SECTION FSU
FRONT SUSPENSION

CONTENTS

PRECAUTIONS

PFP:00001

Caution

EES0006Z

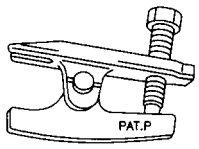
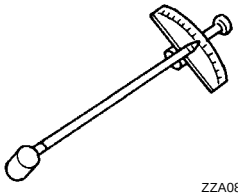
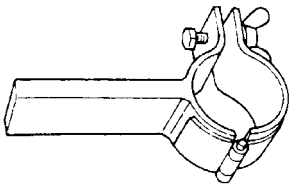
- When installing rubber bushings, final tightening must be carried out under unladen conditions with tires on flat, level ground. Oil will shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- “Unladen condition” means that fuel, coolant and lubricant are full and ready for drive. However, spare tire, jack, and hand tools should be unloaded.
- After installing the removed suspension parts, always check wheel alignment and adjust if necessary.
- Replace the caulking nut with a new one. Install a new nut without wiping the oil off before tightening.

PREPARATION

PFP:00002

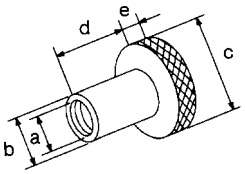
Special Service Tools

EES00070

Tool number Tool name		Description
HT7252000 Ball joint remover	 S-NT146	Removing tie-rod outer and lower ball joint
ST3127S000 Preload gauge	 ZZA0806D	Measuring ball joint sliding torque
KV991040S1 CCK gauge attachment 1 KV99104020 Adapter A 2 KV99104030 Adapter B 3 KV99104040 Adapter C 4 KV99104050 Adapter D 5 KV99104060 Plate 6 KV99104070 Guide bolt 7 KV99104080 Spring 8 KV99104090 Center plate	 ZZA1167D	Measuring wheel alignment
ST35652000 Strut attachment	 ZZA0807D	Disassembling and assembling strut

Commercial Service Tools

EES000JC

Tool name		Description
Attachment wheel alignment a: screw M24 x 1.5 pitch b: 35 mm (1.38 in) dia. c: 65 mm (2.56 in) dia. d: 56 mm (2.20 in) dia. e: 12 mm (0.47 in) dia.	 S-NT148	Measure wheel alignment

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EES000ID

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

Reference page			FSU-5	FSU-8	—	—	—	FSU-5	FSU-6	FSU-11	NVH in PR section	NVH in RFD section.	NVH in RAX and RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in PS section.
Possible cause and SUSPECTED PARTS			Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	PROPELLER SHAFT	DIFFERENTIAL	REAR AXLE AND REAR SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	FRONT SUSPENSION	Noise	×	×	×	×	×	×			×	×	×	×	×	×	×	×
		Shake	×	×	×	×		×			×		×	×	×	×	×	×
		Vibration	×	×	×	×	×				×		×	×		×		×
		Shimmy	×	×	×	×			×				×	×	×		×	×
		Judder	×	×	×								×	×	×		×	×
		Poor quality ride or handling	×	×	×	×	×		×	×			×	×	×			

×: Applicable

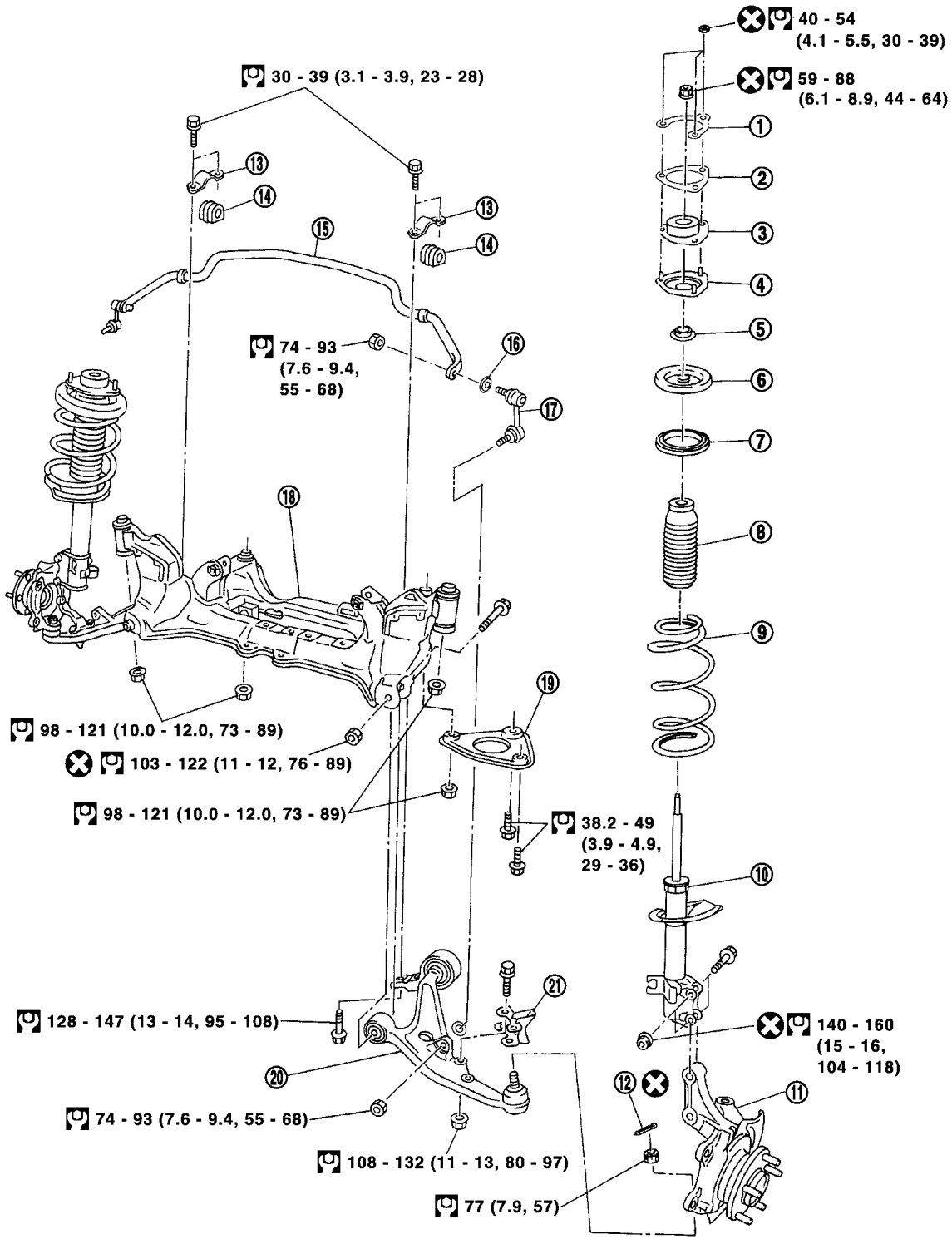
FRONT SUSPENSION ASSEMBLY

PFP:54010

Components

EES00071

SEC. 400•401•406



: N•m (kg-m, ft-lb)

: Always replace after every disassembly.

SEIA0294E

1. Upper mounting plate
2. Strut spacer
3. Strut mounting insulator
4. Spring upper seat
5. Thrust bearing
6. Spring upper seat
7. Upper rubber seat
8. Bound bumper
9. Coil spring
10. Strut
11. Axle assembly
12. Cotter pin
13. Clamp
14. Bushing
15. Stabilizer bar
16. Washer
17. Connecting rod
18. Suspension member
19. Member pin stay
20. Transverse link
21. Steering stopper bracket

On-Vehicle Inspection and Service

EES00072

LOOSENESS, BACKLASH AND DAMAGE OF MOUNTING PARTS AND CONNECTIONS

Lift vehicle and inspect the following:

- Check mounting point of each component for looseness, backlash and damage.
- Check lower ball joint end play.

1. Attach a dial gauge so that the contact rests on the brake caliper.
2. Set front wheels in a straight-ahead position. Do not depress brake pedal.
3. Measure axial endplay by placing an iron pry bar or something similar between transverse link and steering knuckle.

   Axial endplay : 0 mm (0 in)

   CAUTION:
   Be careful not to damage ball joint boot.
4. If axial endplay is outside the standard, remove transverse link and check lower ball joint.

Wheel Alignment

EES00073

DESCRIPTION

- Measure wheel alignment under unladen conditions. “Unladen conditions” means that fuel, coolant, and lubricant are full. However, spare tire, jack, and hand tools should be unloaded.

PRELIMINARY INSPECTION

1. Check the tires for improper air pressure and wear.
2. Check road wheels for runout.
3. Check wheel bearing axial endplay.
4. Check lower ball joint axial endplay.
5. Check strut operation.
6. Check each mounting point of axle and suspension for looseness and deformation.
7. Check each link and arm for cracks, deformation, and other damage.
8. Check the vehicle posture.

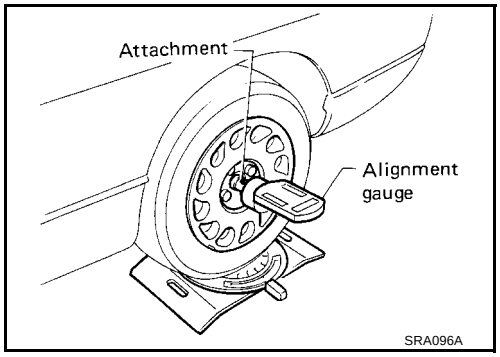
INSPECTION OF CAMBER, CASTER, AND KINGPIN INCLINATION ANGLES

- Camber, caster, and 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 the vehicle will remain horizontal.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

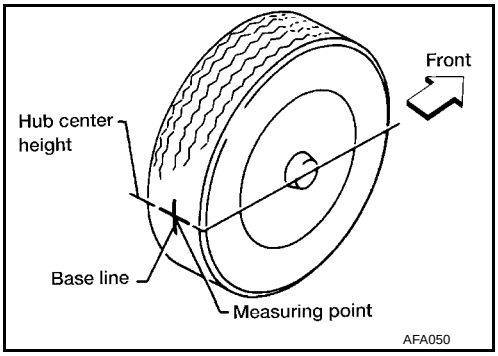
   Camber, caster and kingpin inclination:

   FSU-13, "SERVICE DATA AND SPECIFICATIONS (SDS)"
2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace dam-aged or worn out parts.



Toe-in

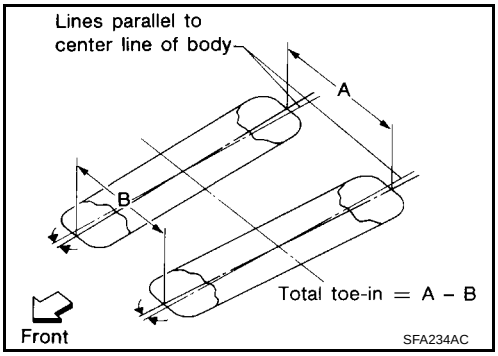
Measure toe-in using the following procedure.



WARNING:

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

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



4. Measure distance “A” (rear side).
5. Push the vehicle slowly ahead to rotate the wheels 180degrees (1/2 turn).

If the wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward.

6. Measure distance “B” (front side).

Total toe-in:

FSU-13, "SERVICE DATA AND SPECIFICATIONS (SDS)"

STEERING ANGLE INSPECTION

1. Set wheels in straight-ahead position. Move vehicle to set front wheels on turning radius gauge.
2. Turn steering wheel fully to right and left, and measure steering angle. Refer to PS-36, "SERVICE DATA AND SPECIFICATIONS (SDS)" .

COIL SPRING AND SHOCK ABSORBER

PFP:54302

Removal and Installation

EES00074

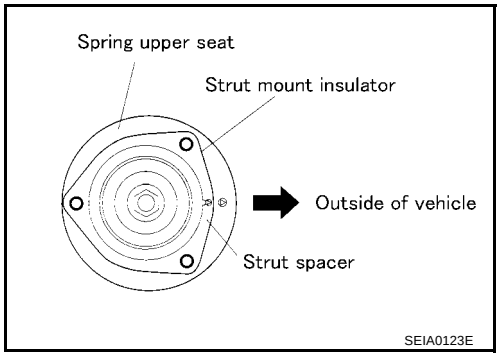
REMOVAL

1. Remove tires. Remove brake caliper and hung it aside.

   CAUTION:
   Avoid depressing brake pedal with brake caliper removed.
2. Remove electrical wires of ABS wheel speed sensor from strut.
3. Remove brake hose lock plate.
4. Remove mounting bolts and nuts securing steering knuckle to strut.
5. Remove mounting nuts on upper mounting plate and remove upper mounting plate and strut from vehicle.

INSTALLATION

- Refer to FSU-5, "Components" in “Front Suspension Assembly” for tightening torque. Tighten in the reverse order of removal.
- Be sure arrows on strut mount insulator and spring upper seat are positioned as shown. Also be sure notch in strut spacer is positioned as shown. Then install strut.
- Assemble upper mounting plate with its notch facing toward the outside.



Disassembly and Assembly

EES00075

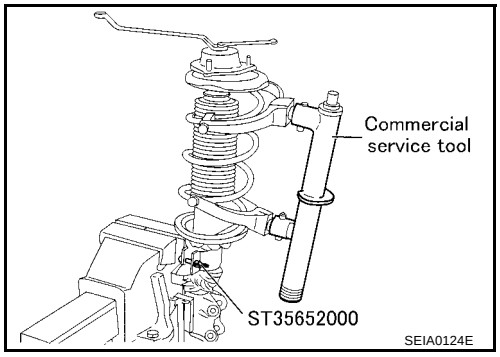
DISASSEMBLY

1. Install strut attachment to strut and fix it in a vise.

   CAUTION:
   When installing strut attachment, wrap a shop cloth around strut to protect it from damage.
2. Slightly loosen piston rod lock nut.

   WARNING:
   Do not remove piston rod lock nut completely. If it is removed completely, coil spring jumps out and may cause serious damage or injury.
3. Compress coil spring using a spring compressor.

   WARNING:
   Make sure that the pawls of the two spring compressors are firmly hooked on the spring. The spring compressors must be tightened alternately so as not to tilt the spring.
4. After making sure coil spring is free between upper and lower seats after Step 3. Remove piston rod lock nut.
5. Remove small parts on strut.
   - Remove strut spacer, strut mount insulator, thrust bearing, spring upper seats, and upper rubber seats. Then remove coil spring.
6. Remove bound bumper from spring upper seat.
7. Gradually release spring compressor, and remove coil spring.



INSPECTION AFTER DISASSEMBLY

Strut

- Check strut for deformation, cracks, and damage, and replace if necessary.
- Check piston rod for damage, uneven wear, and distortion, and replace if necessary.
- Check welded and sealed areas for oil leakage, and replace if necessary.

Insulator and Rubber Parts

Check strut mount insulator for cracks and rubber parts for wear. Replace them if necessary.

Coil Spring

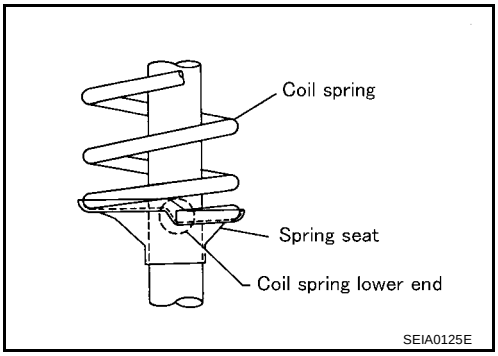
Check for cracks, wear, and damage, and replace if necessary.

ASSEMBLY

1. Compress coil spring using a spring compressor, and install it onto the strut.

   CAUTION:
   Face tube side of coil spring downward. Align lower end to spring seat as shown in the figure.

   WARNING:
   Be sure spring compressor is securely attached to coil spring. Compress coil spring.



2. Connect bound bumper to spring upper seat.

   CAUTION:
   - **Be sure to install bound bumper to spring upper seat securely.**
   - **When installing bound bumper, use soapy water. Do not use machine oil or other lubricants.**

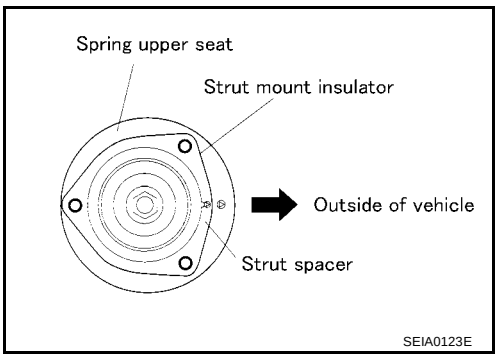
3. Install small parts to the strut.
   - Connect upper rubber seat, spring upper seats, thrust bearing, strut mount insulator, and strut spacer. Temporarily install piston rod lock nut.

   CAUTION:
   Do not reuse piston rod lock nut.

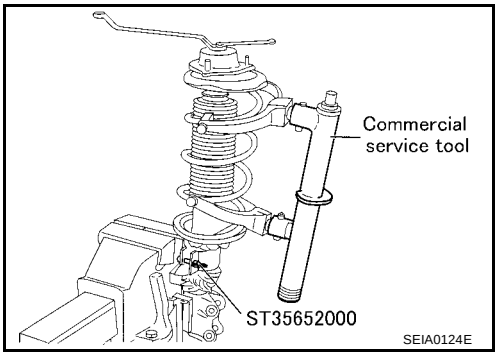
4. Be sure arrows on strut mount insulator and spring upper seat are positioned as shown. Also be sure notch in the strut spacer is positioned as shown.
5. Be sure coil spring is properly set in spring rubber seat. Gradually release spring compressor.

   CAUTION:
   Be sure upper rubber seat is properly aligned to spring upper seat and coil spring.

6. Tighten piston rod lock nut to the specified torque.



7. Remove strut attachment.



TRANSVERSE LINK

PFP:54500

Removal and Installation

EES00076

REMOVAL

1. Remove steering knuckle from transverse link. Refer toFAX-7, "REMOVAL" .
2. Remove mounting nuts and washers on lower portion of stabilizer connecting rod.
3. Slightly loosen transverse link mounting bolts.
4. Remove transverse link mounting bolts and nuts, and remove transverse link from suspension member.

INSPECTION AFTER REMOVAL

Visual Inspection

Check transverse link and bushing for deformation, cracks, and other damage. Replace the entire transverse link assembly if cracks, deformation or any other damage is found.

Ball Joint Inspection

CAUTION:

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

Swing Torque Inspection

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

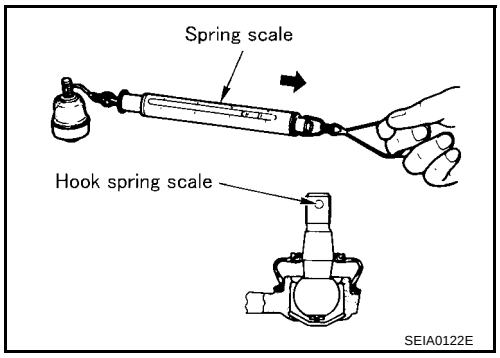
  Swing force:

  0.50 - 3.4 N·m (0.05 - 0.35 kg-m, 5 - 30 in-lb)

  Measurement on spring balance:

  7.94 - 53.97 N (0.81 - 5.50 kg, 1.79 - 12.2 lb)

- If the value is outside the standard, replace transverse link.



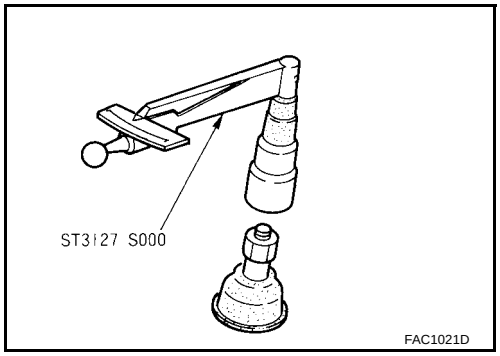
Turning Torque Inspection

- Attach mounting nut to ball stud. Check that turning torque is within specifications with a preload gauge.

  Turning torque:

  0.50 - 3.4 N·m (0.05 - 0.35 kg-m, 5 - 30 in-lb)

- If the value is outside the standard, replace transverse link.



Axial Endplay Inspection

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

  Axial endplay : 0.1 mm (0.004 in) or less

- If any looseness is noted, replace transverse link.

INSTALLATION

- Refer to FSU-5, "Components" for tightening torque. Tighten in the reverse order of removal.
- Tighten transverse link mounting bolts with vehicle unladen and all four tires on flat, level ground.
- After installation, check wheel alignment. Refer to FSU-6, "Wheel Alignment" .

STABILIZER BAR

PFP:54611

Removal and Installation

EES000HH

REMOVAL

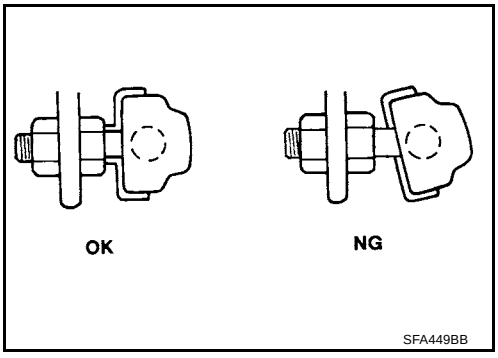
1. Remove mounting nuts on upper portion of stabilizer connecting rod.
2. Remove stabilizer clamp mounting bolts.
3. Remove stabilizer from the vehicle.

INSPECTION AFTER REMOVAL

Check stabilizer, connecting rod, bushing and clamp for deformation, cracks and damage, and replace if necessary.

INSTALLATION

- Refer to FSU-5, "Components" in the reverse order of removal.
- Stabilizer uses pillow ball type connecting rod. Position ball joint with case on pillow ball head parallel to stabilizer.



FRONT SUSPENSION MEMBER

PFP:54401

Removal and Installation

EES00078

REMOVAL

1. Remove tires. Raise vehicle.
2. Remove mounting nuts on lower portion of stabilizer connecting rod from transverse link.
3. Remove transverse link from suspension member, and move the transverse link outward.
4. Remove front exhaust tube mounting rubber from suspension member.
5. Support engine or transmission with a transmission jack.
6. Remove center member from vehicle. Refer to TF-11, "TRANSFER ASSEMBLY"
7. Remove steering gear mounting bolts. Remove steering gear and power steering tube bracket from suspension member.
8. Hang steering gear.
9. Remove rear engine mount insulator from suspension member.
10. Remove body-side mounting bolts from member pin stay.
11. Set a transmission jack under suspension member, and remove suspension member mounting nuts.
12. Slowly lower transmission jack to remove suspension member from vehicle.

INSTALLATION

- Refer to FSU-5, "Components" for tightening torque in the reverse order of removal.
- After installation, perform final tightening of each part under unladen conditions with tires on ground. Check wheel alignment. Refer to FSU-6, "Wheel Alignment" .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specification

EES000J6

Suspension type	Independent Macpherson strut
Shock absorber type	Double-acting hydraulic
Stabilizer bar	Standard equipment

★Wheel Alignment (Unladen)

EES00079

Drive type			4WD	
Engine type			QR20DE and QR25DE	YD22DDTi
Camber Degree minute (Decimal degree)		Minimum	- 0°54′ (- 0.9°)	
		Nominal	- 0°24′ (- 0.4°)	
		Maximum	0°36′ (0.6°)	
		Left and right difference	45′ (0.75°)	
Caster Degree minute (Decimal degree)		Minimum	1°42′ (1.7°)	
		Nominal	2°27′ (2.45°)	
		Maximum	3°12′ (3.2°)	
		Left and right difference	45′ (0.75°)	
Kingpin offset Degree minute (Decimal degree)		Minimum	12°06′ (12.1°)	
		Nominal	13°30′ (13.5°)	
		Maximum	13°36′ (13.6°)	
Total toe-in	Distance (A - B)	Minimum	0 mm (0 in)	
		Nominal	1 mm (0.04 in)	
		Maximum	2 mm (0.08 in)	
Wheel turning angel			Refer to PS-36, "Steering Angle" .	

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

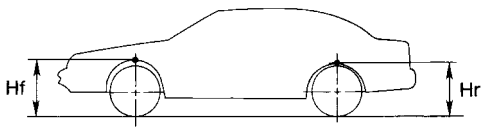
Ball Joint

EES0007A

Swing torque	0.5 - 3.4 N·m (0.05 - 0.35 kg-m, 5 - 30 in-lb)
Measurement on spring balance (cotter pinhole position)	7.94 - 53.97 N (0.81 - 5.50 kg, 1.79 - 12.2 lb)
Turning torque	0.5 - 3.4 N·m (0.05 - 0.35 kg-m, 5 - 30 in-lb)
Axial endplay	0.1 mm (0.004 in) or less

★Wheelarch Height (Unladen)

EES000J9



SFA818A

Applied model	QR20DE and QR25DE engine	YD22DDTi engine
	215/70R15 and 215/65R16	215/65R16
Front (Hf)	773 mm (30.43 in)	771 mm (30.35 in)
Rear (Hr)	786 mm (30.94 in)	785 mm (30.91 in)

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