

FRONT AXLE & FRONT SUSPENSION

SECTION **FA**

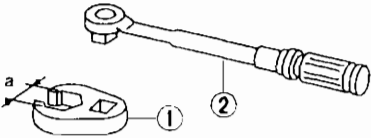
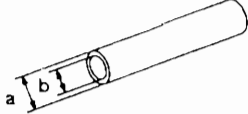
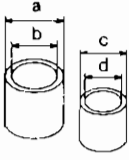
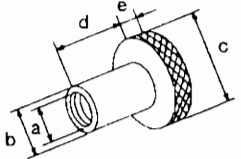
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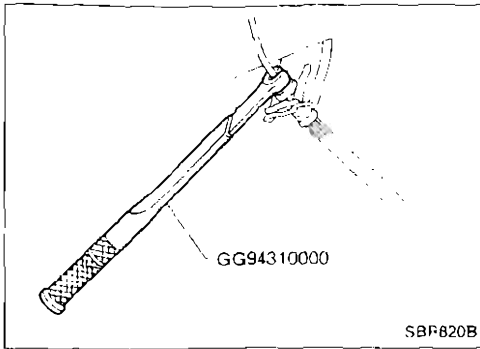
PRECAUTIONS AND PREPARATION

Commercial Service Tools

Tool name	Description	
Equivalent to GG94310000 ① Flare nut crows foot ② Torque wrench	 <p>NT360</p>	Removing and installing each brake piping a: 10 mm (0.39 in)
Baffle plate drift	 <p>NT065</p>	Installing baffle plate a: 88 mm (3.46 in) dia. b: 68 mm (2.68 in) dia.
Tension rod bushing drift	 <p>NT155</p>	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.
Attachment Wheel alignment	 <p>NT148</p>	Measure wheel alignment a: Screw M22 x 1.5 b: 35 (1.38) dia. c: 65 (2.56) dia. d: 56 (2.20) e: 12 (0.47) Unit: mm (in)

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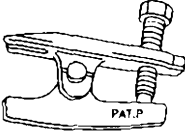
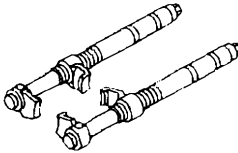
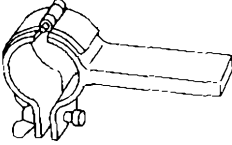
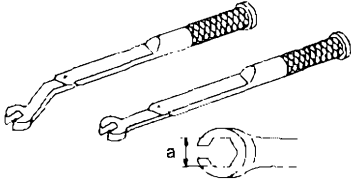
PRECAUTIONS AND PREPARATION



Precautions

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

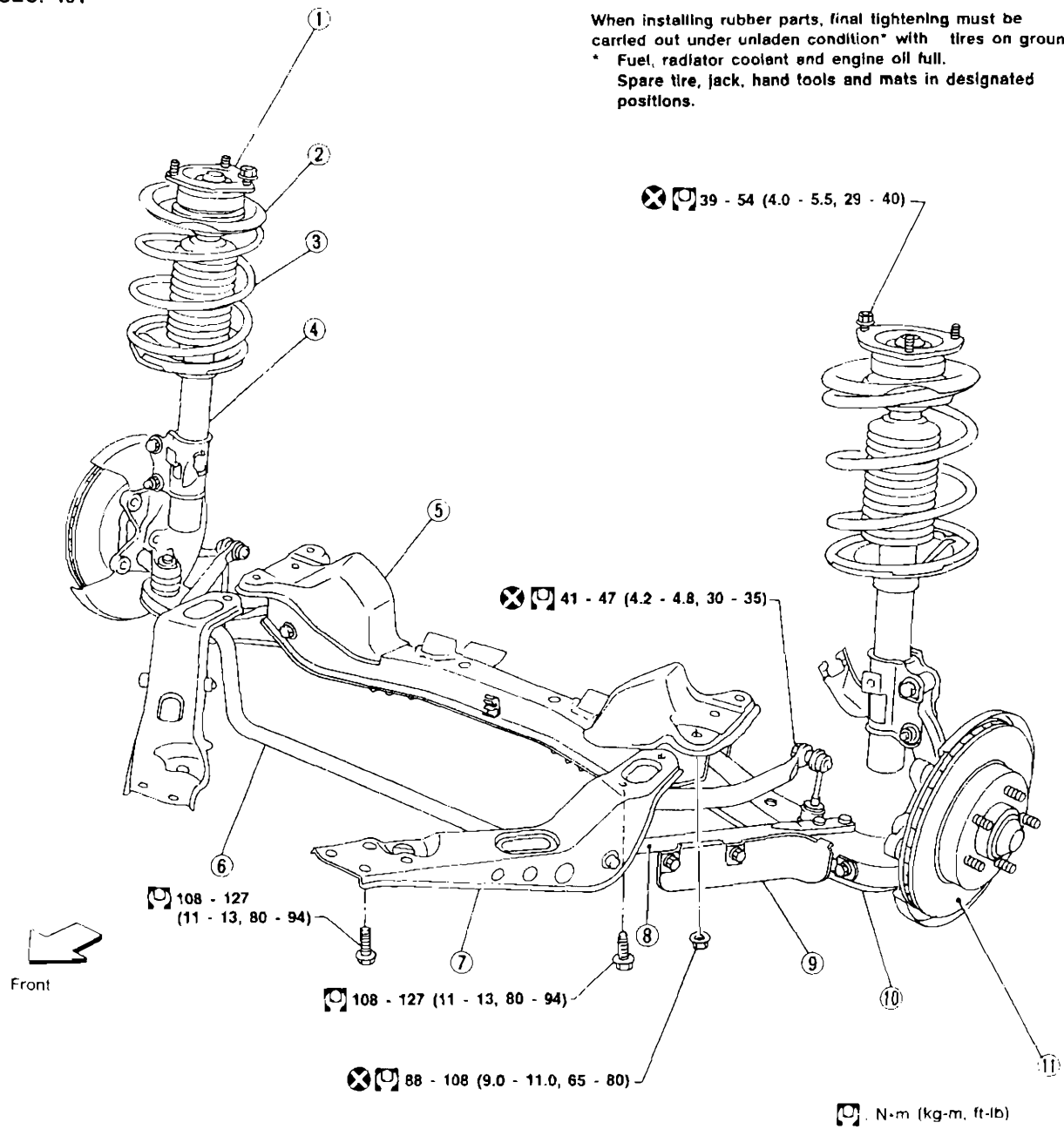
Special Service Tools

Tool number Tool name	Description	
HT72520000 Ball joint remover	 PAT.P NT146	Removing tie-rod outer end and lower ball joint
HT71780000 Spring compressor	 NT144	Removing and installing coil spring
ST35652000 Strut attachment	 NT145	Fixing strut assembly
GG94310000 Flare nut torque wrench	 NT406	Removing and installing brake piping a: 10 mm (0.39 in)

FRONT SUSPENSION SYSTEM

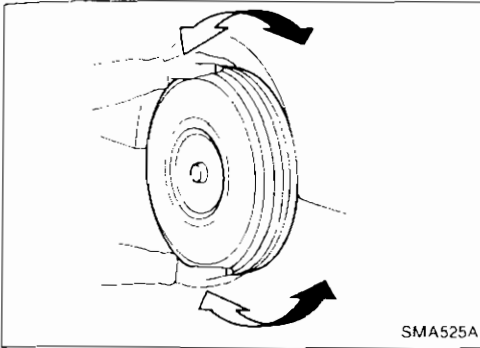
SEC. 401

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.



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|-----------------------------|----------------------------|-------------------------------------|
| 1. Strut mounting insulator | 5. Front suspension member | 9. Air guide |
| 2. Spring upper seat | 6. Front stabilizer | 10. Transverse link with ball joint |
| 3. Coil spring | 7. Tension rod bracket | 11. Brake rotor |
| 4. Strut assembly | 8. Tension rod | |



Front Axle and Front Suspension Parts

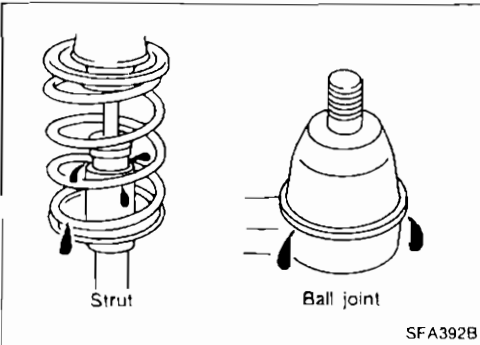
Check front axle and front suspension parts for looseness, cracks, wear or other damage

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

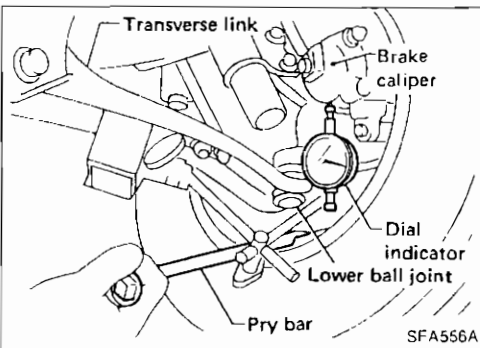
Tightening torque:

Refer to FRONT SUSPENSION (FA-11).

- Make sure that cotter pins are inserted



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

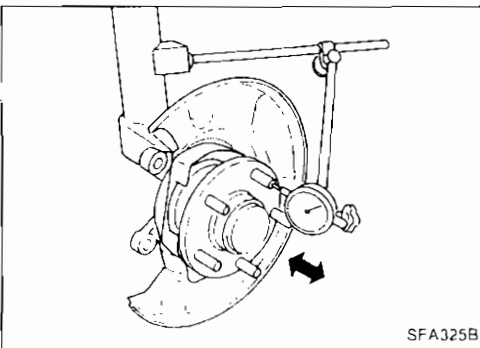


- Check suspension ball joint end play.
 - (1) Jack up front of vehicle and set the stands.
 - (2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper
 - (3) Make sure front wheels are straight and brake pedal is depressed.
 - (4) Place a pry bar between transverse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

Vertical end play:

0 mm (0 in)

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



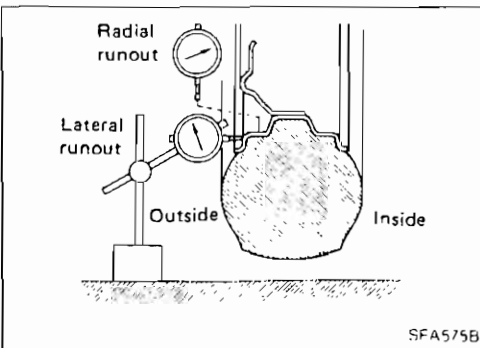
Front Wheel Bearing

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

Axial end play:

0.05 mm (0.0020 in) or less

- If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to FRONT AXLE — Wheel Hub and Knuckle (FA-8)



Front Wheel Alignment

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.

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ON-VEHICLE SERVICE

Front Wheel Alignment (Cont'd)

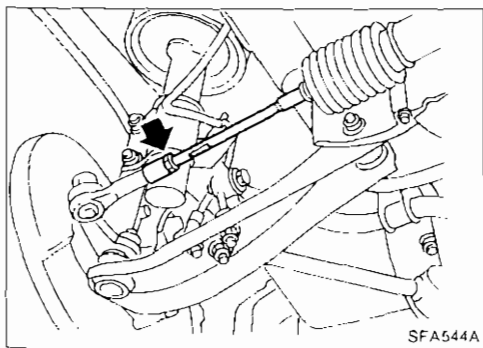
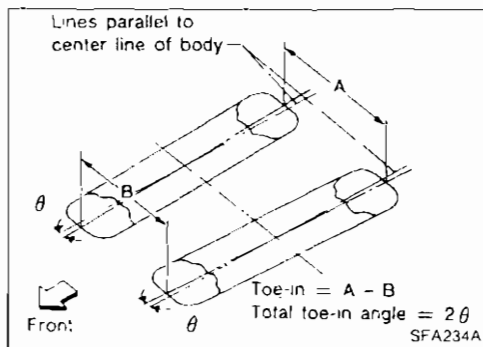
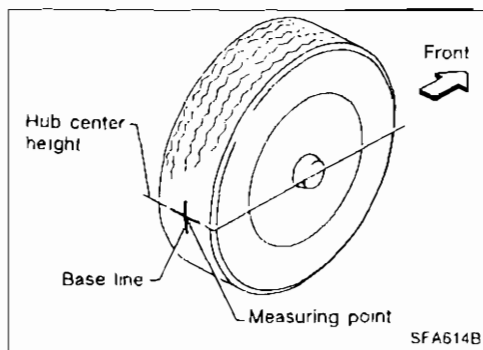
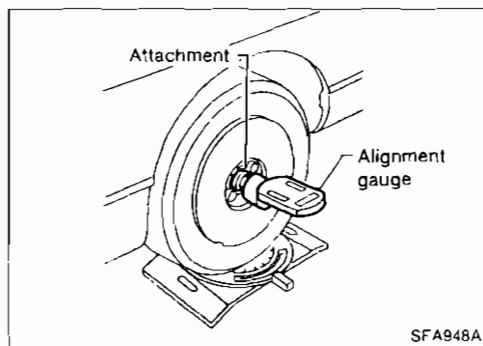
PRELIMINARY INSPECTION

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

Wheel runout:

Refer to SDS (FA-15).

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).



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-15).

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 following procedure. If out of specification, inspect and replace any damaged or worn front suspension parts.

WARNING:

- Perform following procedure always on a flat surface.
 - Make sure that no person is in front of the vehicle before pushing it.
1. Move rear of vehicle up and down to stabilize the posture.
 2. Push the vehicle straight ahead about 5 m (196.9 in).
 3. Put a mark on base line of the tread (rear side) at the same height of hub center to be a measuring point.
 4. Measure distance "A" (rear side).
 5. Push the vehicle slowly ahead to turn the wheels around 180 degrees.

If the wheels have passed 180 degrees, try the above procedure again from the beginning. Never push vehicle backward.

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

Toe-in (A - B):

Refer to SDS (FA-15).

7. Adjust toe-in by varying length of steering tie-rods.
 - a. Loosen lock nuts.
 - b. Adjust toe-in by turning forward and reverse tie-rod.

ON-VEHICLE SERVICE

Front Wheel Alignment (Cont'd)

Make sure both tie-rods are the same length

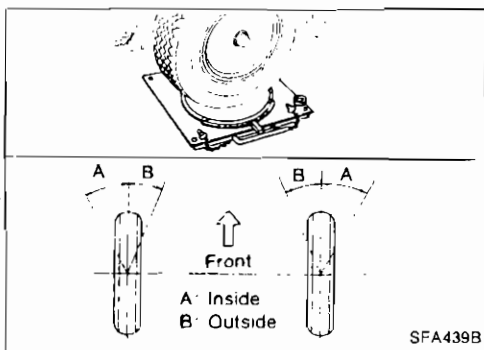
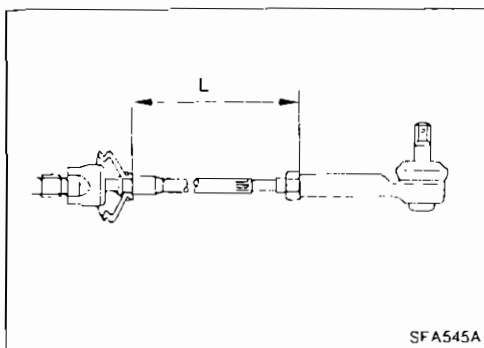
Standard length "L":

Refer to SDS in ST section.

- c. Tighten lock nuts to specified torque.

Lock nut tightening torque:

Refer to ST section.



FRONT WHEEL TURNING ANGLE

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

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

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

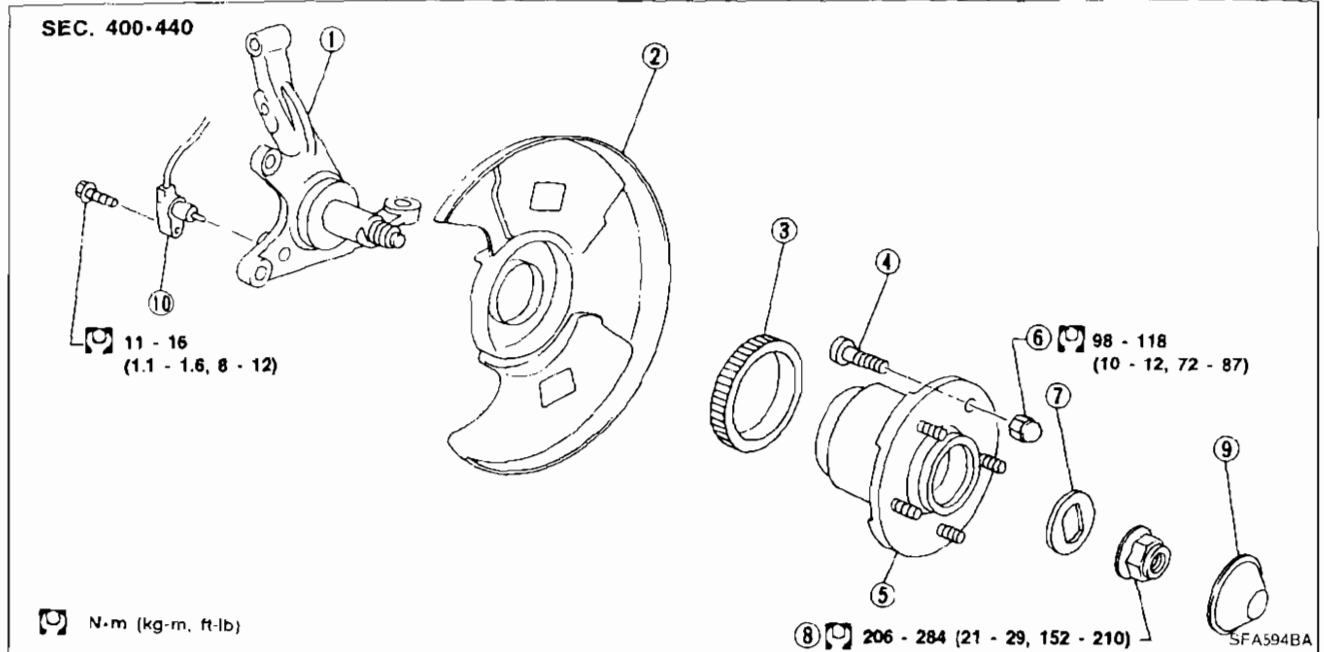
Wheel turning angle (Full turn):

Refer to SDS (FA-15).

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FRONT AXLE

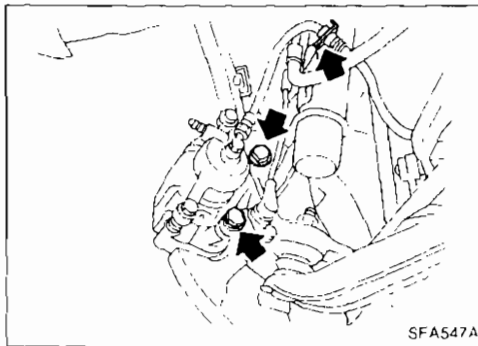
Wheel Hub and Knuckle



- ① Knuckle spindle
- ② Baffle plate
- ③ ABS ring
- ④ Hub bolt

- ⑤ Wheel hub bearing
- ⑥ Wheel nut
- ⑦ Lock washer

- ⑧ Wheel bearing lock nut
- ⑨ Hub cap
- ⑩ ABS sensor



REMOVAL

CAUTION:

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

- Growling noise is emitted from wheel hub bearing during operation.
- Wheel hub bearing drags or turns roughly. This occurs when turning hub by hand after bearing lock nut is tightened to specified torque.
- If the wheel hub bearing assembly is removed, it must be renewed. The old assembly must not be re-used.

Remove brake caliper assembly and rotor.

Before removing the front axle assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the front axle assembly area.

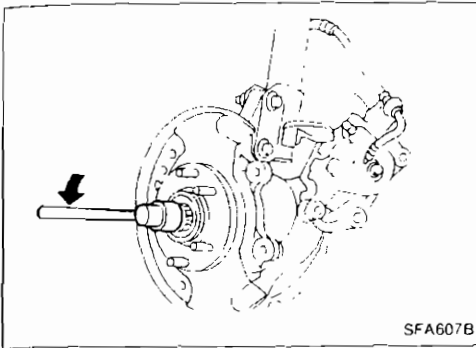
Failure to do so may result in sensor wires being damaged and the sensor becoming inoperative.

Suspend caliper assembly with wire so as not to stretch brake hose.

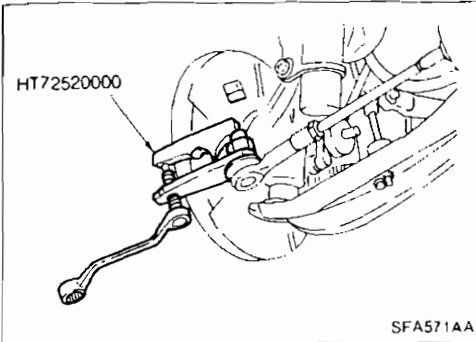
Be careful not to depress brake pedal, or piston will pop out.

FRONT AXLE

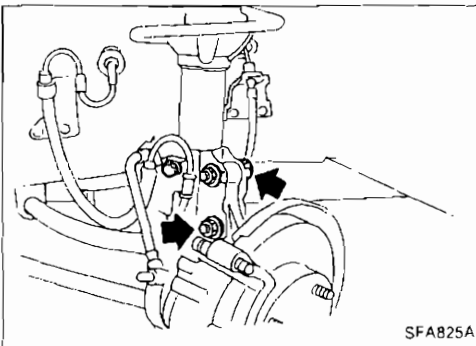
Wheel Hub and Knuckle (Cont'd)



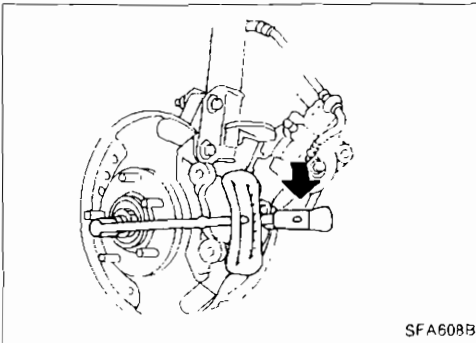
- Remove wheel bearing lock nut. Remove wheel hub from spindle.



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

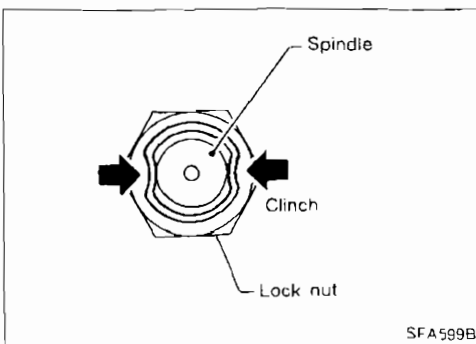


- Disconnect knuckle from strut.



INSTALLATION

- Install wheel hub.
- Tighten wheel bearing lock nut.
□: 206 - 284 N·m
(21 - 29 kg-m, 152 - 210 ft-lb)



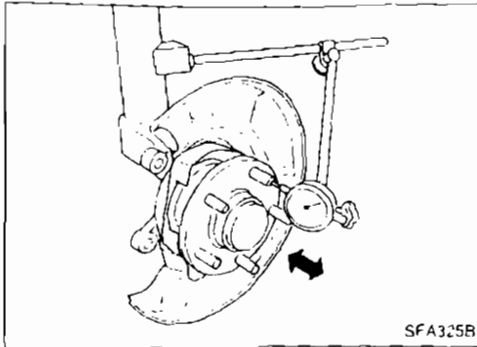
- Clinch two places of lock nut.

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FRONT AXLE

Wheel Hub and Knuckle (Cont'd)

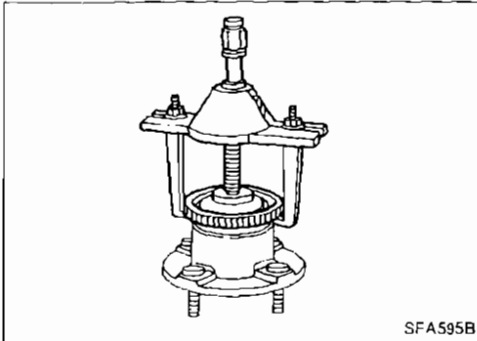
- Check wheel bearing axial end play.
Axial end play: 0.05 mm (0.0020 in) or less



ABS Sensor Rotor

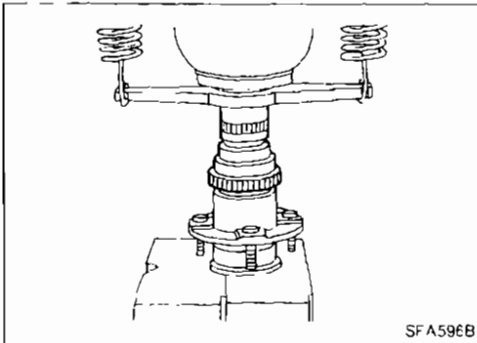
REMOVAL

Remove ABS sensor rotor (models equipped with ABS) or labyrinth plate (models without ABS) with suitable tool.



INSTALLATION

Press-fit ABS sensor rotor or labyrinth plate.

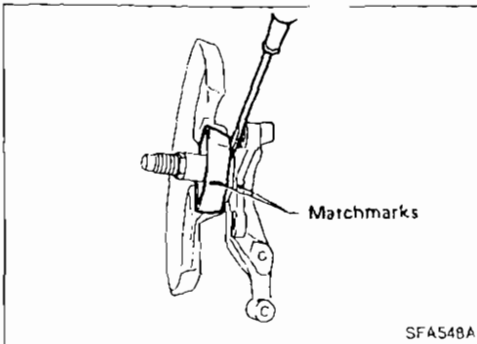


Baffle Plate

REMOVAL

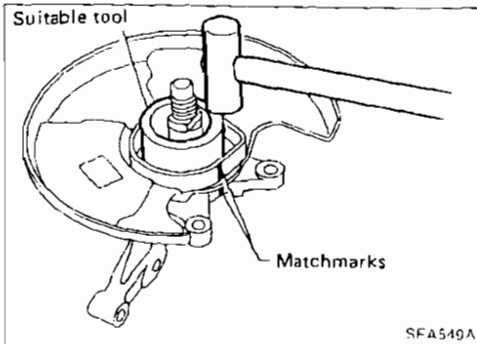
- Mark matchmarks on baffle plate before removing.
- If baffle plate replacement requires removal of knuckle spindle, separate it equally using a screwdriver.

Be careful not to scratch knuckle spindle.



INSTALLATION

With matchmarks aligned, install baffle plate by tapping it with a copper hammer and a suitable tool.

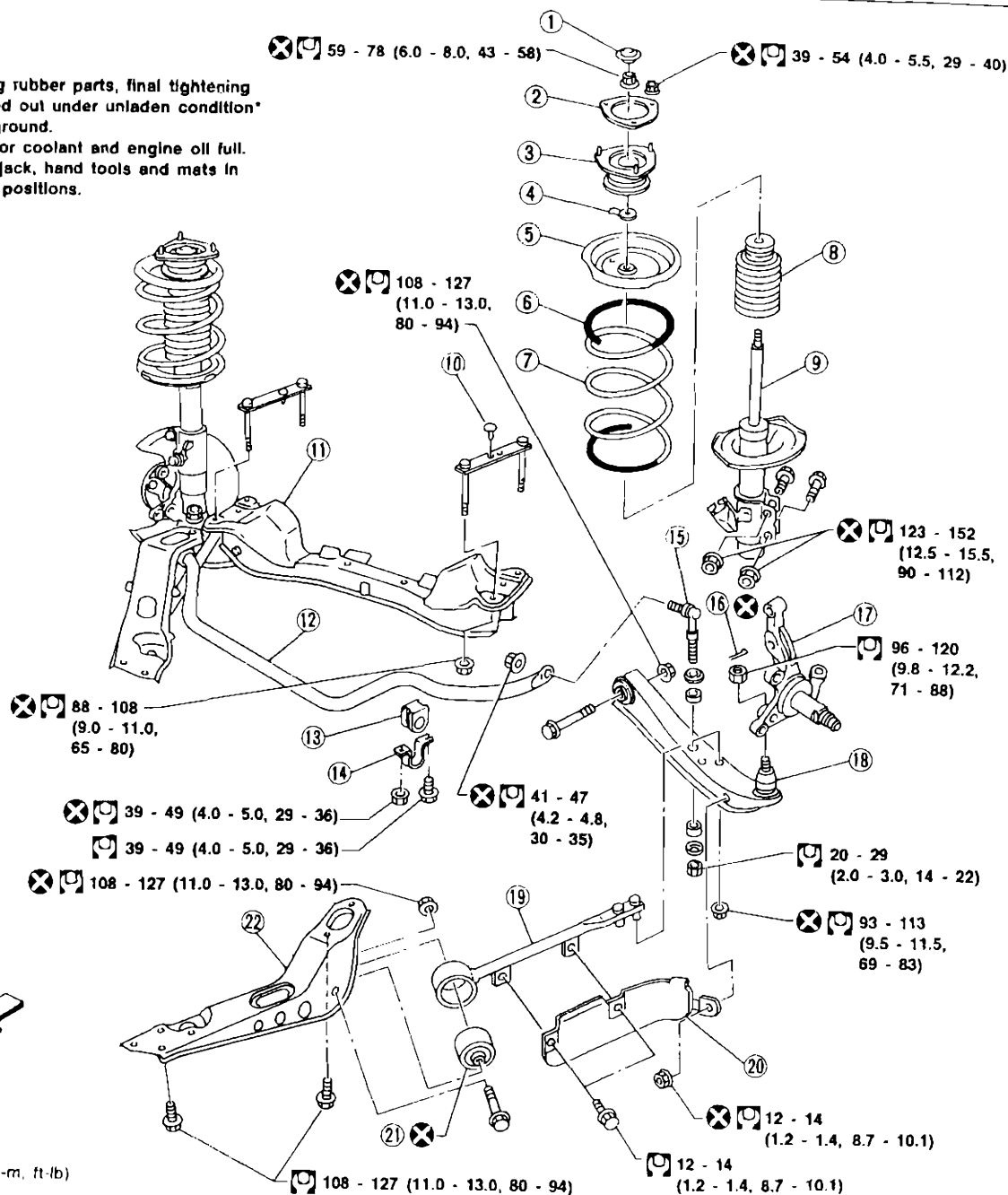


FRONT SUSPENSION

SEC. 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.

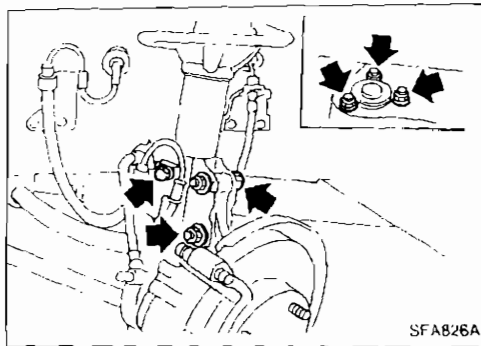


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| ① Cap | ⑨ Strut assembly | ⑯ Cotter pin |
| ② Gasket | ⑩ Plastic clip | ⑰ Knuckle spindle |
| ③ Strut mounting insulator | ⑪ Front suspension member | ⑱ Transverse link with ball joint |
| ④ Lock washer | ⑫ Stabilizer | ⑲ Tension rod |
| ⑤ Upper seat | ⑬ Bushing | ⑳ Air guide |
| ⑥ (Polyurethane tube) | ⑭ Clamp | ㉑ Tension rod bushing |
| ⑦ Coil spring | ⑮ Stabilizer connecting rod | ㉒ Tension rod bracket |
| ⑧ Bound bumper | | |

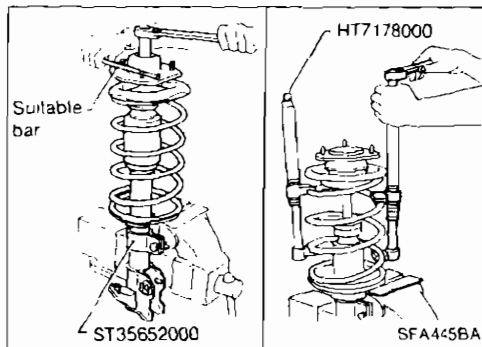
FRONT SUSPENSION



Coil Spring and Strut Assembly

REMOVAL

Remove strut assembly fixing bolts and nuts (to hoodledge).
Do not remove piston rod lock nut on vehicle.

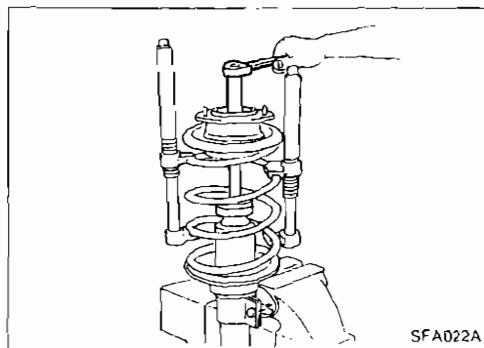


DISASSEMBLY

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

Do not remove piston rod lock nut.

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



3. Remove piston rod lock nut.

INSPECTION

Strut assembly

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

Strut mounting insulator

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

Lock washer

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

Coil spring

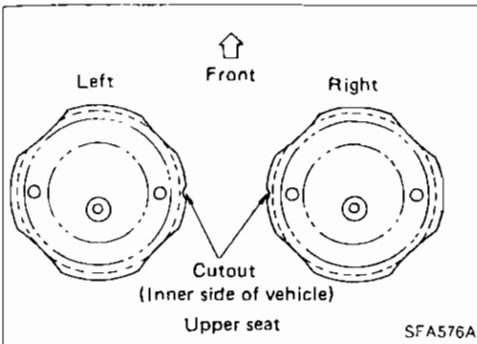
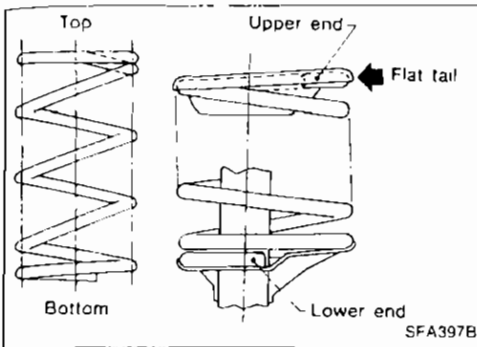
Check for cracks, deformation or other damage. Replace if necessary.

FRONT SUSPENSION

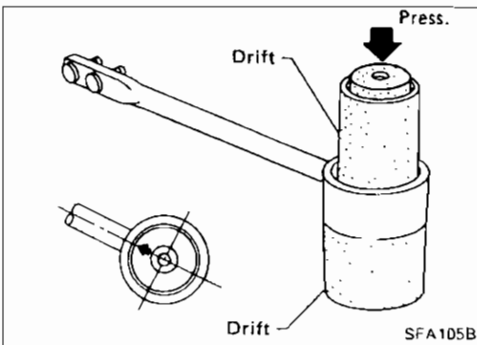
Coil Spring and Strut Assembly (Cont'd)

ASSEMBLY

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



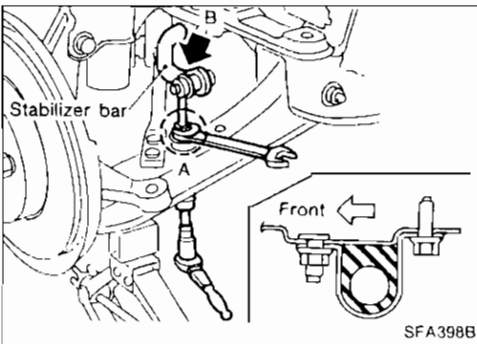
- Install upper spring seat with its cutout facing the inner side of vehicle.



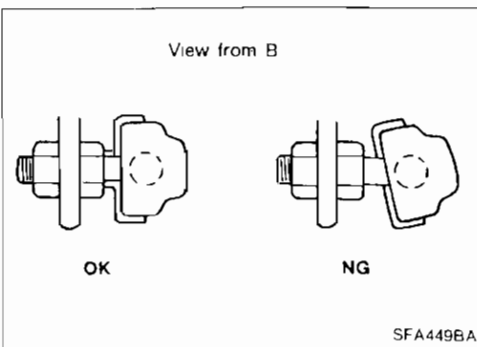
Tension Rod and Stabilizer Bar

REMOVAL AND INSTALLATION

- Remove tension rod and stabilizer bar.
- Place one 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.



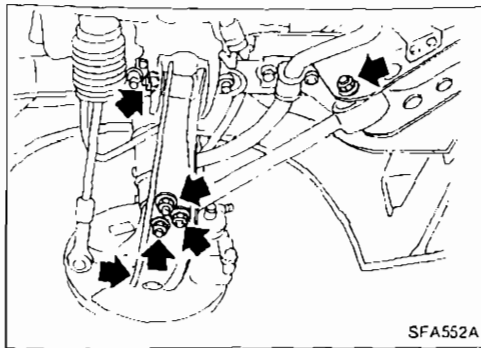
- Install stabilizer rear side bushings, then install front side bushings. When installing stabilizer bar clamp, make sure direction is correct (as shown at left).
- When removing and installing stabilizer bar, fix portion A.



- Install stabilizer bar with ball joint socket properly placed.

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FRONT SUSPENSION



Transverse Link and Lower Ball Joint

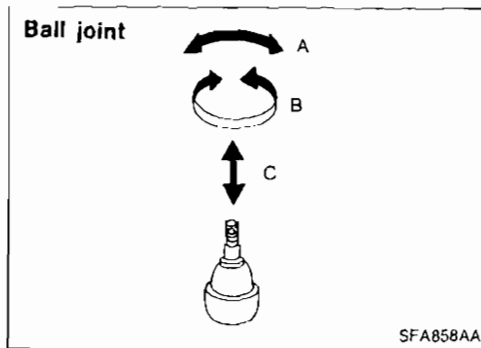
REMOVAL AND INSTALLATION

- Remove stabilizer, tension rod, ball joint and transverse link assembly.
- During installation, final tightening must be carried out at curb weight with tires on ground.
- After installation, check wheel alignment. Refer to "Front Wheel Alignment" of ON-VEHICLE SERVICE (FA-5).

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 play. Replace transverse link assembly in any of the following cases: Ball stud is worn, play in axial direction is excessive or joint is hard to swing. Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.
 - Swinging force "A": Refer to SDS (FA-15). (measuring point: cotter pin hole of ball stud)**
 - Turning torque "B": Refer to SDS (FA-15).**
 - Vertical end play "C": Refer to SDS (FA-15).**
- Check dust cover for damage. Replace it if necessary.

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

COIL SPRING

	Unit mm (in)
Applied model	All
Wire diameter	13.1 (0.516)
Coil outer diameter	183.2 (7.21)
Free length	310 (12.20)
Identification color	White x 1, White x 2

STRUT

	Unit mm (in)
Applied model	All
Piston rod diameter	22 (0.87)

FRONT STABILIZER BAR

	Unit mm (in)
Applied model	All
Stabilizer diameter	26.5 (1.043)
Identification color	Red

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Applied model	Europe	Australia	Except Europe and Australia
Camber degree	-1°35' to -0°05'	-1°30' to 0°	
Caster degree	5°55' - 7°25'	6°00' - 7°30'	
Toe-in			
A B	1 - 3	1.5 - 3.5	
mm (in)	(0.04 - 0.12)	(0.059 - 0.138)	
Total angle 2θ degree	5' - 16'	8' - 19'	
Kingpin inclination degree	12°55' - 14°25'		12°50' - 14°20'
Front wheel turning angle			
Full turn*2 inside/outside degree	39° - 43°/ 33°05'	39° - 43°/33°10'	

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

*2 On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine at idle

WHEEL BEARING

Wheel bearing axial end play 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)

LOWER BALL JOINT

Swinging force "A" (Measuring point: cotter pin hole of ball stud) N (kg, lb)	23.5 - 79.4 (2.4 - 8.1, 5.3 - 17.9)
Turning torque "B" N·m (kg·cm, in·lb)	1.5 - 4.9 (15 - 50, 13 - 43)
Vertical end play "C" mm (in)	0 (0)

WHEEL RUNOUT (Radial and lateral)

Wheel type	Radial runout	Lateral runout
Aluminum wheel mm (in)	0.3 (0.012) or less	
Steel wheel mm (in)	0.7 (0.028) or less	1.0 (0.039) or less

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