SECTION FSU
FRONT SUSPENSION

CONTENTS

SERVICE INFORMATION

PRECAUTIONS

Caution

INFOID:0000000004160523

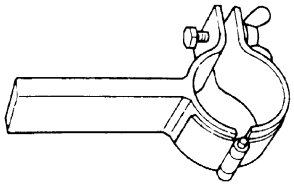
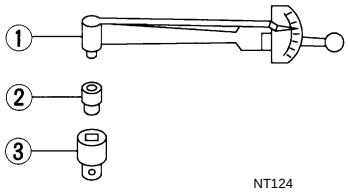
- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Oil might shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- Unladen conditions mean that fuel, engine coolant and lubricant are full. Spare tire, jack, 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

Special Service Tool

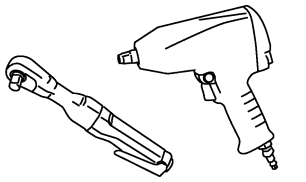
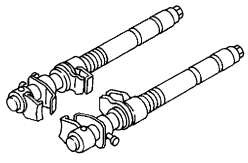
INFOID:0000000004160524

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
ST35652000 (—) Shock absorber 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 Tool

INFOID:0000000004160525

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

NVH Troubleshooting Chart

INFOID:0000000004160526

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

Reference page			FSU-7	FSU-10	—	—	—	FSU-7	FSU-5	FSU-16	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

On-Vehicle Inspection

INFOID:0000000004160527

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

INSPECTION OF UPPER LINK 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

INFOID:0000000004160528

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 tires for improper air pressure and wear.
- Check road wheels for runout. Refer to WT-8.
- Check wheel bearing axial end play. Refer to FAX-6, "On-Vehicle Inspection".
- Check transverse link ball joint axial end play. Refer to FSU-13, "Removal and Installation".
- Check shock absorber operation.
- Check each mounting part of axle and suspension for looseness and deformation.
- Check each of suspension member, shock absorber, upper link and transverse link for cracks, deformation and other damage.
- Check 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.**

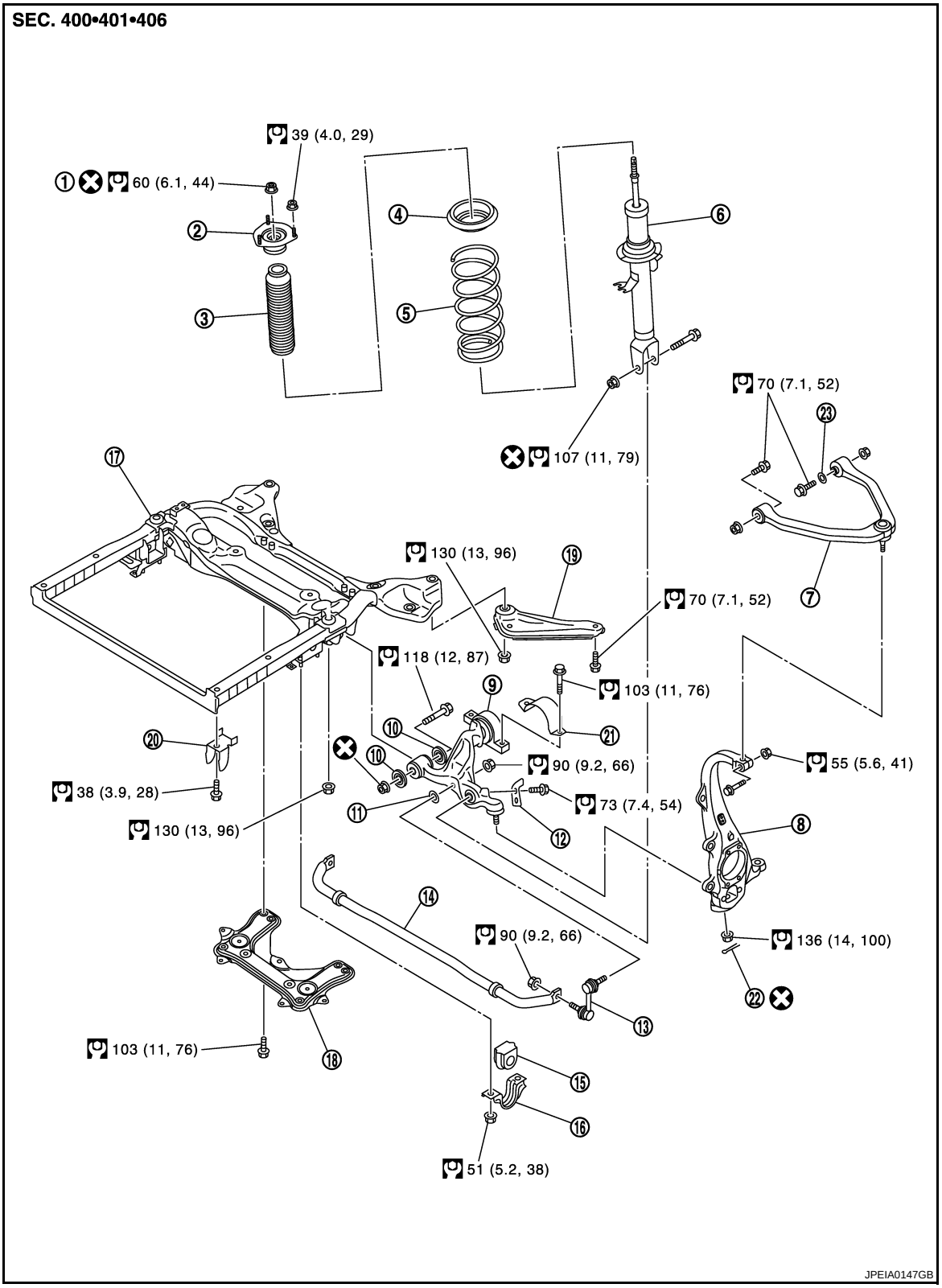
- Use the “Jacking Compensation Method”. After installing the alignment targets or head units, raise the vehicle and rotate the wheels 1/2 turn both ways.
- See Instructions in the alignment machine you're using for more information on this.

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.

Component

INFOID:0000000004160529



1. Piston rod lock nut
2. Shock absorber mounting bracket
3. Bound bumper
4. Rubber seat
5. Coil spring
6. Shock absorber
7. Upper link
8. Steering knuckle
9. Transverse link
10. Stopper-arm bush
11. Washer
12. Steering stopper bracket

13. Stabilizer connecting rod
14. Stabilizer bar
15. Stabilizer bushing
16. Stabilizer clamp
17. Front suspension member
18. Rack stay
19. Member stay
20. Member bracket
21. Clamp
22. Cotter pin
23. Stopper rubber

Refer to GI-9, "Component", for the symbols in the figure.

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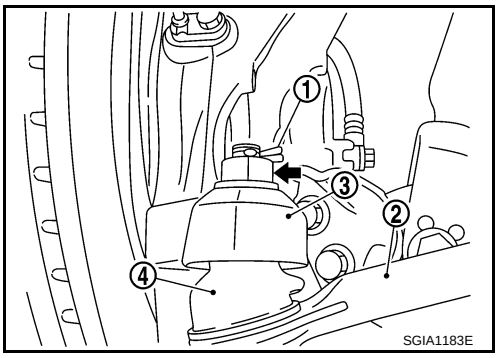
Removal and Installation

INFOID:0000000004160530

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-238.
2. Remove cowl top panel and hood. Refer to EI-30, BL-17, "Removal and Installation of Hood Assembly".
3. For VQ35HR engine models, install engine slinger, and then hoist engine. Refer to EM-108, "2WD : Component".
4. Remove tires from vehicle with a power tool.
5. Remove wheel sensor from steering knuckle. Refer to BRC-59.
   CAUTION:
   Do not pull on wheel sensor harness.
6. Remove brake hose bracket. Refer to BR-11.
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-12.
12. Remove rack stay. Refer to FSU-7, "Component".
13. Remove steering hydraulic piping bracket from front suspension member. Refer to PS-36.
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-108, "2WD : Component" (VQ35HR), EM-238, "2WD : Component" (VK45DE).
19. Remove the mounting bolts of member bracket, and then remove member bracket from front suspension member with a power tool. Refer to FSU-7, "Component".
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-7, "Component".
22. For VQ35HR 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-7, "Component".
- 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-5, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".
- Check wheel sensor harness for proper connection. Refer to BRC-59.

COIL SPRING AND SHOCK ABSORBER

Removal and Installation

INFOID:0000000004160531

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove harness of wheel sensor from shock absorber. Refer to BRC-59.
   CAUTION:
   Do not pull on wheel sensor harness.
3. Remove brake hose bracket. Refer to BR-11.
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-7, "Component".
- 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-5, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".
- Check wheel sensor harness for proper connection. Refer to BRC-59.

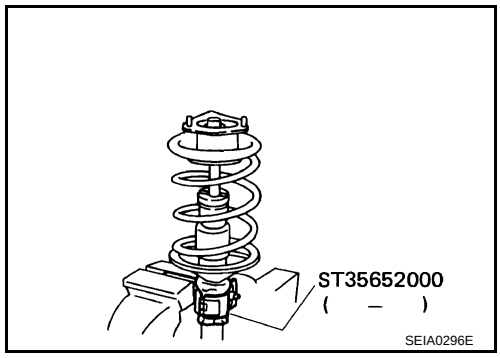
Disassembly and Assembly

INFOID:0000000004160532

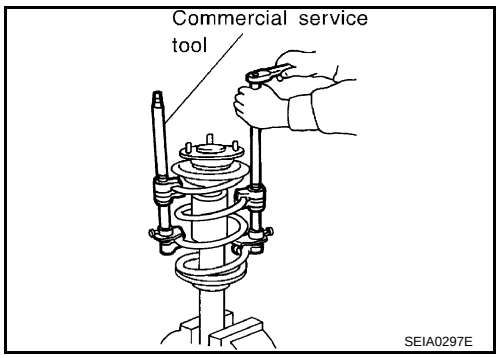
DISASSEMBLY

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

1. Install shock absorber attachment [SST] to shock absorber and secure it in a vise.
   CAUTION:
   When installing the shock absorber 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 shock absorber 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.

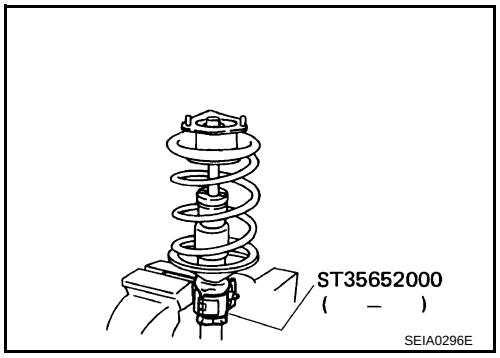
Coil Spring Inspection

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

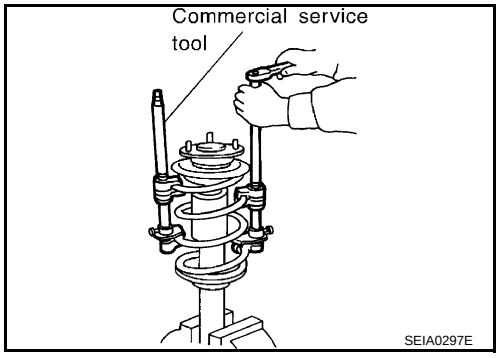
ASSEMBLY

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

1. Install shock absorber attachment [SST] to shock absorber and secure it in a vise.
CAUTION:
When installing the shock absorber attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.

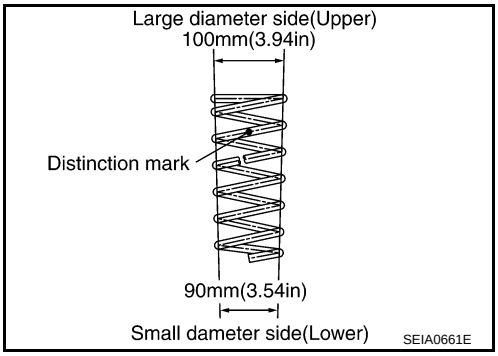


2. Compress coil spring using a spring compressor (commercial service tool), and install it onto shock absorber.



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 compressor is securely attached to coil spring. Compress coil spring.**

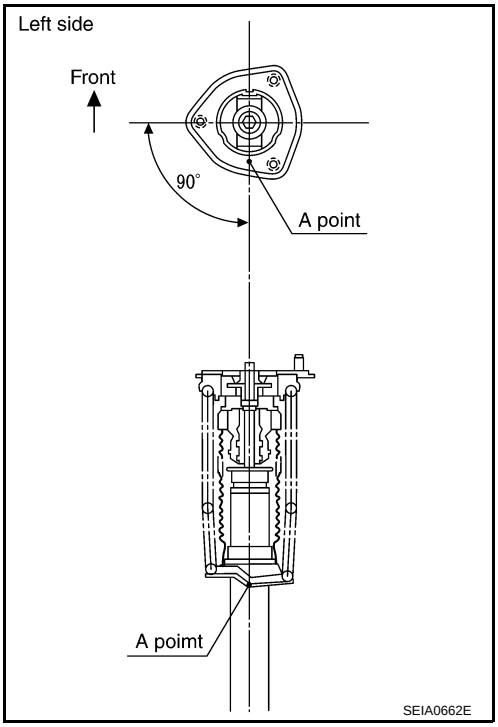


3. Apply soapy water to bound bumper. Insert bound bumper into shock absorber mounting bracket, and then install it to shock absorber together with rubber seat.

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 shock absorber attachment from shock absorber.

TRANSVERSE LINK

Removal and Installation

INFOID:0000000004160533

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-12.
5. Remove rack stay. Refer to FSU-7, "Component".
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 FSU-7, "Component".
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-7, "Component".
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-7, "Component".
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 stopper-arm bush, and then remove transverse link from vehicle.

INSPECTION AFTER REMOVAL

Visual Inspection

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

Ball Joint Inspection

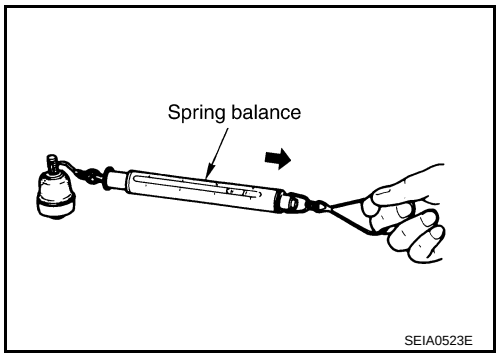
Manually move ball stud to confirm it moves smoothly with no binding.

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.

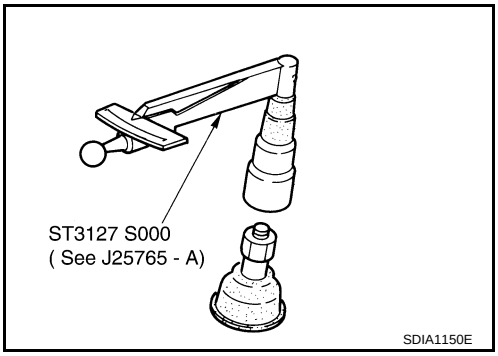
Rotating Torque Inspection

- 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-7, "Component".
- 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-5, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".

UPPER LINK

Removal and Installation

INFOID:0000000004160534

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove shock absorber. Refer to FSU-10.
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

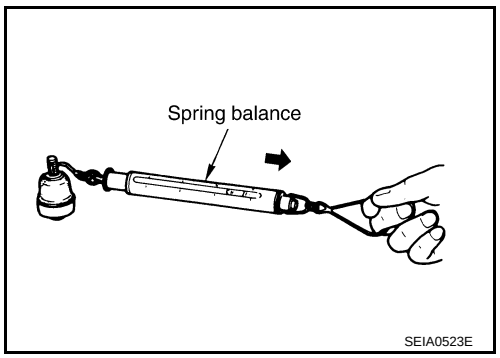
Manually move ball stud to confirm it moves smoothly with no binding.

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.

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-7, "Component".
- 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-5, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".

STABILIZER BAR

Removal and Installation

INFOID:0000000004160535

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-7, "Component".

SERVICE DATA AND SPECIFICATIONS (SDS)

Wheel Alignment (Unladen *)

INFOID:0000000004160536

Item			Standard	
Tire size			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′ (3.84°)
		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	In 1 mm (0.04 in)	
		Maximum	In 2 mm (0.08 in)	
	Angle (left wheel or right wheel) Degree minute (Decimal degree)	Minimum	0° 00′ (0.00°)	
		Nominal	In 0° 03′ (0.05°)	
		Maximum	In 0° 06′ (0.10°)	

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

Ball Joint

INFOID:0000000004160537

Item		Standard
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)
Axial end play		0 mm (0 in)

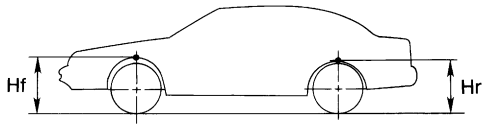
Wheelarch Height (Unladen*)

INFOID:0000000004160538

U.S.A. model

Item	Standard	
Tire size	245/45R18	245/40R19
Front (Hf)	717 mm (28.23 in)	721 mm (28.39 in)

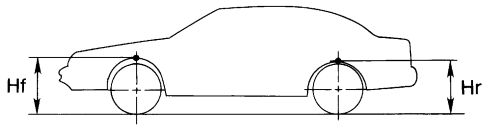
Item	Standard	
Tire size	245/45R18	245/40R19
Rear (Hr)	710 mm (27.95 in)	711 mm (27.99 in)



SFA818A

Canada model

Item	Standard	
Tire size	245/45R18	245/40R19
Front (Hf)	718 mm (28.27 in)	721 mm (28.39 in)
Rear (Hr)	711 mm (27.99 in)	711 mm (27.99 in)



SFA818A

SERVICE INFORMATION

PRECAUTIONS

Caution

INFOID:0000000004160539

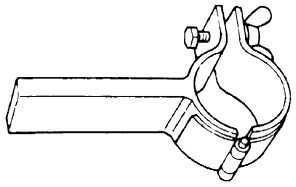
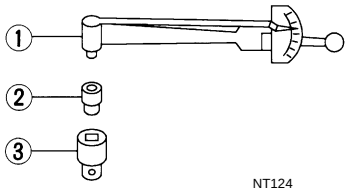
- When installing rubber bushings, the final tightening must be carried out under unladen conditions with tires on ground. Oil might shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- Unladen conditions mean that fuel, engine coolant and lubricant are full. Spare tire, jack, 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

Special Service Tool

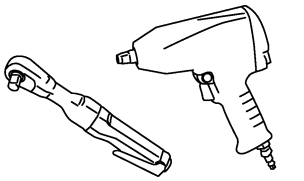
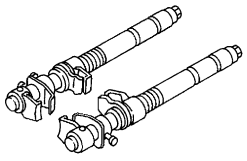
INFOID:0000000004160540

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
ST35652000 (—) Shock absorber 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 Tool

INFOID:0000000004160541

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

NVH Troubleshooting Chart

INFOID:0000000004160542

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

Reference page			FSU-24	FSU-27	—	—	—	FSU-24	FSU-22	FSU-33	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

On-Vehicle Inspection

INFOID:0000000004160543

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

INSPECTION OF UPPER LINK 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

INFOID:0000000004160544

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. Check tires for improper air pressure and wear.
2. Check road wheels for runout. Refer to WT-8.
3. Check wheel bearing axial end play. Refer to FAX-6, "On-Vehicle Inspection".
4. Check transverse link ball joint axial end play. Refer to FSU-30, "Removal and Installation".
5. Check shock absorber operation.
6. Check each mounting part of axle and suspension for looseness and deformation.
7. Check each of suspension member, shock absorber, upper link and transverse link for cracks, deformation and other damage.
8. Check 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.

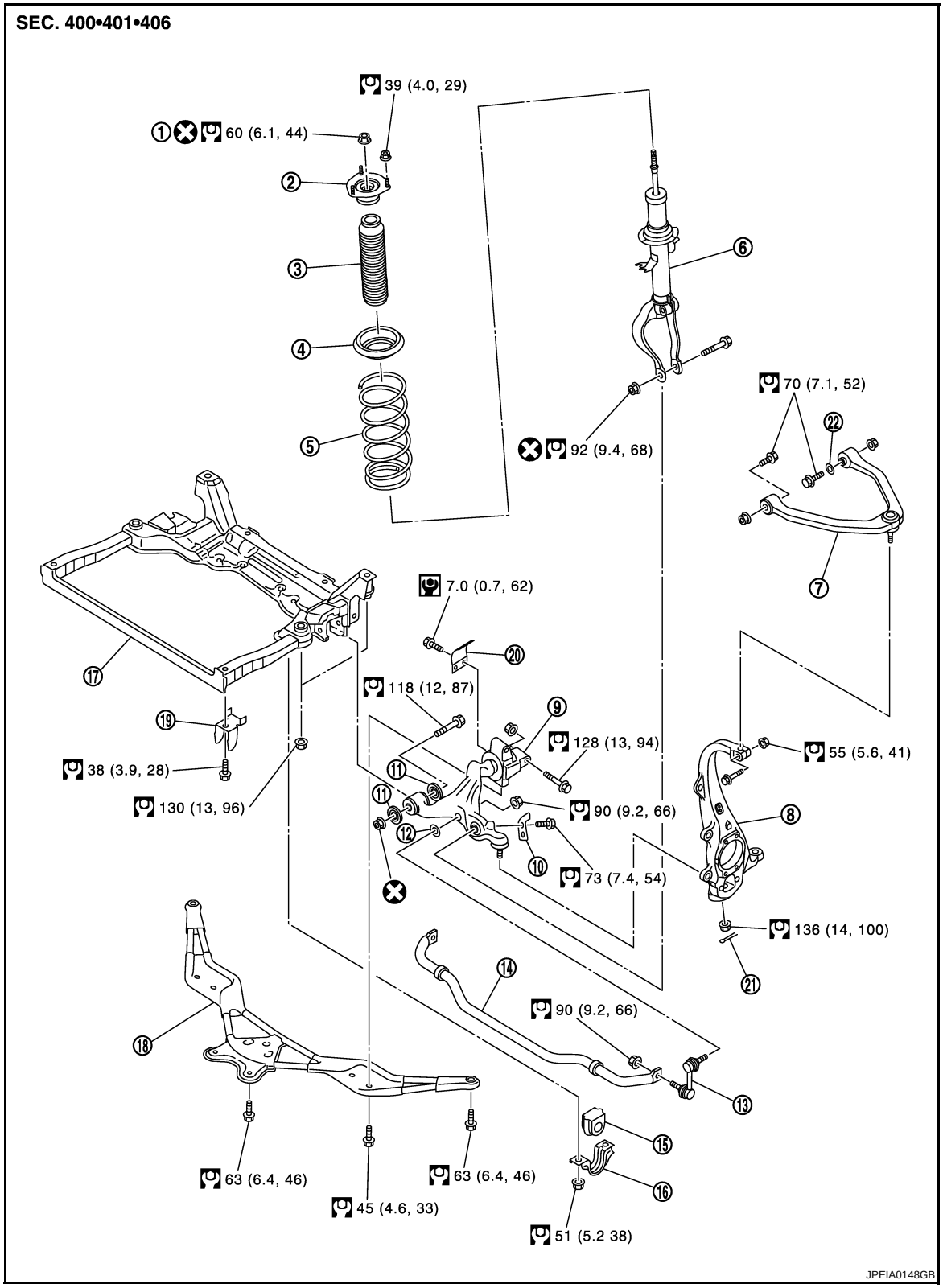
• Some newer alignment machines are equipped with an optional “Rolling Compensation” method to “compensate” the sensors (alignment targets or head units). **DO not use this “Rolling Compensation” method.**
- Use the “Jacking Compensation Method”. After installing the alignment targets or head units, 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.

Component

INFOID:0000000004160545



1. Piston rod lock nut
2. Shock absorber mounting bracket
3. Bound bumper
4.. Rubber seat
5. Coil spring
6. Shock absorber
7. Upper link
8. Steering knuckle
9. Transverse link
10. Steering stopper bracket
11. Stopper-arm bush
12. Washer

13. Stabilizer connecting rod
14. Stabilizer bar
15. Stabilizer bushing
16. Stabilizer clamp
17. Front suspension member
18. Front cross bar
19. Member bracket
20. Clamp
21. Cotter pin
22. Stopper rubber

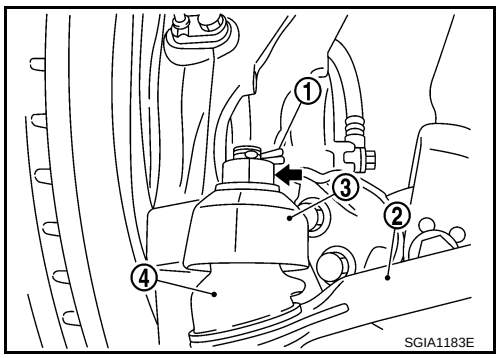
Refer to GI-9, "Component", for the symbols in the figure.

Removal and Installation

INFOID:0000000004160546

REMOVAL

1. Remove cowl top panel and hood. Refer to EI-30, BL-17, "Removal and Installation of Hood Assembly".
2. Install engine slinger, and then hoist engine. Refer to EM-113, "AWD : Component" (VQ35HR), EM-242, "AWD : Component" (VK45DE).
3. Remove tires from vehicle with a power tool.
4. Remove wheel sensor from steering knuckle. Refer to BRC-59.
   CAUTION:
   Do not pull on wheel sensor harness.
5. Remove brake hose bracket. Refer to BR-11.
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-12.
11. Remove front cross bar. Refer to FSU-24, "Component".
12. Remove steering hydraulic piping bracket from front suspension member. Refer to PS-36.
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, "AWD : Component" (VQ35HR), EM-242, "AWD : Component" (VK45DE).
18. Remove the mounting bolts of member bracket, and then remove member bracket from front suspension member with a power tool. Refer to FSU-24, "Component".
19. Remove the mounting nuts of front suspension member with a power tool. Refer to FSU-24, "Component".
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-24, "Component".
- 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-22, "Wheel Alignment Inspection".

- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".
- Check wheel sensor harness for proper connection. Refer to BRC-59.

COIL SPRING AND SHOCK ABSORBER

Removal and Installation

INFOID:0000000004160547

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove harness of wheel sensor from shock absorber. Refer to BRC-59.
   CAUTION:
   Do not pull on wheel sensor harness.
3. Remove brake hose bracket. Refer to BR-11.
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-24, "Component".
- 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-22, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".
- Check wheel sensor harness for proper connection. Refer to BRC-59.

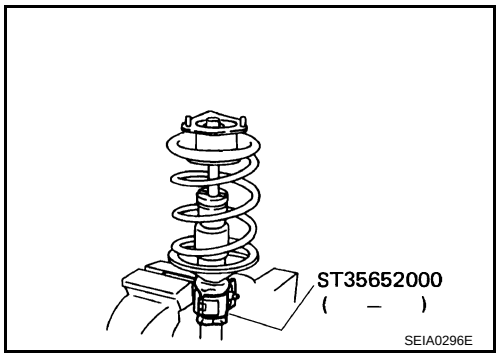
Disassembly and Assembly

INFOID:0000000004160548

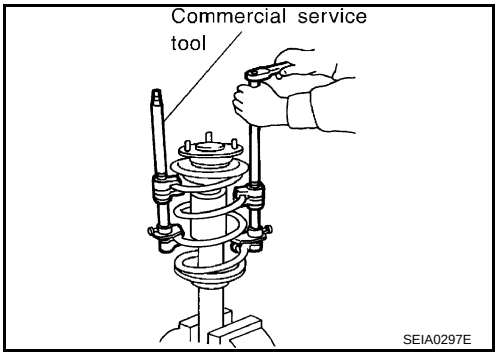
DISASSEMBLY

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

1. Install shock absorber attachment [SST] to shock absorber and secure it in a vise.
   CAUTION:
   When installing the shock absorber 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 shock absorber 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

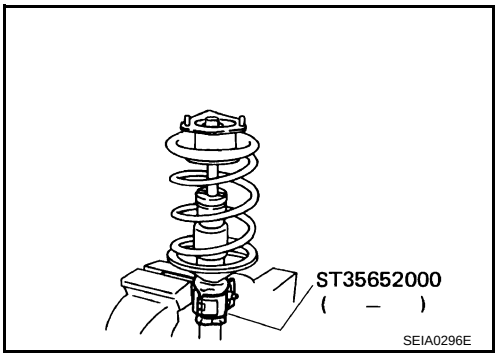
Coil Spring Inspection

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

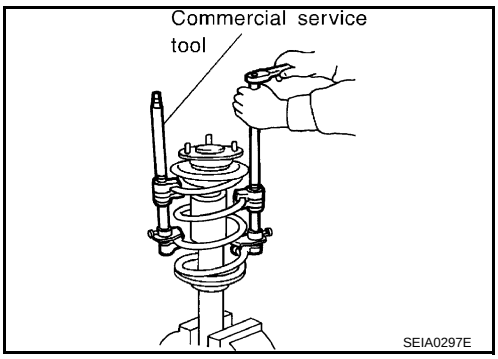
ASSEMBLY

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

1. Install shock absorber attachment [SST] to shock absorber and secure it in a vise.
   CAUTION:
   When installing the shock absorber attachment to shock absorber, wrap a shop cloth around strut to protect it from damage.

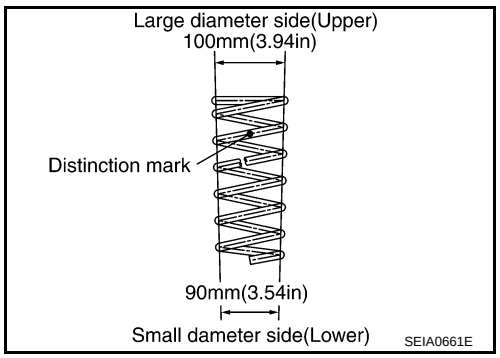


2. Compress coil spring using a spring compressor (commercial service tool), and install it onto shock absorber.



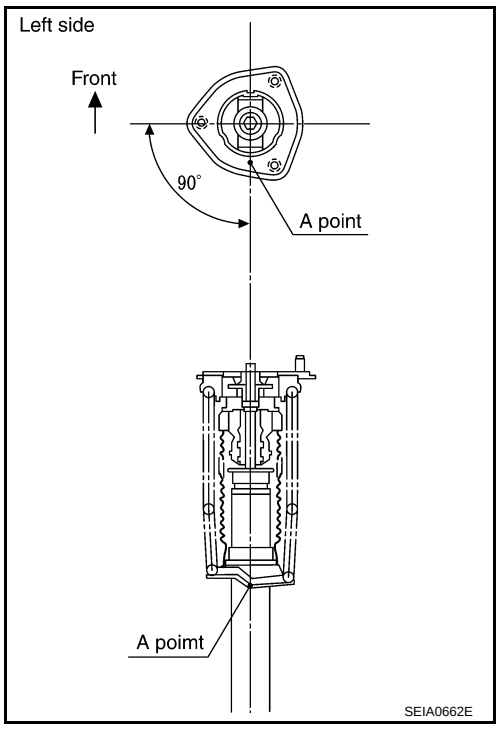
CAUTION:

- **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 compressor 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 shock absorber attachment from shock absorber.



TRANSVERSE LINK

Removal and Installation

INFOID:0000000004160549

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-24, "Component".
6. Remove transverse link from steering knuckle. Refer to FSU-24, "Component".
7. Remove mounting nuts and bolts and stopper-arm bush, 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

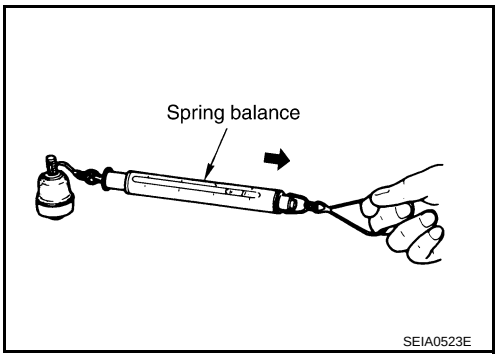
Manually move ball stud to confirm it moves smoothly with no binding.

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)

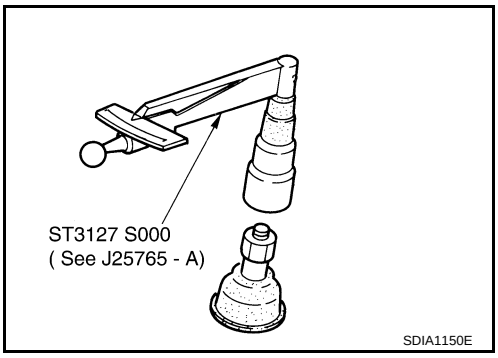
Spring balance measurement

: 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-24, "Component".
- 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-22, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".

UPPER LINK

Removal and Installation

INFOID:0000000004160550

REMOVAL

1. Remove tires from vehicle with a power tool.
2. Remove shock absorber. Refer to FSU-27.
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

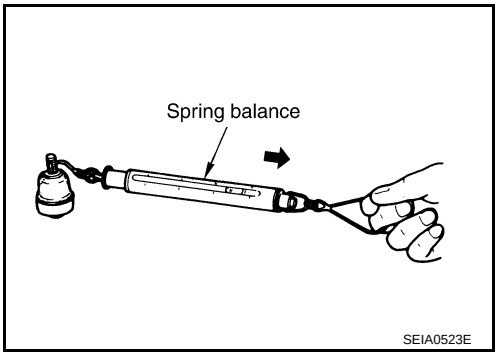
Manually move ball stud to confirm it moves smoothly with no binding.

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.

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-24, "Component".
- 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-22, "Wheel Alignment Inspection".
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to BRC-8, "Adjustment of Steering Angle Sensor Neutral Position".

STABILIZER BAR

Removal and Installation

INFOID:0000000004160551

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-24, "Component".

SERVICE DATA AND SPECIFICATIONS (SDS)

Wheel Alignment (Unladen*)

INFOID:0000000004160552

Item			Standard
Tire			245/45 R18
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′ (3.09°)
		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	In 1 mm (0.04 in)
		Maximum	In 2 mm (0.08 in)
	Angle (left wheel or right wheel) Degree minute (Decimal degree)	Minimum	0′ (0°)
		Nominal	In 3′ (0.05°)
		Maximum	In 6′ (0.10°)

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

Ball Joint

INFOID:0000000004160553

Item		Standard
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)
Axial end play		0 mm (0 in)

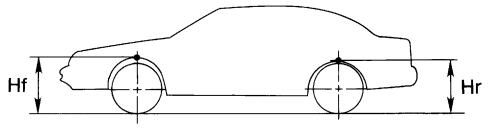
Wheelarch Height (Unladen*)

INFOID:0000000004160554

U.S.A. model

Item	Standard
Tire size	245/45R18
Front (Hf)	731 mm (28.78 in)

Item	Standard
Tire size	245/45R18
Rear (Hr)	725 mm (28.54 in)



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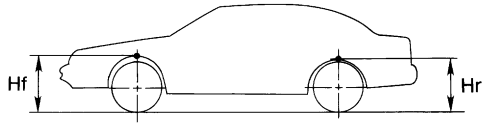
Canada model

Item	Standard
Tire size	245/45R18
Front (Hf)	732 mm (28.82 in)
Rear (Hr)	726 mm (28.58 in)



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