SECTION FSU
FRONT SUSPENSION

CONTENTS

2WD

AWD

PRECAUTIONS

PFP:00001

Caution

NES000I6

- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Oil might shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
  - Unladen conditions mean that fuel, engine coolant and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.
- After servicing suspension parts, be sure to check wheel alignment.
- Self-lock nuts are not reusable. Always use new ones when installing. Since new self-lock nuts are pre-oiled, tighten as they are.

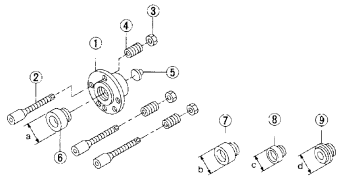
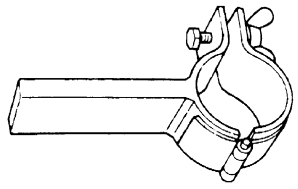
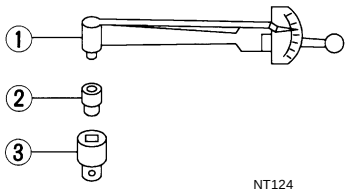
PREPARATION

PFP:00002

Special Service Tools [SST]

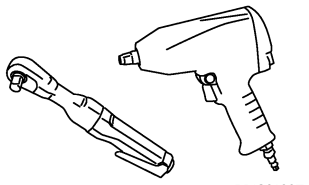
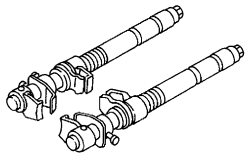
NES000I7

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
KV991040S0 (—) CCK gauge attachment 1. Plate 2. Guide bolt 3. Nut 4. Spring 5. Center plate 6. KV99104020 Adapter A a: 72 mm (2.83 in) dia. 7. KV99104030 Adapter B b: 65 mm (2.56 in) dia. 8. KV99104040 Adapter C c: 57 mm (2.24 in) dia. 9. KV99104050 Adapter D d: 53.4 mm (2.102 in) dia.  S-NT498	Measuring wheel alignment
ST35652000 (—) Strut attachment  ZZA0807D	Disassembling and assembling shock absorber
ST3127S000 (See J-25765-A) Preload Gauge 1. GG91030000 (J-25765-A) Torque wrench 2. HT62940000 (—) Socket adapter 3. HT62900000 (—) Socket adapter  NT124	Measuring rotating torque of ball joint

Commercial Service Tools

NES000I8

Tool name	Description
Power tool  PBIC0190E	● Removing wheel nuts ● Removing torque member fixing bolts ● Removing undercover ● Removing front suspension components parts ● Removing hub lock nut
Spring compressor  S-NT717	Removing and installing coil spring

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

NES000I9

Use chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			FSU-8	FSU-12	—	—	—	FSU-8	FSU-6	FSU-18	NVH in PR section	NVH in FAX and FSU section	NVH in WT section	NVH in BR section	NVH in PS section
Possible cause and SUSPECTED PARTS			Improper installation, looseness	Strut deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	PROPELLER SHAFT	FRONT AXLE AND FRONT SUSPENSION	ROAD WHEEL	BRAKES	STEERING
Symptom	FRONT SUSPENSION	Noise	×	×	×	×	×	×			×	×	×	×	×
		Shake	×	×	×	×		×			×	×	×	×	×
		Vibration	×	×	×	×	×				×	×			×
		Shimmy	×	×	×	×			×			×	×	×	×
		Judder	×	×	×							×	×	×	×
		Poor quality ride or handling	×	×	×	×	×		×	×		×	×		

×: Applicable

FRONT SUSPENSION ASSEMBLY

PFP:54010

On-Vehicle Inspection and Service

NES000IA

Make sure the mounting conditions (looseness, back lash) of each component and component conditions (wear, damage) are normal.

INSPECTION OF LOWER BALL JOINT END PLAY

1. Set front wheels in a straight-ahead position. Do not depress brake pedal.
2. Place an iron bar or similar tool between transverse link and steering knuckle.
3. Measure axial end play by prying it up and down.

Axial end play : 0 mm (0 in)

CAUTION:
Be careful not to damage ball joint boot. Do not damage the installation position by applying excessive force.

SHOCK ABSORBER INSPECTION

Check for oil leakage, damage and breakage of installation positions.

Wheel Alignment Inspection

NES000IB

DESCRIPTION

Measure wheel alignment under unladen conditions.

NOTE:
“Unladen conditions” means that fuel, engine coolant, and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.

PRELIMINARY CHECK

Check the following:

1. Tires for improper air pressure and wear.
2. Road wheels for runout. Refer to WT-6, "ROAD WHEEL" .
3. Wheel bearing axial end play. Refer to FAX-5, "WHEEL BEARING INSPECTION" .
4. Transverse link ball joint axial end play. Refer to FSU-14, "INSPECTION AFTER REMOVAL" .
5. Shock absorber operation.
6. Each mounting part of axle and suspension for looseness and deformation.
7. Each of suspension member, shock absorber, upper link and transverse link for cracks, deformation and other damage.
8. Vehicle height (posture).

GENERAL INFORMATION AND RECOMMENDATIONS

- A four-wheel thrust alignment should be performed.
  - This type of alignment is recommended for any NISSAN/INFINITI vehicle.
  - The four-wheel “thrust” process helps ensure that the vehicle is properly aligned and the steering wheel is centered.
  - The alignment rack itself should be capable of accepting any NISSAN/INFINITI vehicle.
  - The rack should be checked to ensure that it is level.
- Make sure the machine is properly calibrated.
  - Your alignment equipment should be regularly calibrated in order to give correct information.
  - Check with the manufacturer of your specific equipment for their recommended Service/Calibration Schedule.

THE ALIGNMENT PROCESS

IMPORTANT:

Use only the alignment specifications listed in this Service Manual.

- When displaying the alignment settings, many alignment machines use “indicators”: (Green/red, plus or minus, Go/No Go). **Do NOT use these indicators.**
  - The alignment specifications programmed into your machine that operate these indicators may not be correct.
  - This may result in an ERROR.
- Some newer alignment machines are equipped with an optional “Rolling Compensation” method to “compensate” the sensors (alignment targets or head units). **DO NOT use this “Rolling Compensation” method.**
  - Use the “Jacking Compensation Method”. After installing the alignment targets or head units, raise the vehicle and rotate the wheels 1/2 turn both ways.
  - See Instructions in the alignment machine you're using for more information on this.

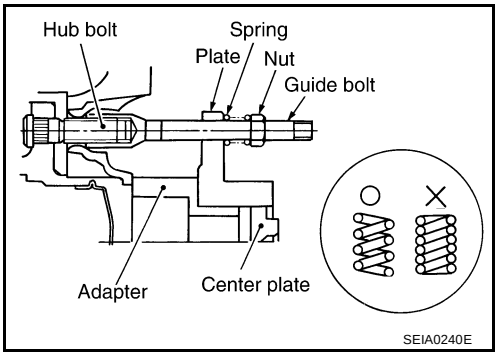
INSPECTION OF CAMBER, CASTER AND KINGPIN INCLINATION ANGLES

- Camber, caster, kingpin inclination angles cannot be adjusted.
- Before inspection, mount front wheels onto turning radius gauge. Mount rear wheels onto a stand that has same height so vehicle will remain horizontal.

Using a CCK Gauge

Install the CCK gauge attachment [SST: KV991040S0 (–)] with the following procedure on wheel, then measure wheel alignment.

1. Remove three wheel nuts, and install the guide bolts to hub bolt.
2. Screw the adapter into the plate until it contacts the plate tightly.
3. Screw the center plate into the plate.
4. Insert the plate assembly on the guide bolt. Put the spring in, and then evenly screw the three guide bolt nuts. When fastening the guide nuts, do not completely compress the spring.



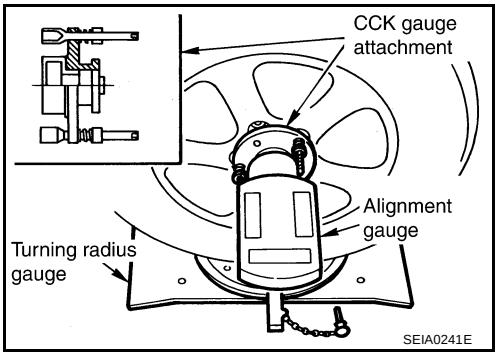
5. Place the dent of alignment gauge onto the projection of the center plate and tightly contact them to measure.

Camber, caster, kingpin inclination angles:

Refer to FSU-19, "SERVICE DATA AND SPECIFICATIONS (SDS)" .

CAUTION:

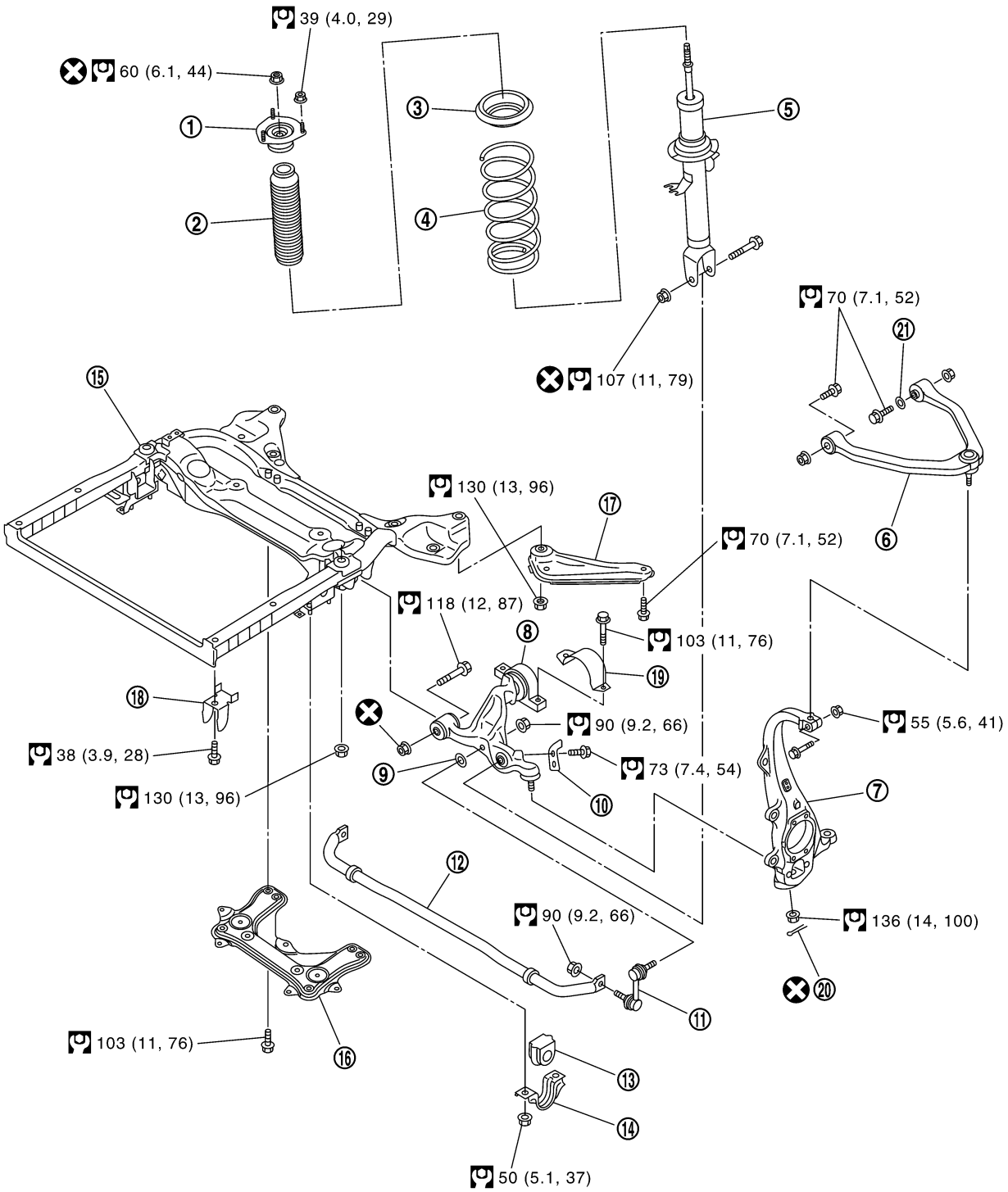
- **If camber, caster, or kingpin inclination angle is outside the standard, check front suspension parts for wear and damage. Replace suspect parts if a malfunction is detected.**
- **Kingpin inclination angle is reference value, no inspection is required.**



Components

NES000IC

SEC.400•401•406



1. Shock absorber mounting bracket	2. Bound bumper	3. Rubber seat
4. Coil spring	5. Shock absorber	6. Upper link
7. Steering knuckle	8. Transverse link	9. Washer
10. Steering stopper bracket	11. Stabilizer connecting rod	12. Stabilizer bar
13. Stabilizer bushing	14. Stabilizer clamp	15. Front suspension member
16. Rack stay	17. Member stay	18. Member bracket
19. Clamp	20. Cotter pin	21. Stopper rubber

Refer to GI section for symbol marks in the figure. Refer to GI-9, "HOW TO USE THIS MANUAL" .

Removal and Installation

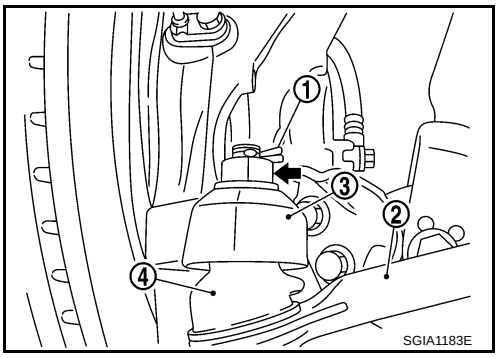
NES000ID

REMOVAL

1. For VK45DE engine models, disconnect related electric wires and hoses from engine assembly to remove front suspension member with engine assembly. Refer to EM-244, "ENGINE ASSEMBLY" .
2. Remove cowl top panel and hood. Refer to EI-18, "COWL TOP" , EI-17, "HOOD" .
3. For VQ35DE engine models, install engine slinger, and then hoist engine. Refer to EM-113, "Removal and Installation (2WD Models)" .
4. Remove tires from vehicle with a power tool.
5. Remove wheel sensor from steering knuckle. Refer to BRC-57, "WHEEL SENSOR" .

   CAUTION:
   Do not pull on wheel sensor harness.
6. Remove brake hose bracket. Refer to BR-12, "BRAKE TUBE AND HOSE" .
7. Remove undercover with a power tool.
8. Remove cotter pin (1), and then loosen the nut.
9. Remove steering outer socket (2) from steering knuckle (3) so as not to damage ball joint boot (4) using the ball joint remover (suitable tool).

   CAUTION:
   Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover (suitable tool) from suddenly coming off.



10. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
11. Separate steering gear assembly and lower joint. Refer to PS-13, "STEERING COLUMN" .
12. Remove rack stay. Refer to FSU-8, "Components" .
13. Remove steering hydraulic piping bracket from front suspension member. Refer to PS-38, "HYDRAULIC LINE" .
14. Remove the mounting nut and bolt on the lower side of shock absorber with a power tool, and then remove shock absorber from transverse link.
15. Remove cotter pin of transverse link and steering knuckle, and then loosen nut.
16. Set jack under front suspension member.
17. Remove transverse link from steering knuckle so as not to damage ball joint boot using the ball joint remover (suitable tool)

    CAUTION:
    Temporarily tighten the nut to prevent damage to threads and to prevent ball joint remover (suitable tool) from suddenly coming off.
18. Remove the mounting nuts of engine mounting insulator. Refer to EM-113, "ENGINE ASSEMBLY" .
19. Remove the mounting bolts of member bracket, and then remove member bracket from front suspension member with a power tool. Refer to FSU-8, "Components" .
20. Remove the mounting nut and bolts of member stay, and then remove member stay from front suspension member and vehicle with a power tool.
21. Remove the mounting nut of front suspension member with a power tool. Refer to FSU-8, "Components" .
22. For VQ35DE engine models, gradually lower a jack to remove front suspension assembly from vehicle.

For VK45DE engine models, gradually lower a jack to remove front suspension assembly with engine assembly from vehicle.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-8, "Components" .
- Perform final tightening of each of parts (rubber bushing), under unladen conditions, which were removed when removing front suspension assembly. Check wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .
- Check wheel sensor harness for proper connection. Refer to BRC-57, "WHEEL SENSOR" .

COIL SPRING AND SHOCK ABSORBER

PFP:55302

Removal and Installation

NES000IE

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove harness of wheel sensor from shock absorber. Refer to BRC-57, "WHEEL SENSOR" .

   CAUTION:
   Do not pull on wheel sensor harness.
3. Remove brake hose bracket. Refer to BR-12, "BRAKE TUBE AND HOSE" .
4. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
5. Remove mounting nut and bolt on the lower side of shock absorber with a power tool, and then remove shock absorber from transverse link.
6. Remove cotter pin of transverse link and steering knuckle, and then loosen nut.
7. Remove transverse link from steering knuckle so as not to damage ball joint boot using the ball joint remover (suitable tool).

   CAUTION:
   Temporarily tighten the nut to prevent damage to threads and to prevent ball joint remover (suitable tool) from suddenly coming off.
8. Remove the mounting nuts of shock absorber mounting bracket, then remove shock absorber from vehicle.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-8, "Components" .
- Perform final tightening of bolt and nut at the shock absorber lower side (rubber bushing), under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .
- Check wheel sensor harness for proper connection. Refer to BRC-57, "WHEEL SENSOR" .

Disassembly and Assembly

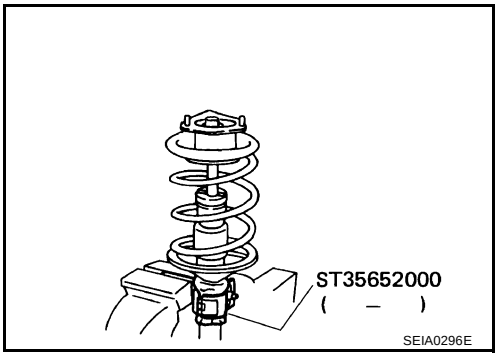
NES000IF

DISASSEMBLY

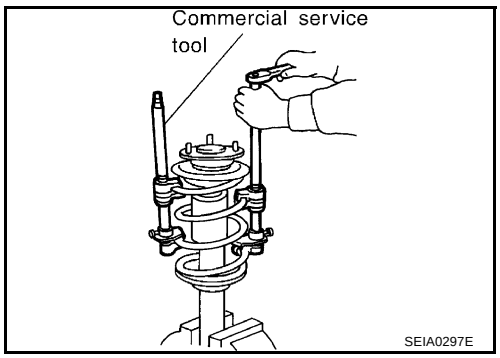
CAUTION:
Do not damage shock absorber piston rod when removing components from shock absorber.

1. Install strut attachment [SST] to shock absorber and secure it in a vise.

   CAUTION:
   When installing the strut attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.



2. Using a spring compressor (commercial service tool), compress coil spring between rubber seat and spring lower seat (on shock absorber) until coil spring with a spring compressor is free.



CAUTION:
Be sure a spring compressor is securely attached coil spring. Compress coil spring

3. Make sure coil spring with a spring compressor between rubber seat and spring lower seat (shock absorber) is free and then remove piston rod lock nut while securing the piston rod tip so that piston rod does not turn.
4. Remove shock absorber mounting bracket, rubber seat, bound bumper from shock absorber.
5. Remove coil spring with a spring compressor, and then gradually release a spring compressor.

CAUTION:
Loosen while making sure coil spring attachment position does not move.

6. Remove the strut attachment from shock absorber.

INSPECTION AFTER DISASSEMBLY

Shock Absorber Inspection

Check the following:

- Shock absorber for deformation, cracks or damage, and replace it if a malfunction is detected.
- Piston rod for damage, uneven wear or distortion, and replace it if a malfunction is detected.
- For oil leakage, and replace it if a malfunction is detected.

Shock Absorber Mounting Bracket and Rubber Parts Inspection

Check shock absorber mounting bracket for cracks and rubber parts for wear. Replace it if a malfunction is detected.

Coil Spring Inspection

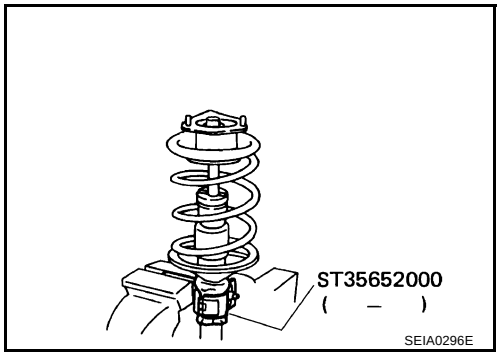
Check coil spring for cracks, wear or damage, and replace it if a malfunction is detected.

ASSEMBLY

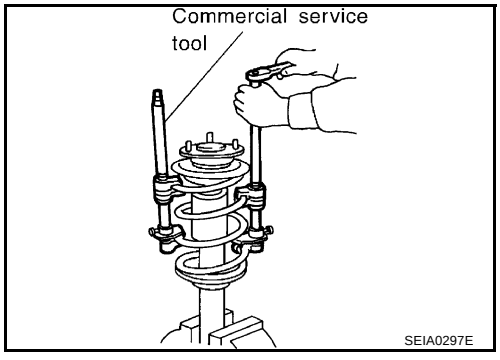
CAUTION:
Do not damage shock absorber piston rod when installing components to shock absorber.

1. Install strut attachment [SST] to shock absorber and secure it in a vise.

CAUTION:
When installing the strut attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.

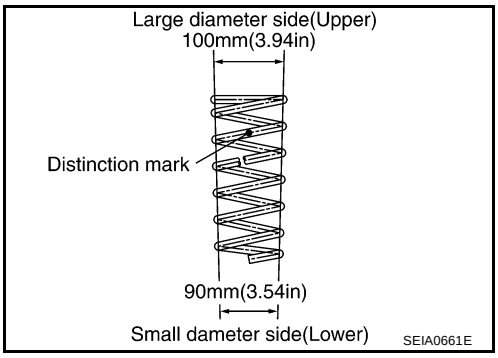


2. Compress coil spring using a spring compressor (commercial service tool), and install it onto shock absorber.



CAUTION:

- **Install coil spring as shown in the figure with large diameter side [100 mm (3.94 in)] up and small diameter side [90 mm (3.54 in)] down. (Distinction marks are 4.75 and 5.75 turn from the lower side end.)**
- **Be sure a spring compress or is securely attached to coil spring. Compress coil spring.**

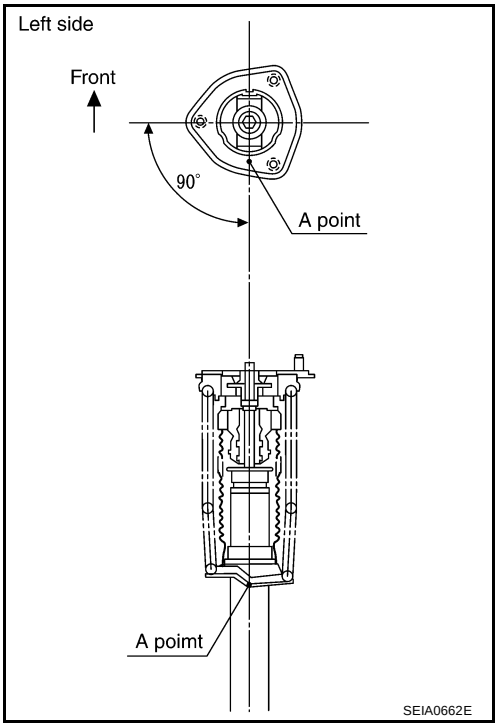


3. Apply soapy water to bound bumper. Insert bound bumper into shock absorber mounting bracket, and then install it to shock absorber together with rubber seat.

CAUTION:

Do not use machine oil.

- Install shock absorber mounting bracket as shown in the figure.



CAUTION:

- **Coil spring is securely seated in spring mounting groove of rubber seat.**
- **The bottom part of spring should be at the position of A point of spring seat.**

4. Secure piston rod tip so that piston rod does not turn, then tighten piston rod lock nut with specified torque.
5. Gradually release a spring compressor, and remove coil spring.

CAUTION:

Loosen while making sure coil spring attachment position does not move.

6. Remove the strut attachment from shock absorber.

TRANSVERSE LINK

PFP:54500

Removal and Installation

NES000IG

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove undercover with a power tool.
3. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
4. Separate steering gear assembly and lower joint. Refer to PS-13, "STEERING COLUMN" .
5. Remove rack stay. Refer to FSU-8, "Components" .
6. Remove the mounting nut and bolt on the lower side of shock absorber with a power tool, and then remove shock absorber from transverse link.
7. Remove transverse link from steering knuckle. Refer to FAX-5, "Removal and Installation" .
8. Set jack under front suspension member.
9. Remove the mounting bolts of member bracket, and then remove member bracket from front suspension member with a power tool. Refer to FSU-8, "Components" .
10. Remove the mounting nut and bolts of member stay, and then remove member stay from front suspension member and vehicle with a power tool.
11. Remove the mounting nut of front suspension member with a power tool. Refer to FSU-8, "Components" .
12. Gradually lower the suspension member to the position where transverse link mounting bolts is remove.

    CAUTION:
    Be careful not to lower it too far. (Do not overload the links)
13. Remove mounting nut and bolts, and then remove transverse link from vehicle.

INSPECTION AFTER REMOVAL

Visual Inspection

Check the following:

- Transverse link and bushing for deformation, cracks or damage. Replace it if a malfunction is detected.
- Ball joint boot for cracks or other damage, and also for grease leakage. Replace it if a malfunction is detected.

Ball Joint Inspection

Manually move ball stud to confirm it moves smoothly with no binding.

Swing Torque Inspection

NOTE:
Before measurement, move ball stud at least ten times by hand to check for smooth movement.

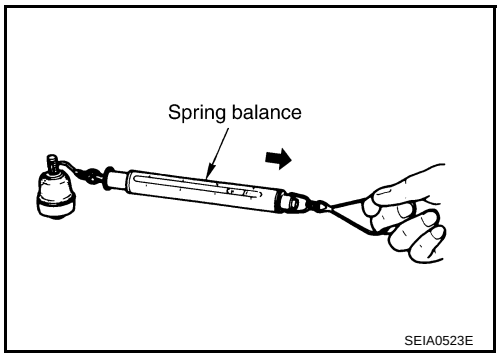
- Hook a spring balance at cotter pin mounting hole. Confirm spring balance measurement value is within specifications when ball stud begins moving.

  Swing torque

  : 0.5 - 3.6 N·m (0.06 - 0.36 kg-m, 5 - 31 in-lb)

  Spring balance measurement

  : 7.8 - 56.3 N (0.8 - 5.7 kg, 1.8 - 12.5 lb)



- If it is outside the specified range, replace transverse link assembly.

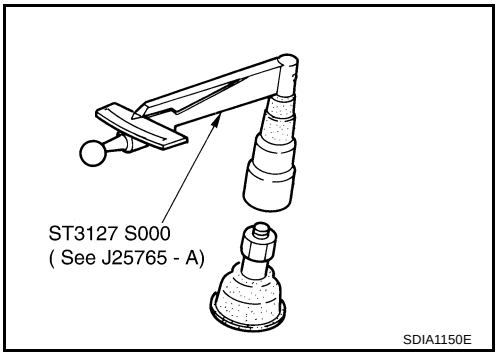
Rotating Torque Inspection

- Attach mounting nut to ball stud. Make sure that rotating torque is within specifications with a preload gauge [SST].

  Rotating torque

  : 0.5 - 3.9 N·m (0.06 - 0.39 kg-m, 5 - 34 in-lb)

- If it is outside the specified range, replace transverse link assembly.



Axial End Play Inspection

- Move tip of ball stud in axial direction to check for looseness.

  Axial end play : 0 mm (0 in)

- If it is outside the specified range, replace transverse link assembly.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-8, "Components" .
- Perform final tightening of bolts and nuts at the front suspension member installation position and the shock absorber lower side (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .

UPPER LINK

PFP:54524

Removal and Installation

NES000IH

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove shock absorber. Refer to FSU-11, "COIL SPRING AND SHOCK ABSORBER" .
3. Remove mounting nut and bolt with a power tool, and then remove upper link from steering knuckle.
4. Remove mounting nuts and bolts, and then remove upper link and stopper rubber from vehicle.

INSPECTION AFTER REMOVAL

Visual Inspection

Check the following:

- Upper link and bushing for deformation, cracks or damage. Replace it if a malfunction is detected.
- Ball joint boot for cracks or other damage, and also for grease leakage. Replace it if a malfunction is detected.

Ball Joint Inspection

Manually move ball stud to confirm it moves smoothly with no binding.

Swing Torque Inspection

NOTE:

Before measurement, move ball stud at least ten times by hand to check for smooth movement.

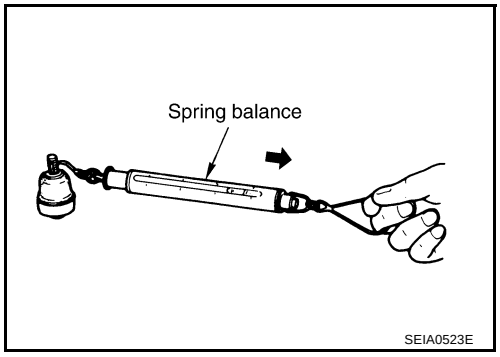
- Hook a spring balance at cutout on ball stud. Confirm spring balance measurement value is within specifications when ball stud begins moving.

  Swing torque

  : 0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)

  Spring balance measurement

  : 0 - 61.5 N (0 - 6.2 kg, 0 - 13.6 lb)



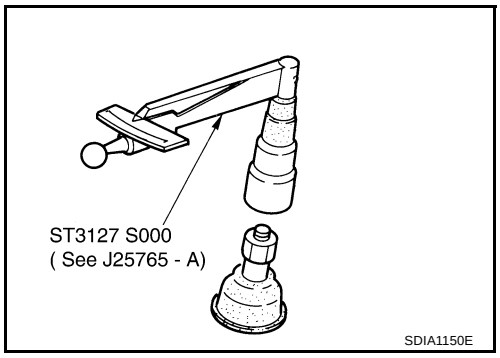
- If it is outside the specified range, replace upper link assembly.

Rotating Torque Inspection

- Attach mounting nut to ball stud. Make sure that rotating torque is within specifications with a preload gauge [SST].

  Rotating torque

  : 0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)



- If it is outside the specified range, replace upper link assembly.

Axial End Play Inspection

- Move tip of ball stud in axial direction to check for looseness.

  Axial end play : 0 mm (0 in)

- If it is outside the specified range, replace upper link assembly.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-8, "Components" .
- Perform final tightening of bolts and nuts at the vehicle installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .

- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .

STABILIZER BAR

PFP:54611

Removal and Installation

NES000II

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove undercover with a power tool.
3. Remove the mounting nut on the lower side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from stabilizer bar.
4. If necessary remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
5. Remove the mounting nuts of stabilizer clamp, and then remove stabilizer clamp and stabilizer bushing.
6. Remove stabilizer bar from vehicle.

INSPECTION AFTER REMOVAL

Check stabilizer bar, stabilizer connecting rod, stabilizer bushing and stabilizer clamp for deformation, cracks or damage. Replace it if a malfunction is detected.

INSTALLATION

Installation is the reverse order of removal. For tightening torque, refer to FSU-8, "Components" .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Wheel Alignment (Unladen)

NES000IJ

Tire			245/45R18	245/40R19
Camber Degree minute (Decimal degree)		Minimum	– 1° 00′ (– 1.00°)	
		Nominal	– 0° 15′ (– 0.25°)	
		Maximum	0° 30′ (0.50°)	
		Left and right difference	33′ (0.55°) or less	
Caster Degree minute (Decimal degree)		Minimum	3° 45′ (3.75°)	3° 50′ (3.83°)
		Nominal	4° 30′ (4.50°)	4° 35′ (4.58°)
		Maximum	5° 15′ (5.25°)	5° 20′ (5.33°)
		Left and right difference	39′ (0.65°) or less	
Kingpin inclination Degree minute (Decimal degree)		Minimum	6° 30′ (6.50°)	
		Nominal	7° 15′ (7.25°)	
		Maximum	8° 00′ (8.00°)	
Total toe-in	Distance	Minimum	0 mm (0 in)	
		Nominal	1 mm (0.04 in)	
		Maximum	2 mm (0.08 in)	
	Angle (left plus right) Degree minute (Degree)	Minimum	0′ (0°)	
		Nominal	3′ (0.05°)	
		Maximum	6′ (0.10°)	

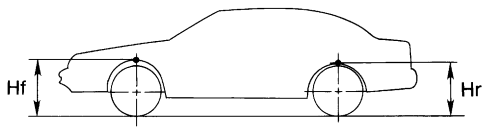
Ball Joint

NES000IK

Swing torque	Transverse link	0.5 - 3.6 N·m (0.06 - 0.36 kg-m, 5 - 31 in-lb)
	Upper link	0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)
Measurement on spring balance	Transverse link	7.8 - 56.3 N (0.8 - 5.7 kg, 1.8 - 12.5 lb)
	Upper link	0 - 61.5 N (0 - 6.2 kg, 0 - 13.6 lb)
Rotating torque	Transverse link	0.5 - 3.9 N·m (0.06 - 0.39 kg-m, 5 - 34 in-lb)
	Upper link	0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)
Axial end play		0 mm (0 in)

Wheelarch Height (Unladen*)

NES000IL



SFA818A

Tire		245/45R18	245/40R19
Front (Hf)	USA	717 mm (28.23 in)	721 mm (28.39 in)
	CANADA	718 mm (28.27 in)	
Rear (Hr)	USA	710 mm (27.95 in)	711 mm (27.99 in)
	CANADA	711 mm (27.99 in)	

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

PRECAUTIONS

PFP:00001

Caution

NES000IM

- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Oil might shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
  - Unladen conditions mean that fuel, engine coolant and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.
- After servicing suspension parts, be sure to check wheel alignment.
- Self-lock nuts are not reusable. Always use new ones when installing. Since new self-lock nuts are pre-oiled, tighten as they are.

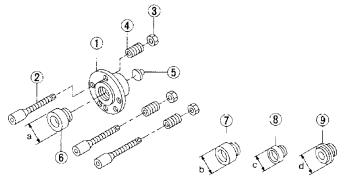
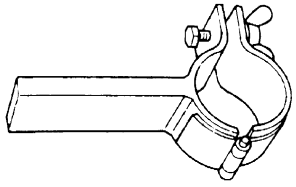
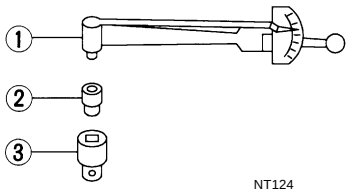
PREPARATION

PFP:00002

Special Service Tools [SST]

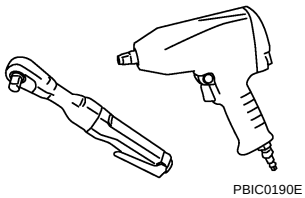
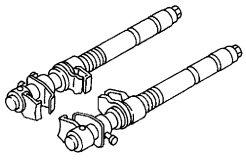
NES000IN

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
KV991040S0 (—) CCK gauge attachment 1. Plate 2. Guide bolt 3. Nut 4. Spring 5. Center plate 6. KV99104020 Adapter A a: 72 mm (2.83 in) dia. 7. KV99104030 Adapter B b: 65 mm (2.56 in) dia. 8. KV99104040 Adapter C c: 57 mm (2.24 in) dia. 9. KV99104050 Adapter D d: 53.4 mm (2.102 in) dia.  S-NT498	Measuring wheel alignment
ST35652000 (—) Strut attachment  ZZA0807D	Disassembling and assembling shock absorber
ST3127S000 (See J-25765-A) Preload Gauge 1. GG91030000 (J-25765-A) Torque wrench 2. HT62940000 (—) Socket adapter 3. HT62900000 (—) Socket adapter  NT124	Measuring rotating torque of ball joint

Commercial Service Tools

NES000IO

Tool name	Description
Power tool  PBIC0190E	● Removing wheel nuts ● Removing torque member fixing bolts ● Removing undercover ● Removing front suspension components parts ● Removing hub lock nut
Spring compressor  S-NT717	Removing and installing coil spring

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

NES000IP

Use chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			FSU-25	FSU-29	—	—	—	FSU-25	FSU-23	FSU-35	NVH in PR section	NVH in RFD section	NVH in FAX and FSU section	NVH in WT section	NVH in FAX section	NVH in BR section	NVH in PS section
Possible cause and SUSPECTED PARTS			Improper installation, looseness	Strut deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	PROPELLER SHAFT	DIFFERENTIAL	FRONT AXLE AND FRONT SUSPENSION	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	FRONT SUSPENSION	Noise	×	×	×	×	×	×			×	×	×	×	×	×	×
		Shake	×	×	×	×		×			×		×	×	×	×	×
		Vibration	×	×	×	×	×				×		×		×		×
		Shimmy	×	×	×	×			×				×	×		×	×
		Judder	×	×	×								×	×		×	×
		Poor quality ride or handling	×	×	×	×	×		×	×			×	×			

×: Applicable

FRONT SUSPENSION ASSEMBLY

PFP:54010

On-Vehicle Inspection and Service

NES000IQ

Make sure the mounting conditions (looseness, back lash) of each component and component conditions (wear, damage) are normal.

INSPECTION OF LOWER BALL JOINT END PLAY

1. Set front wheels in a straight-ahead position. Do not depress brake pedal.
2. Place an iron bar or similar tool between transverse link and steering knuckle.
3. Measure axial end play by prying it up and down.

Axial end play : 0 mm (0 in)

CAUTION:
Be careful not to damage ball joint boot. Do not damage the installation position by applying excessive force.

SHOCK ABSORBER INSPECTION

Check for oil leakage, damage and breakage of installation positions.

Wheel Alignment Inspection

NES000IR

DESCRIPTION

Measure wheel alignment under unladen conditions.

NOTE:
“Unladen conditions” means that fuel, engine coolant, and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.

PRELIMINARY CHECK

Check the following:

1. Tires for improper air pressure and wear.
2. Road wheels for runout. Refer to WT-6, "ROAD WHEEL" .
3. Wheel bearing axial end play. Refer to FAX-5, "WHEEL BEARING INSPECTION" .
4. Transverse link ball joint axial end play. Refer to FSU-31, "INSPECTION AFTER REMOVAL" .
5. Shock absorber operation.
6. Each mounting part of axle and suspension for looseness and deformation.
7. Each of suspension member, shock absorber, upper link and transverse link for cracks, deformation and other damage.
8. Vehicle height (posture).

GENERAL INFORMATION AND RECOMMENDATIONS

- A four-wheel thrust alignment should be performed.
  - This type of alignment is recommended for any NISSAN/INFINITI vehicle.
  - The four-wheel “thrust” process helps ensure that the vehicle is properly aligned and the steering wheel is centered.
  - The alignment rack itself should be capable of accepting any NISSAN/INFINITI vehicle.
  - The rack should be checked to ensure that it is level.
- Make sure the machine is properly calibrated.
  - Your alignment equipment should be regularly calibrated in order to give correct information.
  - Check with the manufacturer of your specific equipment for their recommended Service/Calibration Schedule.

THE ALIGNMENT PROCESS

IMPORTANT:

Use only the alignment specifications listed in this Service Manual.

- When displaying the alignment settings, many alignment machines use “indicators”: (Green/red, plus or minus, Go/No Go). **Do NOT use these indicators.**
  - The alignment specifications programmed into your machine that operate these indicators may not be correct.
  - This may result in an ERROR.
- Some newer alignment machines are equipped with an optional “Rolling Compensation” method to “compensate” the sensors (alignment targets or head units). **DO NOT use this “Rolling Compensation” method.**
  - Use the “Jacking Compensation Method”. After installing the alignment targets or head units, raise the vehicle and rotate the wheels 1/2 turn both ways.
  - See Instructions in the alignment machine you're using for more information on this.

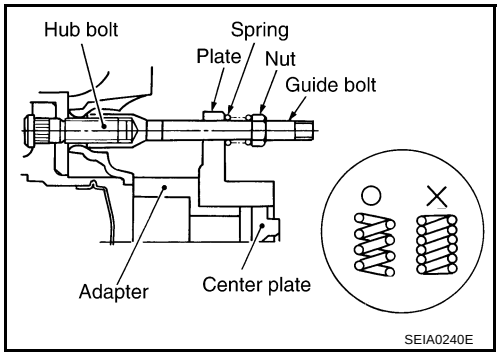
INSPECTION OF CAMBER, CASTER AND KINGPIN INCLINATION ANGLES

- Camber, caster, kingpin inclination angles cannot be adjusted.
- Before inspection, mount front wheels onto turning radius gauge. Mount rear wheels onto a stand that has same height so vehicle will remain horizontal.

Using a CCK Gauge

Install the CCK gauge attachment [SST: KV991040S0 (–)] with the following procedure on wheel, then measure wheel alignment.

1. Remove three wheel nuts, and install the guide bolts to hub bolt.
2. Screw the adapter into the plate until it contacts the plate tightly.
3. Screw the center plate into the plate.
4. Insert the plate assembly on the guide bolt. Put the spring in, and then evenly screw the three guide bolt nuts. When fastening the guide nuts, do not completely compress the spring.



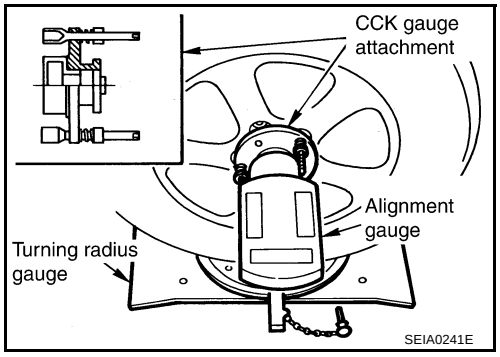
5. Place the dent of alignment gauge onto the projection of the center plate and tightly contact them to measure.

Camber, caster, kingpin inclination angles:

Refer to FSU-36, "SERVICE DATA AND SPECIFICATIONS (SDS)" .

CAUTION:

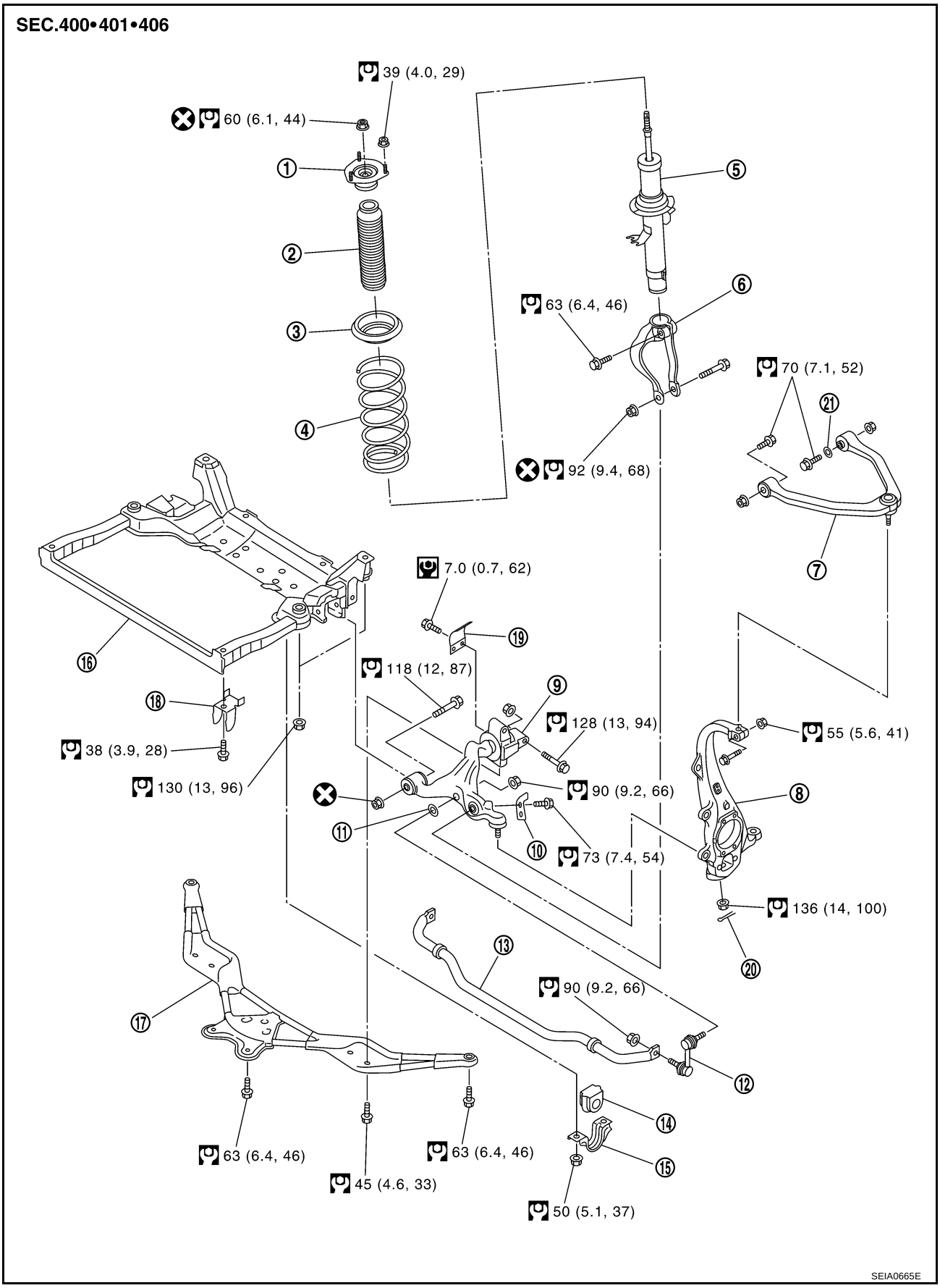
- **If camber, caster, or kingpin inclination angle is outside the standard, check front suspension parts for wear and damage. Replace suspect parts if a malfunction is detected.**
- **Kingpin inclination angle is reference value, no inspection is required.**



Components

NES000IS

SEC.400•401•406



1. Shock absorber mounting bracket
2. Bound bumper
3. Rubber seat
4. Coil spring
5. Shock absorber
6. Shock absorber arm
7. Upper link
8. Steering knuckle
9. Transverse link
10. Steering stopper bracket
11. Washer
12. Stabilizer connecting rod
13. Stabilizer bar
14. Stabilizer bushing
15. Stabilizer clamp
16. Front suspension member
17. Front cross bar
18. Member bracket
19. Clamp
20. Cotter pin
21. Stopper rubber

Refer to GI section for symbol marks in the figure. Refer to GI-9, "HOW TO USE THIS MANUAL" .

Removal and Installation

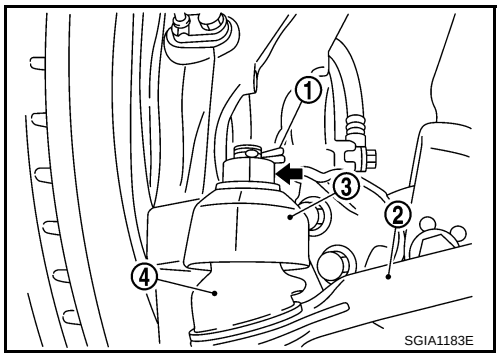
NES000IT

REMOVAL

1. Remove cowl top panel and hood. Refer to EI-18, "COWL TOP" , EI-17, "HOOD" .
2. Install engine slinger, and then hoist engine. Refer to EM-118, "Removal and Installation (AWD Models)" .
3. Remove tires from vehicle with a power tool.
4. Remove wheel sensor from steering knuckle. Refer to BRC-57, "WHEEL SENSOR" .

   CAUTION:
   Do not pull on wheel sensor harness.
5. Remove brake hose bracket. Refer to BR-12, "BRAKE TUBE AND HOSE" .
6. Remove undercover with a power tool.
7. Remove cotter pin (1), and then loosen the nut.
8. Remove steering outer socket (2) from steering knuckle (3) so as not to damage ball joint boot (4) using the ball joint remover (suitable tool).

   CAUTION:
   Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover (suitable tool) from suddenly coming off.



9. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
10. Separate steering gear assembly and lower joint. Refer to PS-13, "STEERING COLUMN" .
11. Remove front cross bar. Refer to FSU-25, "Components" .
12. Remove steering hydraulic piping bracket from front suspension member. Refer to PS-38, "HYDRAULIC LINE" .
13. Remove the mounting nut and bolt on the lower side of shock absorber arm with a power tool, and then remove shock absorber arm from transverse link.
14. Remove cotter pin of transverse link and steering knuckle, and then loosen nut.
15. Remove transverse link from steering knuckle so as not to damage ball joint boot using the ball joint remover (suitable tool).

    CAUTION:
    Temporarily tighten the nut to prevent damage to threads and to prevent ball joint remover (suitable tool) from suddenly coming off.
16. Set jack under front suspension member.
17. Remove the mounting nuts of engine mounting insulator. Refer to EM-113, "ENGINE ASSEMBLY" .
18. Remove the mounting bolts of member bracket, and then remove member bracket from front suspension member with a power tool. Refer to FSU-25, "Components" .
19. Remove the mounting nuts of front suspension member with a power tool. Refer to FSU-25, "Components" .
20. Gradually lower a jack to remove front suspension assembly from vehicle.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-25, "Components" .

- Perform final tightening of each of parts (rubber bushing), under unladen conditions, which were removed when removing front suspension assembly. Check wheel alignment. Refer to FSU-23, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .
- Check wheel sensor harness for proper connection. Refer to BRC-57, "WHEEL SENSOR" .

COIL SPRING AND SHOCK ABSORBER

PFP:55302

Removal and Installation

NES000IU

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove harness of wheel sensor from shock absorber. Refer to BRC-57, "WHEEL SENSOR" .

   CAUTION:
   Do not pull on wheel sensor harness.
3. Remove brake hose bracket. Refer to BR-12, "BRAKE TUBE AND HOSE" .
4. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
5. Remove mounting nut and bolt on the lower side of shock absorber arm with a power tool, and then remove shock absorber arm from transverse link.
6. Remove cotter pin of transverse link and steering knuckle, and then loosen nut.
7. Remove transverse link from steering knuckle so as not to damage ball joint boot using the ball joint remover (suitable tool).

   CAUTION:
   Temporarily tighten the nut to prevent damage to threads and to prevent ball joint remover (suitable tool) from suddenly coming off.
8. Remove the mounting bolt on the upper side of shock absorber arm with a power tool, and then remove shock absorber arm from shock absorber.
9. Remove the mounting nuts of shock absorber mounting bracket, then remove shock absorber from vehicle.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-25, "Components" .
- Perform final tightening of bolt and nut at the shock absorber arm lower side (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-23, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .
- Check wheel sensor harness for proper connection. Refer to BRC-57, "WHEEL SENSOR" .

Disassembly and Assembly

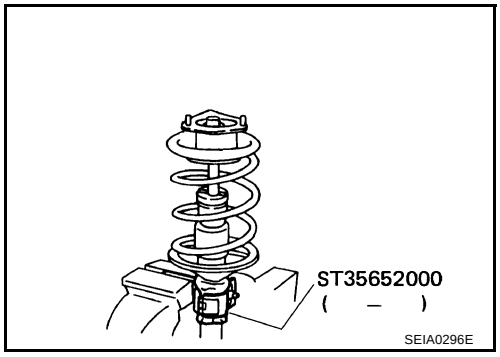
NES000IV

DISASSEMBLY

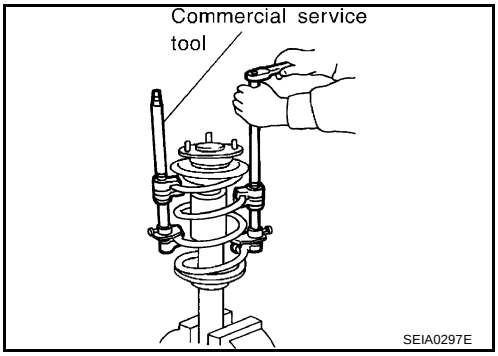
CAUTION:
Do not damage shock absorber piston rod when removing components from shock absorber.

1. Install strut attachment [SST] to shock absorber and secure it in a vise.

   CAUTION:
   When installing the strut attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.



2. Using a spring compressor (commercial service tool), compress coil spring between rubber seat and spring lower seat (on shock absorber) until coil spring with a spring compressor is free.



CAUTION:
Be sure a spring compressor is securely attached coil spring. Compress coil spring

3. Make sure coil spring with a spring compressor between rubber seat and spring lower seat (shock absorber) is free and then remove piston rod lock nut while securing the piston rod tip so that piston rod does not turn.
4. Remove shock absorber mounting bracket, rubber seat, bound bumper from shock absorber.
5. Remove coil spring with a spring compressor, and then gradually release a spring compressor.

CAUTION:
Loosen while making sure coil spring attachment position does not move.

6. Remove the strut attachment from shock absorber.

INSPECTION AFTER DISASSEMBLY

Shock Absorber Inspection

Check the following:

- Shock absorber for deformation, cracks or damage, and replace it if a malfunction is detected.
- Piston rod for damage, uneven wear or distortion, and replace it if a malfunction is detected.
- For oil leakage, and replace it if a malfunction is detected.

Shock Absorber Mounting Bracket and Rubber Parts Inspection

Check shock absorber mounting bracket for cracks and rubber parts for wear. Replace it if a malfunction is detected

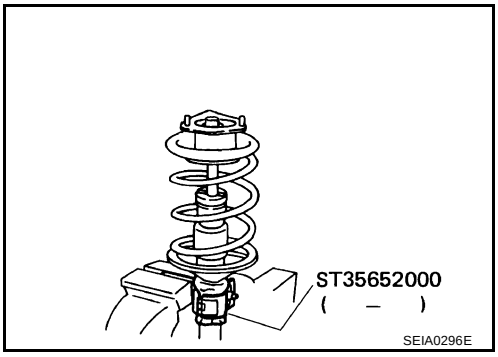
Coil Spring Inspection

Check coil spring for cracks, wear or damage, and replace it if a malfunction is detected.

ASSEMBLY

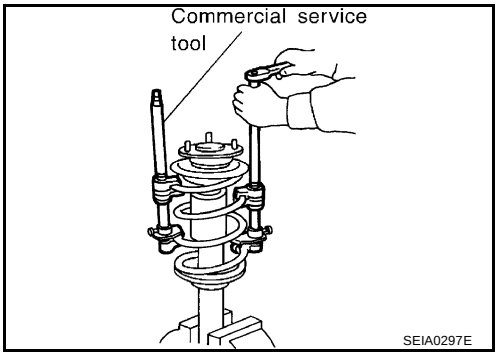
CAUTION:
Do not damage shock absorber piston rod when installing components to shock absorber.

1. Install strut attachment [SST] to shock absorber and secure it in a vise.



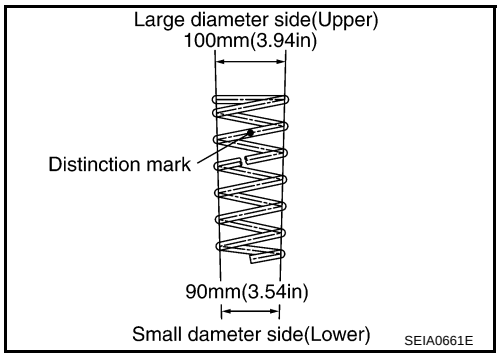
CAUTION:
When installing the strut attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.

2. Compress coil spring using a spring compressor (commercial service tool), and install it onto shock absorber.



CAUTION:

- **Install coil spring as shown in the figure with large diameter side [100 mm (3.94 in)] up and small diameter side [90 mm (3.54 in)] down. (Distinction marks are 4.75 and 5.75 turn from the lower side end.)**
- **Be sure a spring compress or is securely attached to coil spring. Compress coil spring.**



3. Apply soapy water to bound bumper. Insert bound bumper into shock absorber mounting bracket, and then install it to shock absorber together with rubber seat.

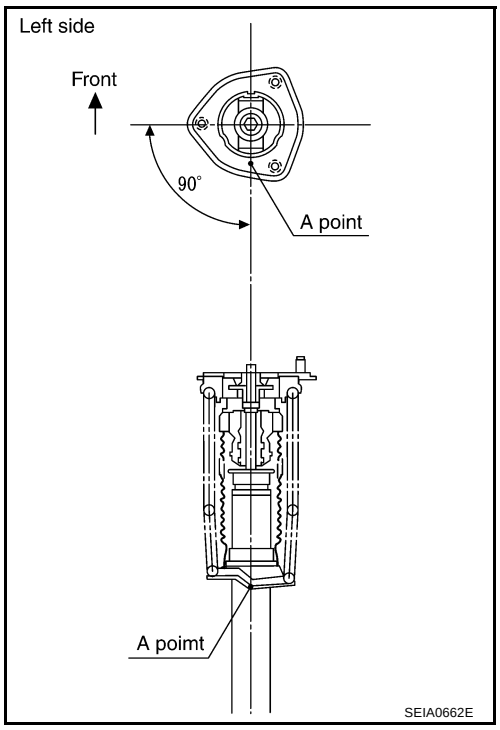
CAUTION:

Do not use machine oil.

- Install shock absorber mounting bracket as shown in the figure.

CAUTION:

- **Coil spring is securely seated in spring mounting groove of rubber seat.**
- **The bottom part of spring should be at the position of A point of spring seat.**



4. Secure piston rod tip so that piston rod does not turn, then tighten piston rod lock nut with specified torque.
5. Gradually release a spring compressor, and remove coil spring.

CAUTION:

Loosen while making sure coil spring attachment position does not move.

6. Remove the strut attachment from shock absorber.

TRANSVERSE LINK

PFP:54500

Removal and Installation

NES000IW

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove undercover with a power tool.
3. Remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
4. Remove the mounting nut and bolt on the lower side of shock absorber arm with a power tool, and then remove shock absorber arm from transverse link.
5. Remove front cross bar. Refer to FSU-25, "Components" .
6. Remove transverse link from steering knuckle. Refer to FAX-5, "Removal and Installation" .
7. Remove mounting nuts and bolts, and then remove transverse link from vehicle.

INSPECTION AFTER REMOVAL

Visual Inspection

Check the following:

- Transverse link and bushing for deformation, cracks or damage. Replace it if a malfunction is detected.
- Ball joint boot for cracks or other damage, and also for grease leakage. Replace it if a malfunction is detected.

Ball Joint Inspection

Manually move ball stud to confirm it moves smoothly with no binding.

Swing Torque Inspection

NOTE:
Before measurement, move ball stud at least ten times by hand to check for smooth movement.

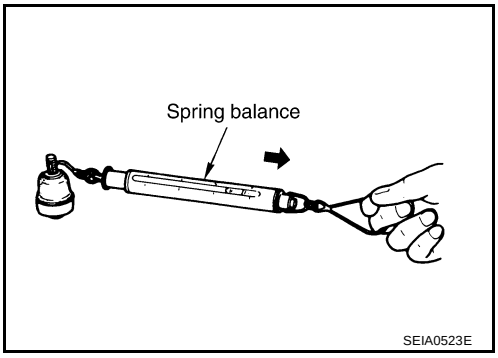
- Hook a spring balance at cotter pin mounting hole. Confirm spring balance measurement value is within specifications when ball stud begins moving.

  Swing torque

  : 0.5 - 3.6 N·m (0.06 - 0.36 kg-m, 5 - 31 in-lb)

  Spring balance measurement

  : 7.8 - 56.3 N (0.8 - 5.7 kg, 1.8 - 12.5 lb)



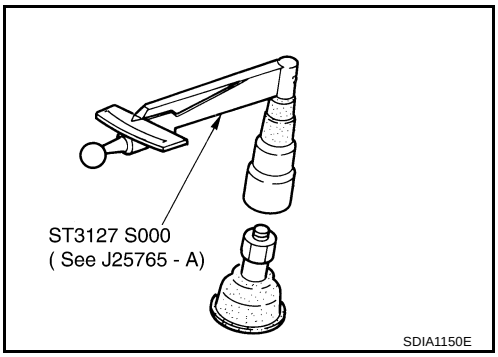
- If it is outside the specified range, replace transverse link assembly.

Rotating Torque Inspection

- Attach mounting nut to ball stud. Make sure that rotating torque is within specifications with a preload gauge [SST].

  Rotating torque

  : 0.5 - 3.9 N·m (0.06 - 0.39 kg-m, 5 - 34 in-lb)



- If it is outside the specified range, replace transverse link assembly.

Axial End Play Inspection

- Move tip of ball stud in axial direction to check for looseness.

  Axial end play : 0 mm (0 in)

- If it is outside the specified range, replace transverse link assembly.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-25, "Components" .
- Perform final tightening of bolts and nuts at the front suspension member installation position and the shock absorber lower side (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-23, "Wheel Alignment Inspection" .
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .

UPPER LINK

PFP:54524

Removal and Installation

NES000IX

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove shock absorber. Refer to FSU-28, "COIL SPRING AND SHOCK ABSORBER" .
3. Remove mounting nut and bolt with a power tool, and then remove upper link from steering knuckle.
4. Remove mounting nuts and bolts, and then remove upper link and stopper rubber from vehicle.

INSPECTION AFTER REMOVAL

Visual Inspection

Check the following:

- Upper link and bushing for deformation, cracks or damage. Replace it if a malfunction is detected.
- Ball joint boot for cracks or other damage, and also for grease leakage. Replace it if a malfunction is detected.

Ball Joint Inspection

Manually move ball stud to confirm it moves smoothly with no binding.

Swing Torque Inspection

NOTE:

Before measurement, move ball stud at least ten times by hand to check for smooth movement.

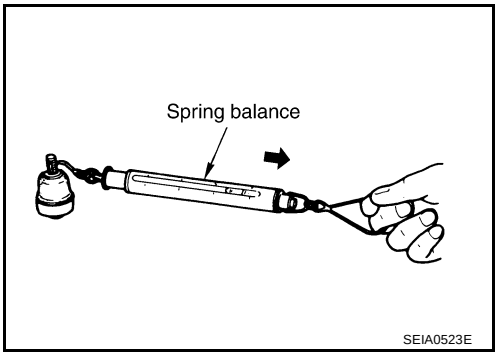
- Hook a spring balance at cutout on ball stud. Confirm spring balance measurement value is within specifications when ball stud begins moving.

  Swing torque

  : 0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)

  Spring balance measurement

  : 0 - 61.5 N (0 - 6.2 kg, 0 - 13.6 lb)



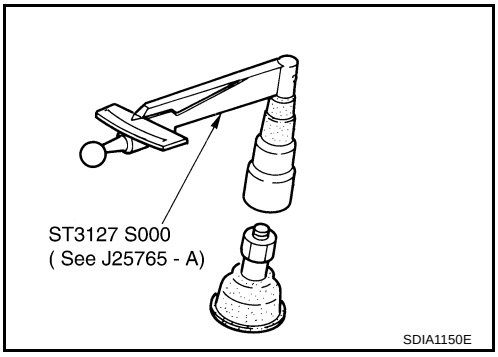
- If it is outside the specified range, replace upper link assembly.

Rotating Torque Inspection

- Attach mounting nut to ball stud. Make sure that rotating torque is within specifications with a preload gauge [SST].

  Rotating torque

  : 0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)



- If it is outside the specified range, replace upper link assembly.

Axial End Play Inspection

- Move tip of ball stud in axial direction to check for looseness.

  Axial end play : 0 mm (0 in)

- If it is outside the specified range, replace upper link assembly.

INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to FSU-25, "Components" .
- Perform final tightening of bolts and nuts at the vehicle installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to FSU-23, "Wheel Alignment Inspection" .

- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position" .

STABILIZER BAR

PFP:54611

Removal and Installation

NES000IY

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove undercover with a power tool.
3. Remove the mounting nut on the lower side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from stabilizer bar.
4. If necessary remove the mounting nut on the upper side of stabilizer connecting rod with a power tool, and then remove stabilizer connecting rod from transverse link.
5. Remove the mounting nuts of stabilizer clamp, and then remove stabilizer clamp and stabilizer bushing.
6. Remove stabilizer bar from vehicle.

INSPECTION AFTER REMOVAL

Check stabilizer bar, stabilizer connecting rod, stabilizer bushing, and stabilizer clamp for deformation, cracks or damage. Replace it if a malfunction is detected.

INSTALLATION

Installation is the reverse order of removal. For tightening torque, refer to FSU-25, "Components" .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Wheel Alignment (Unladen)

NES000IZ

Camber Degree minute (Decimal degree)		Minimum	– 1° 00′ (– 1.00°)
		Nominal	– 0° 15′ (– 0.25°)
		Maximum	0° 30′ (– 0.50°)
		Left and right difference	33′ (0.55°) or less
Caster Degree minute (Decimal degree)		Minimum	3° 05′ (3.08°)
		Nominal	3° 50′ (3.83°)
		Maximum	4° 35′(4.58°)
		Left and right difference	39′ (0.65°) or less
Kingpin inclination Degree minute (Decimal degree)		Minimum	6° 30′ (6.50°)
		Nominal	7° 15′ (7.25°)
		Maximum	8° 00′ (8.00°)
Total toe-in	Distance	Minimum	0 mm (0 in)
		Nominal	1 mm (0.04 in)
		Maximum	2 mm (0.08 in)
	Angle (left plus right) Degree minute (Degree)	Minimum	0′ (0°)
		Nominal	3′ (0.05°)
		Maximum	6′ (0.10°)

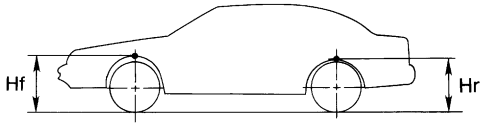
Ball Joint

NES000J0

Swing torque	Transverse link	0.5 - 3.6 N·m (0.06 - 0.36 kg-m, 5 - 31 in-lb)
	Upper link	0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)
Measurement on spring balance	Transverse link	7.8 - 56.3 N (0.8 - 5.7 kg, 1.8 - 12.5 lb)
	Upper link	0 - 61.5 N (0 - 6.2 kg, 0 - 13.6 lb)
Rotating torque	Transverse link	0.5 - 3.9 N·m (0.06 - 0.39 kg-m, 5 - 34 in-lb)
	Upper link	0 - 2.0 N·m (0 - 0.2 kg-m, 0 - 17 in-lb)
Axial end play		0 mm (0 in)

Wheelarch Height (Unladen*)

NES000J1



SFA818A

Tire		245/45R18
Front (Hf)	USA	731 mm (28.78 in)
	CANADA	732 mm (28.82 in)
Rear (Hr)	USA	725 mm (28.54 in)
	CANADA	726 mm (28.58 in)

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