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#### **PRECAUTIONS**

PRECAUTIONS PFP:00001

Cautions

- When installing rubber bushings, final tightening must be carried out under unladen conditions with tires
  on level ground. Oil will shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
- Unladen conditions means 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.
- Caulking nuts are not reusable. Always use new ones when installing. Since new caulking nuts are preoiled, tighten as they are.

#### **PREPARATION**

### PREPARATION PFP:00002

## **Special Service Tools (SST)**

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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
ST3127S000 (See J25742-1) Preload gauge 1. GG91030000	1 2 0 NT124	Measuring rotating torque of ball joint

### **Commercial Service Tools**

AES000MH

Tool name		Description
Power tool	PBIC0190E	<ul> <li>Removing wheel nuts</li> <li>Removing brake caliper assembly</li> <li>Removing rear suspension component parts</li> </ul>

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## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart

PFP:00003

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

	1 7																	
Reference page		RSU-7	RSU-9	ı	ı	ı	RSU-7	RSU-5	RSU-16	NVH in PR section	NVH in RFD section	NVH in FAX and FSU 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	FRONT AXLE AND FRONT SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING	
		Noise	×	×	×	×	×	×			×	×	×	×	×	×	×	×
	REAR SUSPENSION	Shake	×	×	×	×		×			×		×	×	×	×	×	×
		Vibration	×	×	×	×	×				×		×	×		×		×
Symptom		Shimmy	×	×	×	×			×				×	×	×		×	×
		Judder	×	×	×								×	×	×		×	×
		Poor quality ride or handling	×	×	×	×	×		×	×			×	×	×			

<sup>×:</sup> Applicable

#### REAR SUSPENSION ASSEMBLY

#### **REAR SUSPENSION ASSEMBLY**

PFP:55020

### **On-Vehicle Inspection and Service**

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

:S000MJ

#### INSPECTION OF SUSPENSION ARM BALL JOINT END PLAY

Measure axial end play by installing and moving up/down between suspension arm and axle with an iron pry bar or something similar.

Axial end play : 0 mm (0 in)

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#### **CAUTION:**

Be careful not to damage ball joint boot.

#### SHOCK ABSORBER INSPECTION

Check shock absorber for oil leakage, damage and replace if necessary.

## Wheel Alignment Inspection DESCRIPTION

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Measure wheel alignment under unladen conditions. "Unladen conditions" mean that fuel, engine coolant, and lubricant are full. Spare tire, jack, hand tools and mats are in designated positions.

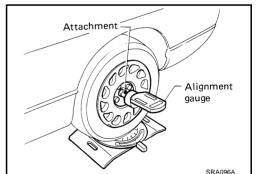
#### PRELIMINARY CHECK

- 1. Check tires for improper air pressure and wear.
- 2. Check road wheels for runout.
- 3. Check wheel bearing axial end play.
- 4. Check suspension arm ball joint axial end play.
- 5. Check shock absorber operation.
- Check each mounting part of axle and suspension for looseness and deformation.
- Check each link, arm and member for cracks, deformation, and other damage.
- 8. Check vehicle posture.

#### **CAMBER INSPECTION**

Measure camber of both right and left wheels with a suitable alignment gauge and adjust in accordance with the following procedures.

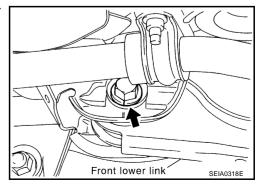
Camber: Refer to RSU-18, "Wheel Alignment".



If outside the standard value, adjust with adjusting bolt in front lower link.

#### NOTE:

After adjusting camber, be sure to check toe-in.



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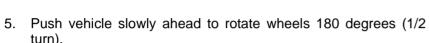
#### **REAR SUSPENSION ASSEMBLY**

#### **TOE-IN**

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

#### **WARNING:**

- Always perform the following procedure on a flat surface.
- Make sure that no person is in front of vehicle before push-
- Bounce rear of vehicle up and down to stabilize the posture.
- 2. Push vehicle straight ahead about 5 m (16 ft).
- 3. Put a mark on base line of the tread (rear side) of both tires at the same height of hub center. These are measuring points.
- Measure distance "A" (rear side).



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

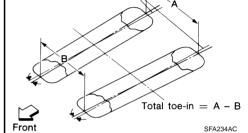
6. Measure distance "B" (front side).

: Refer to RSU-18, "Wheel Alignment" Total toe-in

Base line Measuring point SFA614B Lines parallel to center line of body

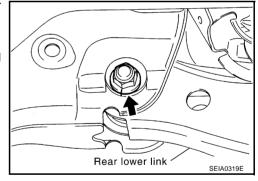
Hub center height

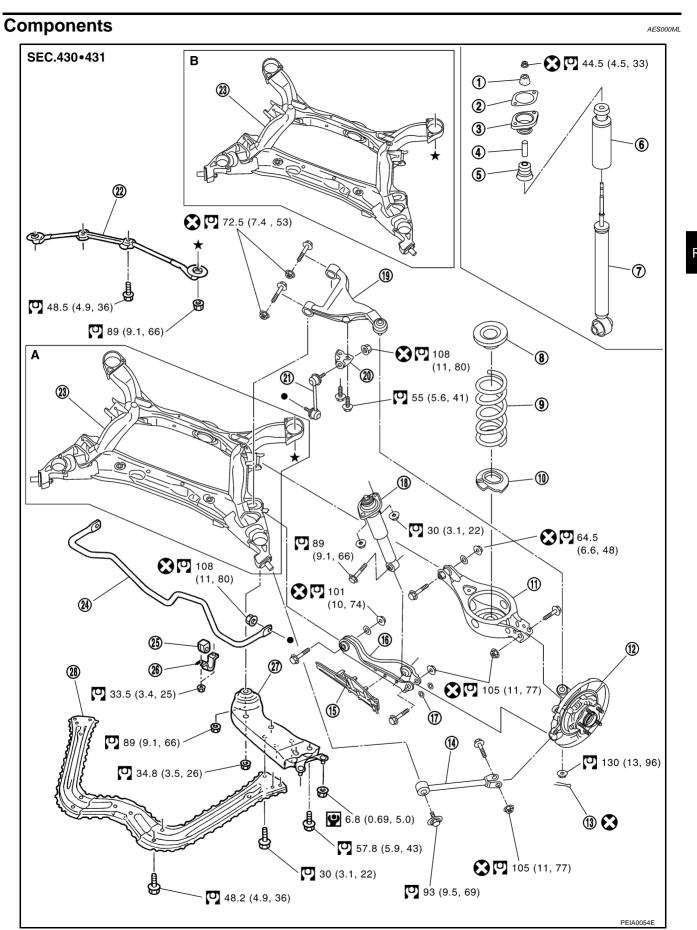
Front



7. If outside the standard value, adjust with adjusting bolt in rear lower link.

Be sure to adjust equally on RH and LH side with adjusting bolt.





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#### REAR SUSPENSION ASSEMBLY

1.	Bushing	2.	Mounting seal	3.	Mounting seal bracket
4.	Distance tube	5.	Bound bumper cover	6.	Bound bumper
7.	Shock absorber	8.	Upper seat	9.	Coil spring
10.	Rubber seat	11.	Rear lower link	12.	Axle
13.	Cotter pin	14.	Radius rod	15.	Front lower link protector
16.	Front lower link	17.	Stopper	18.	Shock absorber assembly
19.	Suspension arm	20.	Stabilizer connecting rod mounting bracket	21.	Stabilizer connecting rod
22.	Rear pin stay	23.	Rear suspension member	24.	Stabilizer bar
25.	Stabilizer bushing	26.	Stabilizer clamp	27.	Member stay
28.	Tunnel stay	A:	With height sensor	B:	Without height sensor
Refe	er to GI-10. "Components" , for the syn	nhols	in the figure		

#### Removal and Installation **REMOVAL**

AFSOOOMM

- 1. Remove tire with power tool.
- 2. Remove brake caliper with power tool. Hang it in a place where it will not interfere with work. Refer to BR-26, "REAR DISC BRAKE".

#### NOTE:

Avoid depressing brake pedal while brake caliper is removed.

- 3. Remove wheel sensor from rear final drive, then remove wheel sensor harness from rear suspension member.
- 4. Remove height sensor harness from rear suspension member (if equipped).
- 5. Remove center muffler and main muffler. Refer to EX-3, "Removal and Installation".
- 6. Remove stabilizer bar. Refer to RSU-16, "Removal and Installation".
- Remove rear propeller shaft. Refer to PR-9, "Removal and Installation".
- Separate attachments between parking brake cable and vehicle and rear suspension member. 8.
- 9. Remove rear lower link and coil spring. Refer to RSU-15, "Removal and Installation".
- 10. Remove fixing bolt in lower side of shock absorber with power tool.
- 11. Set jack under rear final drive.
- 12. Remove fixing bolts and nuts of tunnel stay and member stay with power tool, then remove those parts from vehicle.
- 13. Remove fixing bolts and nuts of rear pin stay with power tool and then remove rear pin stay from vehicle.
- 14. Gradually lowering jack, remove rear suspension assembly.

#### INSTALLATION

Refer to RSU-7, "Components" for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

- Perform final tightening of installation position of links (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to RSU-5, "Wheel Alignment Inspection".
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position".

#### SHOCK ABSORBER

#### **SHOCK ABSORBER**

PFP:56210

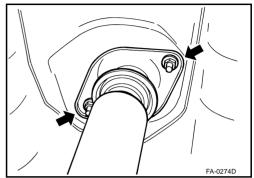
## Removal and Installation

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- 1. Remove tire with power tool.
- 2. Set jack under rear lower link.
- 3. Remove fixing bolt in lower side of shock absorber assembly with power tool.
- 4. Remove fixing nuts in upper side of shock absorber assembly with power tool and remove shock absorber assembly from vehicle.



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#### INSPECTION AFTER REMOVAL

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

#### INSTALLATION

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Refer to <u>RSU-7</u>, "<u>Components</u>" for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

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- Perform final tightening of shock absorber assembly lower side (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to RSU-5, "Wheel Alignment Inspection".
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to <u>BRC-6</u>, "Adjust-ment of Steering Angle Sensor Neutral Position".

## Disassembly and Assembly DISASSEMBLY

AES000MO

#### **CAUTION:**

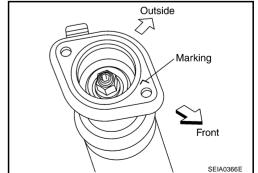
Make sure piston rod on shock absorber is not damaged when removing components from shock absorber.

- 1. Remove mounting seal from mounting seal bracket.
- 2. Wrap a shop cloth around lower side of shock absorber and fix it in a vise.

#### **CAUTION:**

Do not set the cylindrical part of shock absorber in vise.

- Fix piston rod with hexagon wrench, and remove piston rod lock nut.
- 4. Remove mounting seal bracket, bushing, distance tube, bound bumper cover and bound bumper from shock absorber.



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#### **SHOCK ABSORBER**

#### **INSPECTION AFTER DISASSEMBLY**

#### **Bound Bumper and Bushing**

Check bound bumper and bushing for cracks, deformation or other damage. Replace if necessary.

#### **ASSEMBLY**

- Refer to <u>RSU-7, "Components"</u> for tightening torque. Assembly in the reverse order of disassembly.
   NOTE:
  - Refer to component parts location and do not reuse non-reusable parts.
  - Make sure piston rod on shock absorber is not damaged when attaching components to shock absorber.

SUSPENSION ARM PFP:55501

## Removal and Installation

AES000MP

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- 1. Remove tire with power tool.
- 2. Remove stabilizer connecting rod mounting bracket from suspension arm with power tool.
- 3. Remove drive shaft from vehicle. (VK45DE models) Refer to RAX-9, "Removal and Installation".
- 4. Remove cotter pin of suspension arm ball joint, and loosen nut.
- 5. Use a ball joint remover (suitable tool) to remove suspension arm from axle. Be careful not to damage ball joint boot.

**CAUTION:** 

Tighten temporarily mounting nut to prevent damage to threads and to prevent ball joint remover (suitable tool) from coming off.

- 6. Remove fixing nuts and bolts between suspension arm and rear suspension member with power tool.
- 7. Remove suspension arm from vehicle.

#### **INSPECTION AFTER REMOVAL**

#### **Visual Inspection**

- Check suspension arm and bushing for deformation, cracks, or damage. If any non-standard condition is found, replace it.
- Check boot of ball joint for cracks, or damage, and also for grease leakage.

#### **Ball Joint Inspection**

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

#### **Swing Torque Inspection**

#### NOTE:

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

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

#### **Swing torque:**

 $0.5 - 3.4 \text{ N} \cdot \text{m} (0.06 - 0.34 \text{ kg-m}, 5 - 30 \text{ in-lb})$ 

Measured value of spring scale:

9.7 - 66.0 N (0.99 - 6.7 kg, 2.18 - 14.8 lb)

 If it is outside the specified range, replace suspension arm assembly.

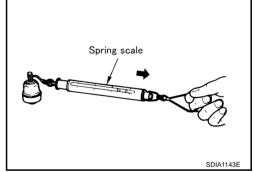
### **Rotating Torque Inspection**

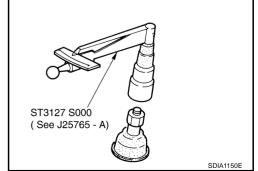
 Attach mounting nut to ball stud. Make sure rotating torque is within the specifications with a preload gauge (SST).

#### Rotating torque:

0.5 - 3.4 N-m (0.06 - 0.34 kg-m, 5 - 30 in-lb)

 If it is outside the specified range, replace suspension arm assembly.





#### **Axial End Play Inspection**

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

Axial end play : 0 mm (0 in)

• If it is outside the specified range, replace suspension arm assembly.

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#### SUSPENSION ARM

#### **INSTALLATION**

• Refer to RSU-7, "Components" for tightening torque. Install in the reverse order of removal.

#### NOTE:

- Refer to component parts location and do not reuse non-reusable parts.
- Perform final tightening of rear suspension member installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to RSU-5, "Wheel Alignment Inspection".
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to <u>BRC-6</u>, "Adjustment of Steering Angle Sensor Neutral Position".

#### **RADIUS ROD**

RADIUS ROD PFP:55110

## Removal and Installation

AES000MQ

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- 1. Remove tire with power tool.
- 2. Set jack under rear lower link.
- 3. Remove fixing bolt and nut in axle side of radius rod.
- 4. Remove fixing bolt in rear suspension member side of radius rod with power tool, then remove radius rod from vehicle.

#### **INSPECTION AFTER REMOVAL**

Check radius rod and bushing for any deformation, cracks, or damage. Replace if necessary.

#### INSTALLATION

• Refer to <u>RSU-7</u>, "Components" for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

- Perform final tightening of rear suspension member and axle installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to <u>RSU-5</u>, "Wheel Alignment <u>Inspection"</u>.
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to <u>BRC-6</u>, "Adjust-ment of Steering Angle Sensor Neutral Position".

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#### FRONT LOWER LINK

#### FRONT LOWER LINK

PFP:55110

AES000MR

## Removal and Installation REMOVAL

- 1. Remove tire with power tool.
- 2. Set jack under rear lower link.
- 3. Remove front lower link protector.
- 4. Remove shock absorber assembly from vehicle. Refer to RSU-9, "Removal and Installation".
- 5. Remove fixing nut and bolt between front lower link and axle with power tool.
- 6. Remove fixing nut and bolt between front lower link and rear suspension member with power tool.
- Remove front lower link from vehicle.

#### **INSPECTION AFTER REMOVAL**

Check front lower link and bushing for any deformation, crack, or damage. Replace if necessary.

#### INSTALLATION

Refer to <u>RSU-7</u>, "Components" for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

- Perform final tightening of rear suspension member and axle installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to <u>RSU-5</u>, "Wheel Alignment <u>Inspection"</u>.
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to <u>BRC-6</u>, "Adjustment of Steering Angle Sensor Neutral Position".

#### **REAR LOWER LINK & COIL SPRING**

#### **REAR LOWER LINK & COIL SPRING**

PFP:551B0

## Removal and Installation

AES000MS

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- 1. Remove tire with power tool.
- 2. Set jack under rear lower link.
- 3. Loosen fixing bolt and nut of rear lower link in side of suspension member, and then remove fixing bolt and nut in side of axle with power tool.
- 4. Slowly lower jack, then remove upper seat, coil spring and rubber sheet from rear lower link.
- 5. Remove fixing bolt and nut in side of rear suspension member to remove rear lower link with power tool.

#### INSPECTION AFTER REMOVAL

Check rear lower link, bushing and coil spring for deformation, cracks, and damage. Replace rear lower link and coil spring if necessary.

#### INSTALLATION

Refer to <u>RSU-7</u>, "<u>Components</u>" for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

Check that upper seat is attached as shown in the figure.

#### NOTE:

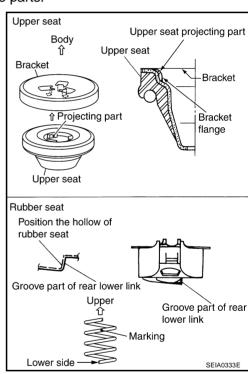
Insert bracket into upper seat with setting three tabs of upper seat to the projecting part of bracket beforehand as shown in the figure.

 Match up rubber seat indentions and rear lower link grooves and attach.

#### NOTE:

Make sure spring is not upside down. The top and bottom are indicated by paint color.

- Perform final tightening of rear suspension member and axle installation position (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to RSU-5, "Wheel Alignment Inspection".
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to <u>BRC-6</u>, "Adjustment of Steering Angle Sensor Neutral Position".



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#### STABILIZER BAR

STABILIZER BAR PFP:56230

## Removal and Installation

AES000MT

- Remove center muffler from vehicle. Refer to EX-3, "Removal and Installation".
- Remove fixing bolts and remove stabilizer connecting rod mount bracket from suspension arm with power tool.
- 3. Remove lower side fixing nut on stabilizer connecting rod and remove stabilizer connecting rod from stabilizer bar with power tool.
- 4. Remove fixing nuts on stabilizer clamps and remove stabilizer from vehicle with power tool.

#### **INSPECTION AFTER REMOVAL**

Check stabilizer bar, stabilizer bushings, stabilizer clamps, stabilizer connecting rod, stabilizer connecting rod mounting bracket for any deformation, cracks or damage. Replace if necessary.

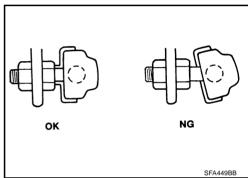
#### INSTALLATION

Refer to <u>RSU-7, "Components"</u> for tightening torque. Install in the reverse order of removal.

#### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

• Stabilizer bar uses pillow ball type connecting rod, position ball joint with case on pillow ball head parallel to stabilizer bar.



#### **REAR SUSPENSION MEMBER**

#### **REAR SUSPENSION MEMBER** PFP:55501 Α Removal and Installation AFS000MU **REMOVAL** Remove tire with power tool. В 2. Remove brake caliper with power tool. Hang it in a place where it will not interfere with work. Refer to BR-26. "REAR DISC BRAKE". NOTE: Avoid depressing brake pedal while brake caliper is removed. Remove wheel sensor from rear final drive, then remove wheel sensor harness from rear suspension member. Refer to BRC-57, "WHEEL SENSORS" . $\mathsf{D}$ Remove height sensor harness from rear suspension member (if equipped). Remove center muffler and main muffler, Refer to EX-3, "EXHAUST SYSTEM", Remove stabilizer bar. Refer to RSU-16, "Removal and Installation". 7. Remove rear drive shaft. Refer to RAX-9, "REAR DRIVE SHAFT" . Remove rear final drive. Refer to RFD-14, "Removal and Installation". 8. Separate attachments between parking brake cable and vehicle and rear suspension member. Refer to PB-3, "PARKING BRAKE CONTROL". 10. Remove rear lower link and coil spring. Refer to RSU-15. "Removal and Installation". 11. Remove fixing bolt in lower side of shock absorber with power tool. 12. Set jack under rear suspension member. 13. Remove fixing bolts and nuts of tunnel stay and member stay with power tool, then remove those parts Н from vehicle. 14. Remove fixing bolts and nuts of rear pin stay with power tool and then remove rear pin stay from vehicle. 15. Slowly lowering jack, then remove rear suspension member, suspension arm, radius rod, front lower link and axle from vehicle as a unit. 16. Remove fixing bolts and nuts with power tool, then remove suspension arm, front lower link, and radius rod from rear suspension member. INSPECTION AFTER REMOVAL Check rear suspension member for deformation, cracks, and other damage and replace if necessary. INSTALLATION Refer to RSU-7, "Components", for tightening torque. Install in the reverse order of removal. Refer to component parts location and do not reuse non-reusable parts.

- Perform final tightening of installation position of links (rubber bushing) under unladen conditions with tires on level ground. Check wheel alignment. Refer to RSU-5, "Wheel Alignment Inspection".
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to BRC-6, "Adjustment of Steering Angle Sensor Neutral Position".

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#### **SERVICE DATA**

### SERVICE DATA PFP:00030

### **Wheel Alignment**

AES000MV

		Minimum	– 1° 18′ (– 1.30°)
Camber Degree minute (Decimal degree)		Nominal	- 0° 48′ (- 0.80°)
		Maximum	- 0° 18′ (- 0.30°)
		Minimum	2.4 mm (0.094 in)
	Distance (A – B)	Nominal	4.7 mm (0.185 in)
Total toe-in		Maximum	7.0 mm (0.276 in)
iotai toe-iii		Minimum	0°05′ (0.08°)
	Angle (left plus right) Degree minute (Degree)	Nominal	0°10′ (0.17°)
		Maximum	0°15′ (0.25°)

Ball Joint

Axial end play	0 mm (0 in)
Swing torque	0.5 – 3.4 N·m (0.06 – 0.34 kg-m, 5 – 30 in-lb)
Measurement on spring balance (cotter pinhole position)	9.7 – 66.0 N (0.99 – 6.7 kg, 2.18 – 14.8 lb)
Rotating torque	0.5 – 3.4 N·m (0.06 – 0.34 kg-m, 5 – 30 in-lb)

## Wheelarch Height (Unladen\*)

AES000MX



SFA818A

Destination				Canada				
Engine	VQ35DE VK4					VQ3	VK45DE	
Axle	2V	VD		AWD	I		AWD	
Tire size	265/60R18	265/50R20	265/60R18	265/5	50R20	265/60R18 265/50R		50R20
Front (Hf)	835 mm (32.87 in)	834 mm (32.83 in)	834 mm (32.83 in)	833 mm (32.80 in)	832 mm (32.76 in)	834 mm (32.83 in)	833 mm (32.80 in)	832 mm (32.76 in)
Rear (Hr)	822 mm (32.36 in)	821 mm (32.32 in)	829 mm (32.64 in)	827 mm (32.56 in)	825 mm (32.48 in)	827 mm (32.56 in)		

<sup>\*:</sup> Fuel, engine coolant and engine oil full. Spare tire, jack, hand tools and mats are in designated positions.