight-ahead position. 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):
Refer to SDS (FA-23).







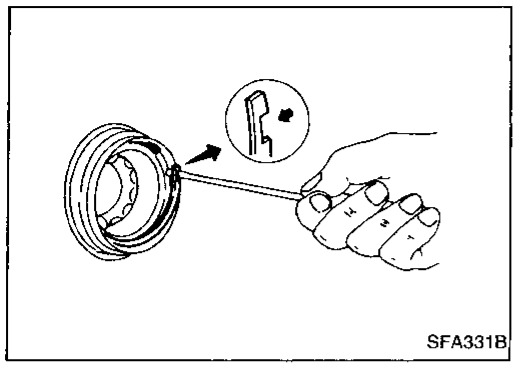
Removal

- Remove brake caliper assembly and rotor.

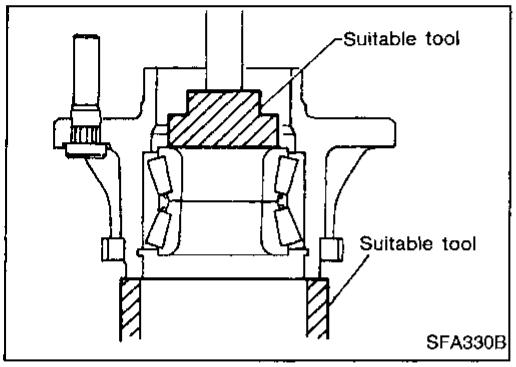
CAUTION:

- **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 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 damaging the sensor wires and the sensor will become inoperative.**
- Remove wheel hub from spindle.

Removal (Cont'd)


SFA331B

- Remove grease seal.
- Remove snap ring.



SFA330B

- Press out bearing and race as a set.

Inspection

WHEEL BEARING

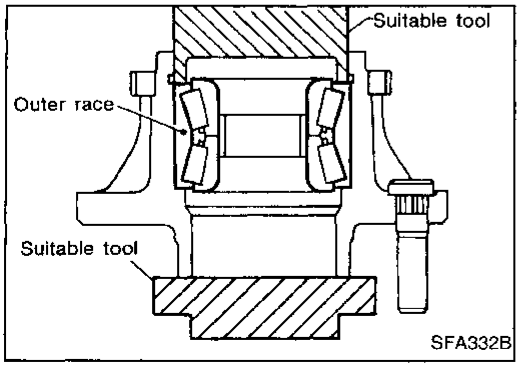
Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear, and replace if damaged.

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.



SFA332B

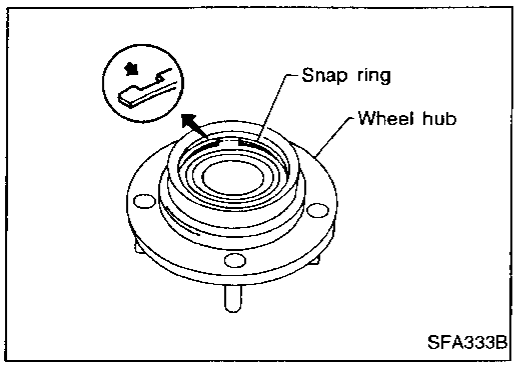
Installation

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

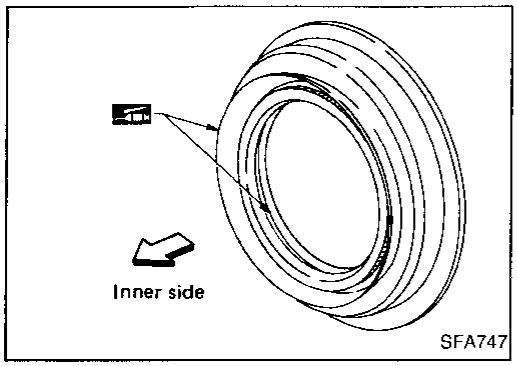
CAUTION:

- **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.**

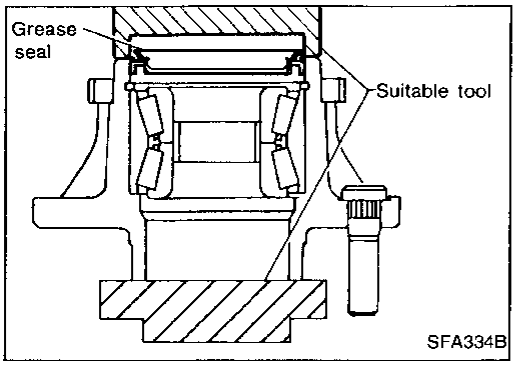
Installation (Cont'd)



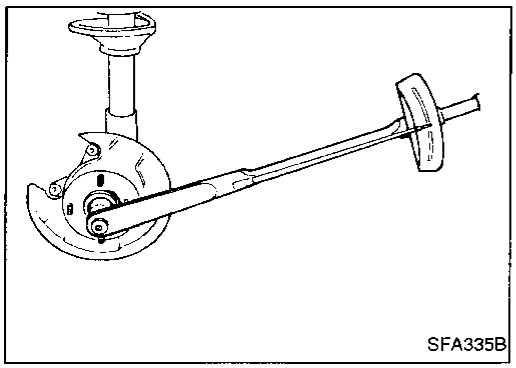
- Install snap ring.



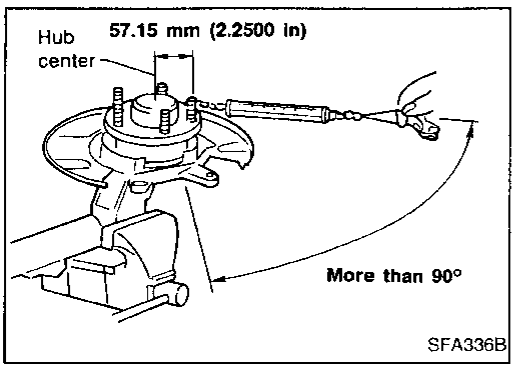
- Pack grease seal lip with recommended multi-purpose grease.



- Install grease seal.



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

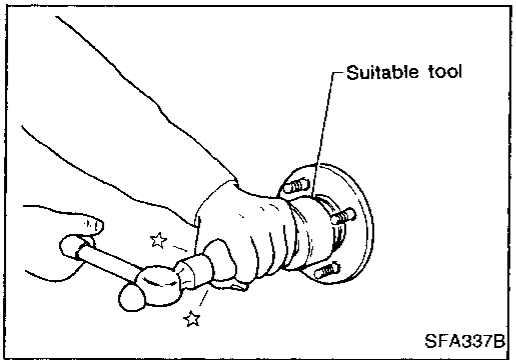


- Turn wheel hub several times in both directions to seat wheel bearing correctly.
- Attach spring balance to wheel hub bolt (as shown at left) and pull it at a speed of 10 rpm to measure rotation torque.

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)

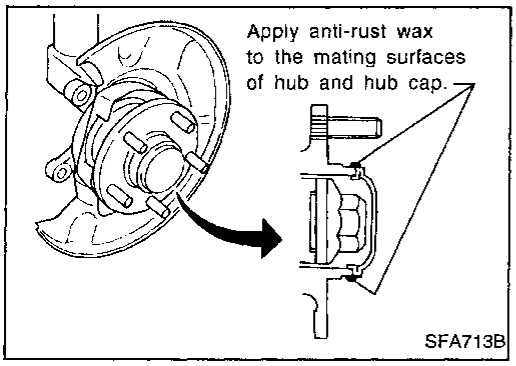
If bearing preload does not meet the specification, replace wheel bearing assembly.

Installation (Cont'd)



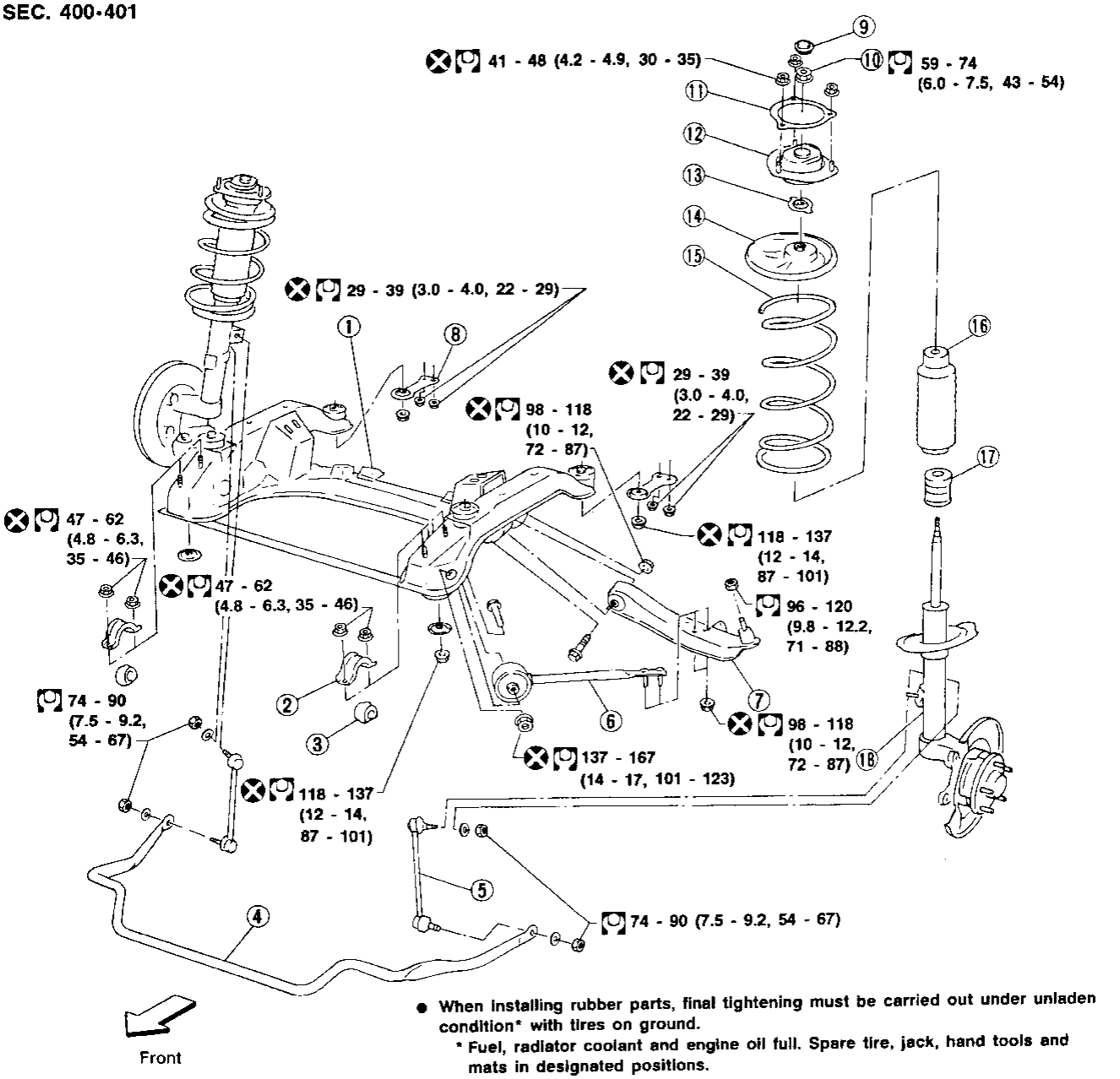
- Clinch lock nut using standard screwdriver and install hub cap using a suitable tool.

Do not reuse hub cap. When installing, replace it with a new one.



- Apply anti-rust wax to the mating surfaces of hub and hub cap.

SEC. 400•401

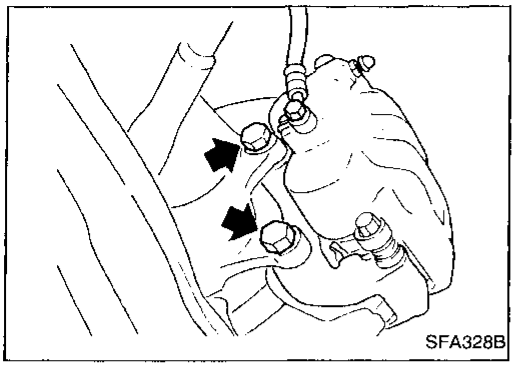


- When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
  * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

: N•m (kg-m, ft-lb)

SFA563BB

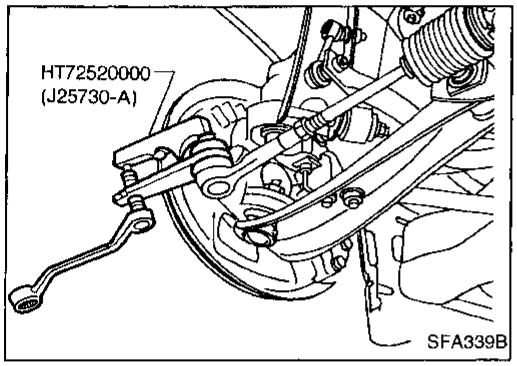
① Front suspension member
② Stabilizer bar clamp
③ Bushing
④ Stabilizer bar
⑤ Stabilizer connecting rod
⑥ Tension rod
⑦ Transverse link
⑧ Member stay
⑨ Cap
⑩ Lock nut
⑪ Gasket
⑫ Strut mounting insulator
⑬ Upper plate
⑭ Spring upper seat
⑮ Coil spring
⑯ Dust cover
⑰ Bound bumper
⑱ Strut assembly



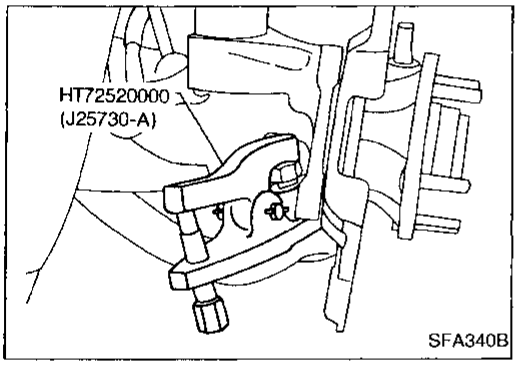
Removal and Installation

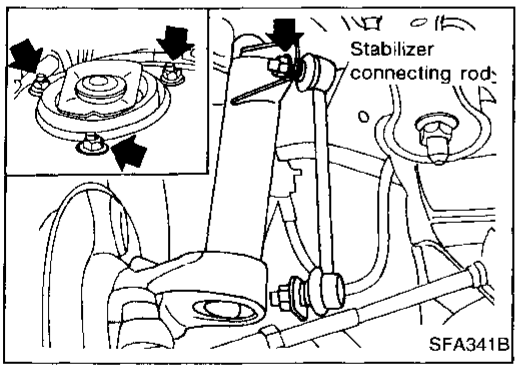
- Remove brake caliper assembly and rotor.

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.

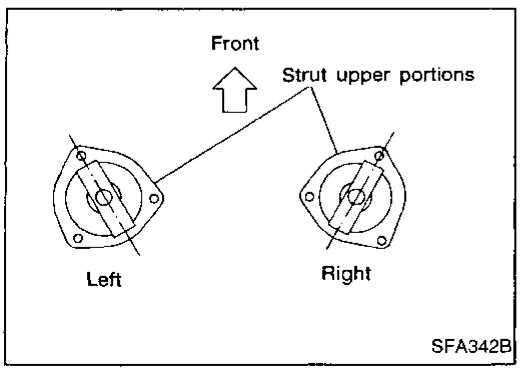


- Remove tie-rod ball joint and lower ball joint with Tool.

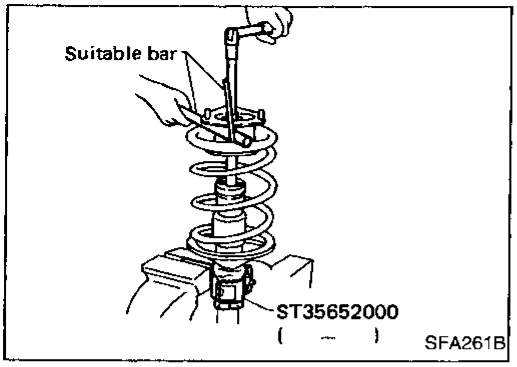




- Remove stabilizer connecting rod upper nut, separate strut assembly and stabilizer connecting rod.
- Remove strut assembly upper nuts.



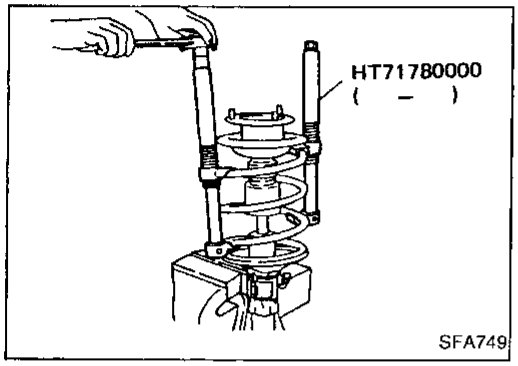
- To install, reverse above removal procedures.
  Installation position of upper end of strut is shown at left.



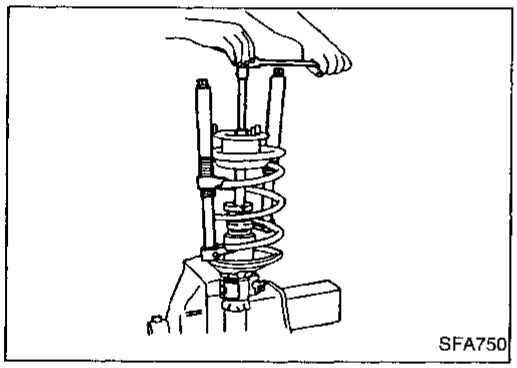
Disassembly

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

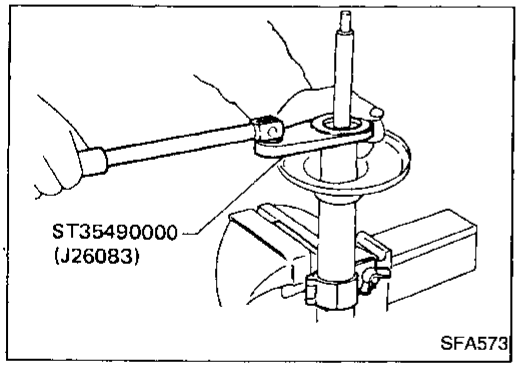
WARNING:
Do not remove piston rod lock nut at this time.



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

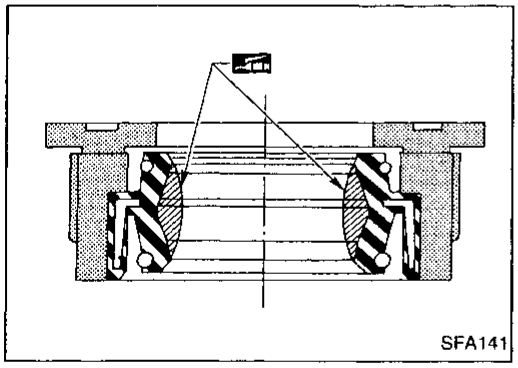
Check for cracks, deformation or other damage. Replace if necessary.

COIL SPRING

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

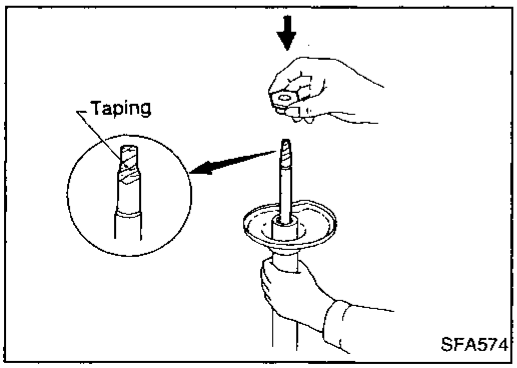
Assembly

- Lubricate sealing lip of gland packing.


SFA141

- Install gland packing.

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



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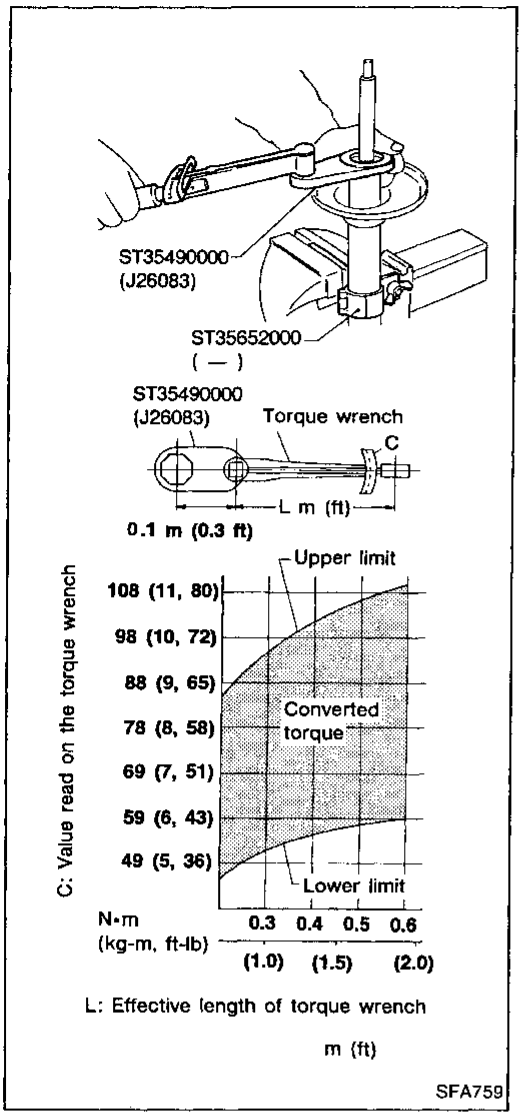
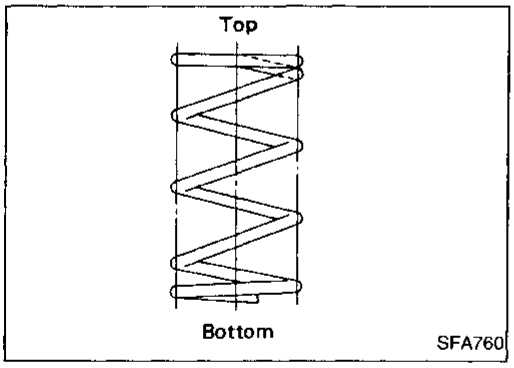
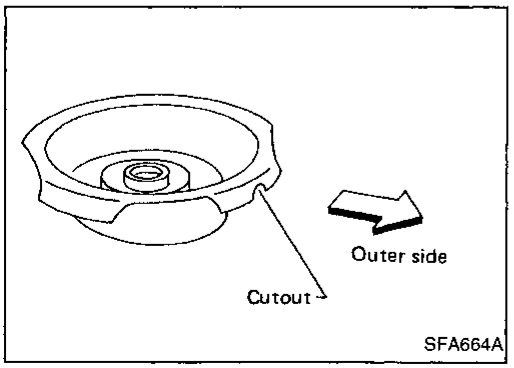
Assembly (Cont'd)



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

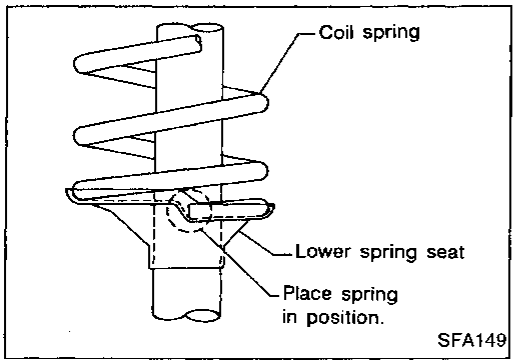


- When installing coil spring, be careful not to reverse top and bottom direction. (top end is flat.)

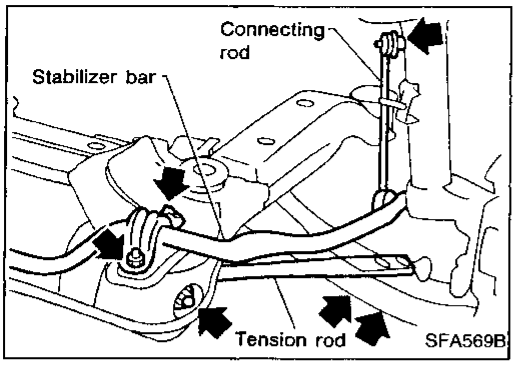


- Install upper spring seat with its cutout facing the outer side of vehicle.

Assembly (Cont'd)

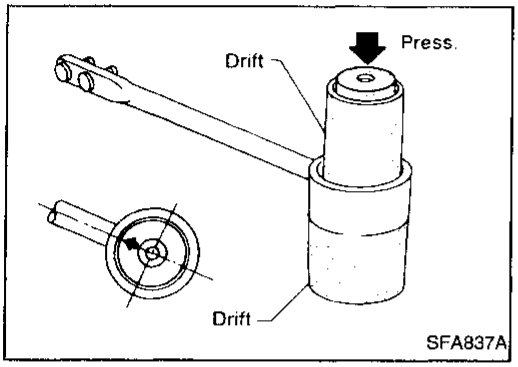


After placing spring in position on lower spring seat, release spring compressor gradually.

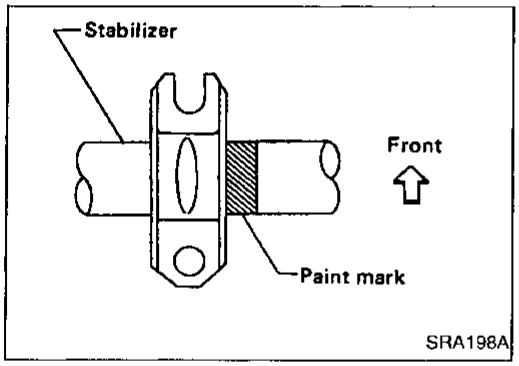


Removal and Installation

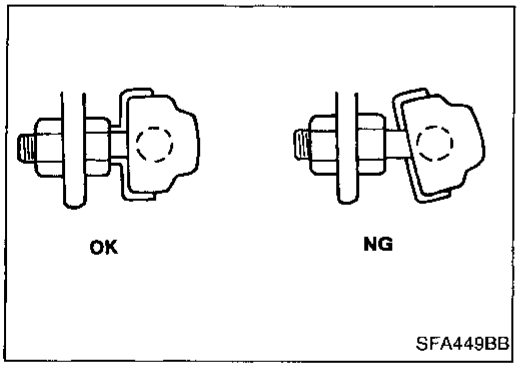
- Remove tension rod and stabilizer bar.



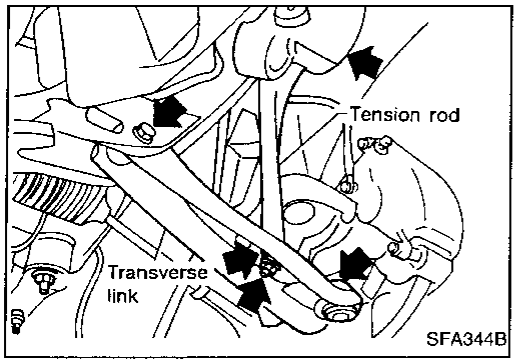
- Place a drift on lower side of tension rod bushing and another on upper side, as shown. Remove tension rod bushing by pressing it out.
- Place arrow mark on bushing facing tension rod before installing bushing.



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

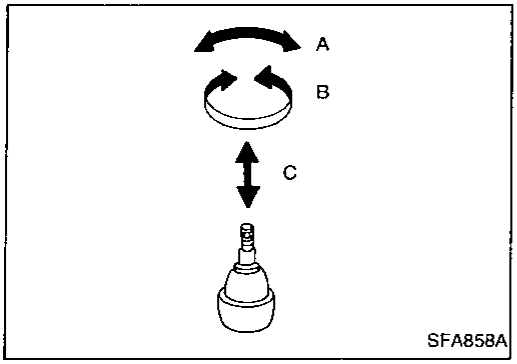


- Install stabilizer bar with ball joint socket properly placed.



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 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.

  Swinging force:
  Refer to SDS (FA-23).
  Turning torque:
  Refer to SDS (FA-23).
  Vertical end play:
  Refer to SDS (FA-23).
- Check dust cover for damage. Replace it and cover clamp if necessary.

General Specifications

COIL SPRING

Applied model		All
Wire diameter	mm (in)	14.2 (0.559)
Coil outer diameter	mm (in)	183.9 (7.24)
Free length	mm (in)	410 (16.14)
Spring constant	N/mm (kg/mm, lb/in)	21.6 (2.2, 123)
Identification color		Orange x 1, Purple x 1

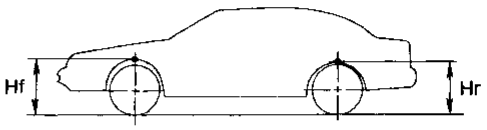
SHOCK ABSORBER (STRUT)

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		All
Stabilizer diameter	mm (in)	24 (0.94)
Identification color		Yellow

WHEELARCH HEIGHT (Unladen*)



SFA818A

Applied model		All
Front (Hf)	mm (in)	697 (27.44)
Rear (Hr)	mm (in)	681 (26.81)

*: 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)

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Camber	Degree minute (Decimal degree)	Minimum	−1°30′ (−1.50°)
		Nominal	−0°45′ (−0.75°)
		Maximum	0°00′ (0.00°)
		Left and right difference	45′ (0.75°) or less
Caster	Degree minute (Decimal degree)	Minimum	5°50′ (5.83°)
		Nominal	6°35′ (6.58°)
		Maximum	7°20′ (7.33°)
		Left and right difference	45′ (0.75°) or less
Kingpin inclination	Degree minute (Decimal degree)	Minimum	12°40′ (12.67°)
		Nominal	13°25′ (13.42°)
		Maximum	14°10′ (14.17°)
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	5.5′ (0.09°)
		Maximum	11′ (0.18°)
Wheel turning angle (Full turn*2)	Degree minute (Decimal degree)	Minimum	35°12′ (35.20°)
Inside		Nominal	38°12′ (38.20°)
		Maximum	39°12′ (39.20°)
Outside	Degree minute (Decimal degree)	Nominal	31°30′ (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 idle.

WHEEL BEARING

Wheel bearing end play limit	mm (in)	0.05 (0.0020) or less
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)

WHEEL RUNOUT (Radial and lateral)

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

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)