

SECTION **RAX**
REAR AXLE

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RAX

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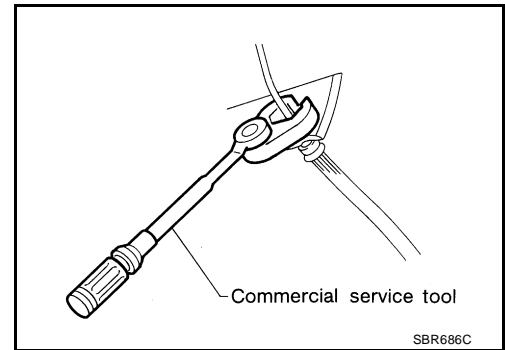
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PRECAUTIONS

Precautions

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



PREPARATION

[C200]

PREPARATION

PFP:00002

Special Service Tools

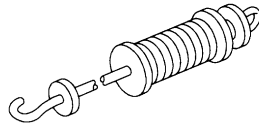
EDS0032X

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

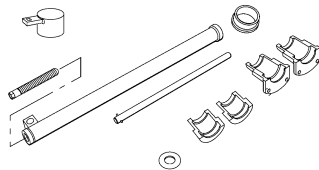
Tool number (Kent-Moore No.) Tool name	Description
KV40101000 (J-25604-01) Axle stand	Removing rear axle shaft
ST36230000 (J-25840-A) Slide hammer	Removing rear axle shaft
KV40106500 (J-45073) Rear axle bearing remover	Removing wheel bearing, wheel bearing lock nut and ABS sensor rotor
— (J-46215) Rear axle bearing installation kit A: ABS sensor mount repair kit J-46215-8 B: Plastic plugs and nuts kit J-46215-4	Installing rear axle bearing
— (J-23907) Seal and bushing puller	Removing rear axle seal



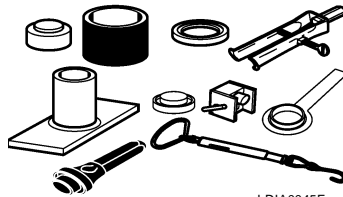
NT159



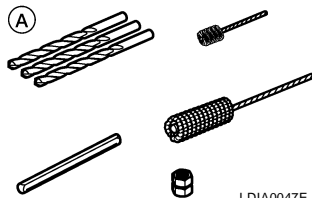
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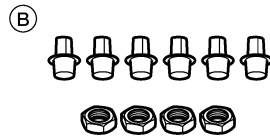
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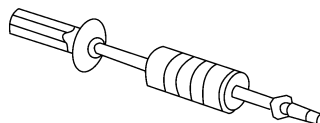
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LDIA0046E

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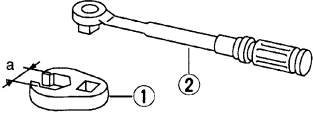
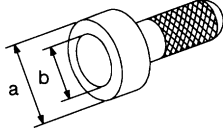
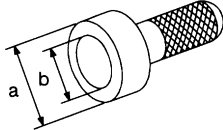
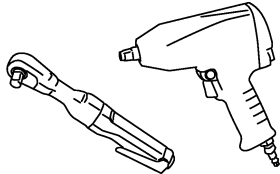
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PREPARATION

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Commercial Service Tools

Tool name	Description
<p>1 Flare nut crowfoot 2 Torque wrench</p>  <p style="text-align: right;">S-NT360</p>	<p>Removing and installing each brake piping a: 10 mm (0.39 in)</p>
<p>Bearing cage oil seal drift</p>  <p style="text-align: right;">NT115</p>	<p>Installing oil seal a: 74 mm (2.91 in) dia. b: 68 mm (2.68 in) dia.</p>
<p>Rear axle oil seal drift</p>  <p style="text-align: right;">NT115</p>	<p>Installing oil seal a: 54.5 mm (2.15 in.) b: 34.5 mm (1.36 in.)</p>
<p>Power tools</p>  <p style="text-align: right;">PBIC0190E</p>	<p>Removing and installing nuts and bolts</p>

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

[C200]

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PF0:0003

NVH Troubleshooting Chart

EDS0032Z

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

Reference page		RAX-7		RAX-7		RAX-7		PR-3, "NVH Troubleshooting Chart"		RFD-8, "NVH Troubleshooting Chart"		RSU-4, "NVH Troubleshooting Chart"		WT-4, "NVH Troubleshooting Chart"		WT-4, "NVH Troubleshooting Chart"		BR-5, "NVH Troubleshooting Chart"	
		Improper installation, looseness		Parts interference		Wheel bearing damage		PROPELLER SHAFT		REAR FINAL DRIVE		SUSPENSION		TIRES		ROAD WHEEL		BRAKES	
Symptom	Noise	x	x			x	x	x	x	x	x	x	x	x	x				
	Shake	x	x			x		x	x	x	x	x	x	x	x				
	Vibration	x	x			x		x	x										
	Shimmy	x	x							x	x	x	x	x	x				
	Shudder	x								x	x	x	x	x	x				
	Poor quality ride or handling	x	x	x							x	x	x	x	x				

x: Applicable

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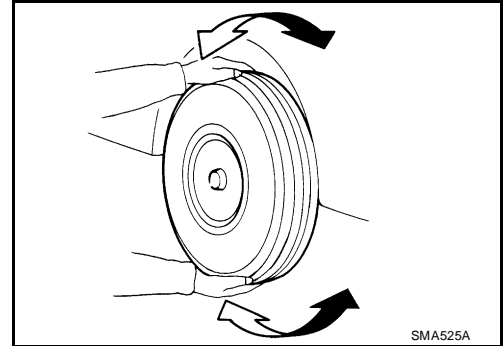
ON-VEHICLE SERVICE

PF0:0000

Rear Axle Parts

EDS00330

- Check the axle parts for excessive play, wear and damage. Replace as necessary.
- Shake each rear wheel to check for excessive play. Repair as necessary.
- Retighten all nuts and bolts to the specified torque. Refer to [RAX-7, "AXLE SHAFT"](#).



EDS00331

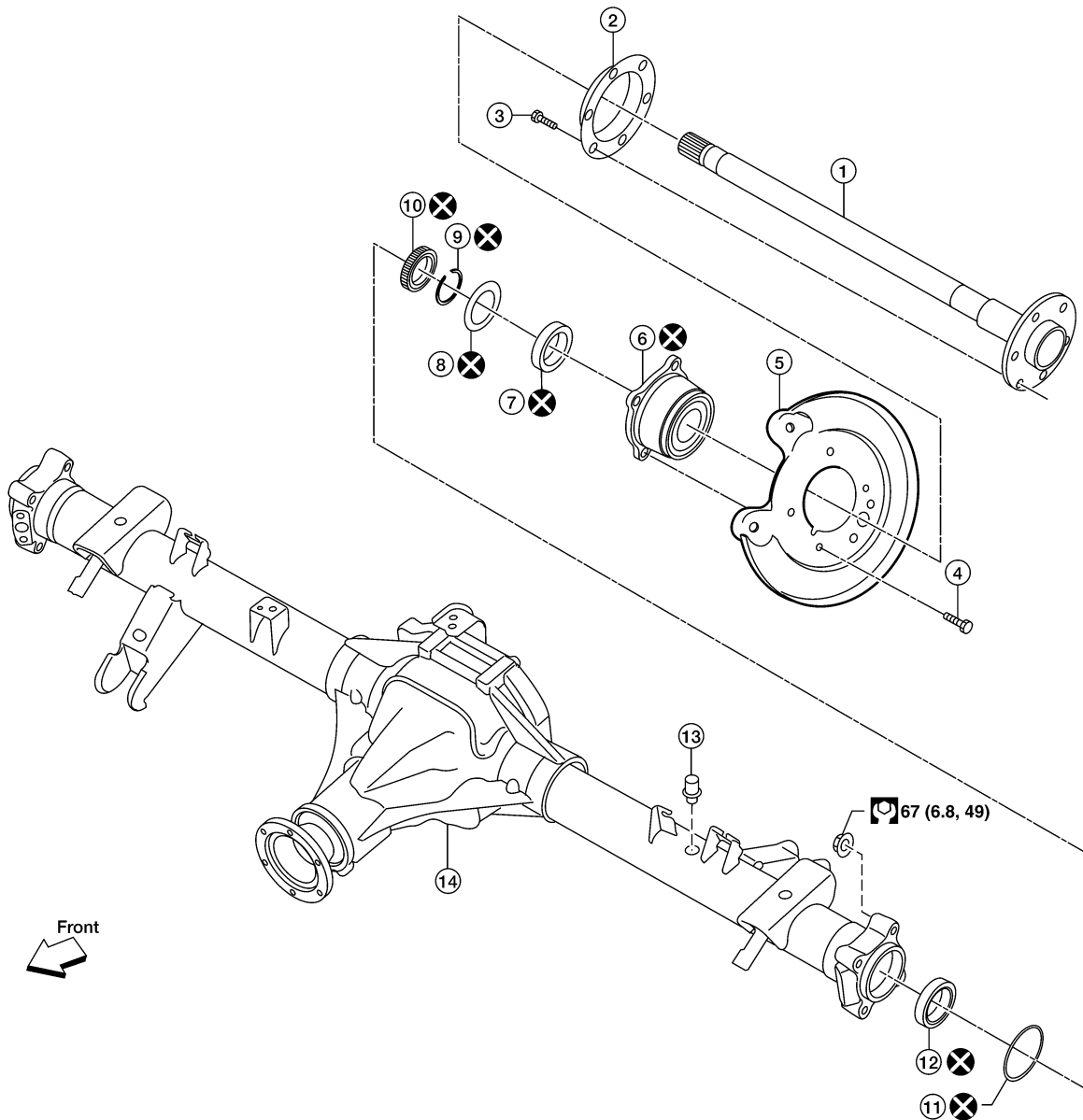
Rear Axle Bearing

- Check that the axle shaft bearing operates smoothly. Replace as necessary.
- Check axial end play. Refer to [RAX-14, "Axle Specifications"](#).

AXLE SHAFT

Removal and Installation

SEC. 381 • 402 • 430 • 431 • 432



: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

- | | | |
|--------------------------|---------------------------------|-------------------|
| 1. Axle shaft | 2. Grease catcher | 3. Wheel stud |
| 4. Axle bearing stud | 5. Back plate and torque member | 6. Axle bearing |
| 7. Bearing ring retainer | 8. Shim washer | 9. Snap ring |
| 10. ABS sensor rotor | 11. O-ring | 12. Axle oil seal |
| 13. Breather | 14. Rear final drive | |

WDIA0280E

CAUTION:

Before removing the rear axle, disconnect the ABS wheel sensor from the assembly. Then move it away from the axle. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.

- Wheel bearing does not require maintenance.
- If growling noise is emitted from wheel bearing during operation, replace wheel bearing assembly.

AXLE SHAFT

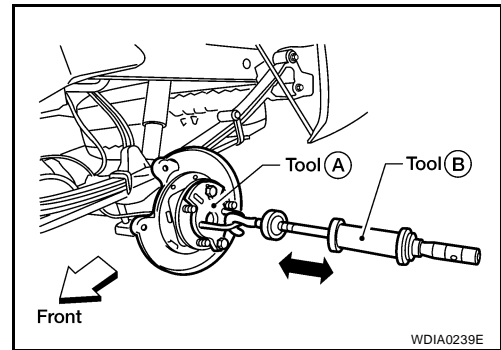
[C200]

- If the wheel bearing assembly is removed, it must be replaced. The old assembly must not be re-used.

REMOVAL

1. Remove the ABS wheel sensor from the axle case and reposition out of the way. Refer to [BRC-59, "WHEEL SENSORS"](#) (VDC/TCS/ABS), [BRC-129, "WHEEL SENSORS"](#) (HDC/HSA/VDC/TCS/ABS).
2. Remove the rear brake caliper assembly without disconnecting the brake hose and reposition out of the way. Refer to [BR-29, "Removal and Installation of Brake Caliper and Disc Rotor"](#).
3. Remove the parking brake assembly from the back plate and torque member. Refer to [PB-6, "Removal and Installation"](#).
4. Remove the axle bearing nuts securing the axle shaft assembly to the axle case.
5. Draw the axle shaft assembly out of the axle case using Tools as shown.

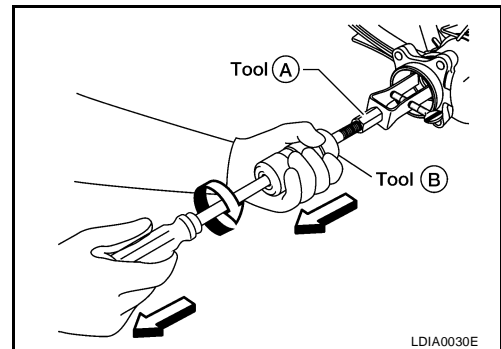
Tool number **A:** KV40101000 (J-25604-01)
 B: ST36230000 (J-25840-A)



6. Remove the O-ring.
7. Remove the axle oil seal using Tools as shown.

Tool number **A:** — (J-26941 part of J-46215)
 B: — (J-23907)

- Do not reuse the axle oil seal once it is removed. Always install a new axle oil seal.
- Apply a constant pressure on the slide hammer while turning the slide hammer 180° degrees periodically while pulling the axle oil seal out.

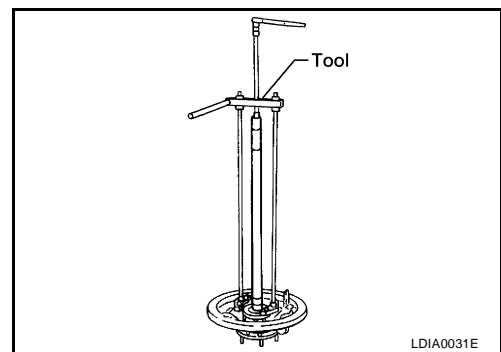


8. Remove the ABS sensor rotor using Tool. Discard the ABS sensor rotor.

Tool number : KV40106500 (J-45073)

NOTE:

Always replace the ABS sensor rotor with a new one.



9. Remove the snap ring and shim washer. Discard the snap ring and shim washer.

NOTE:

Always replace the snap ring and shim washer with new ones.

AXLE SHAFT

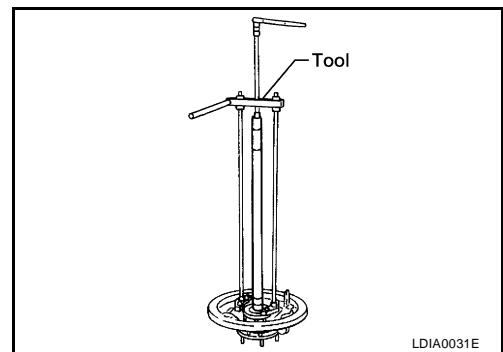
[C200]

10. Remove the bearing ring retainer from the axle shaft using Tool as shown. Discard the bearing ring retainer.

Tool number : KV40106500 (J-45073)

NOTE:

Always replace the bearing ring retainer with a new one.



11. Remove the back plate and torque member with the axle bearing attached from the axle shaft using a suitable press.
12. Remove the axle bearing studs to release the axle bearing from the back plate and torque member using a suitable hammer or press.
13. Remove the wheel studs using a suitable hammer or press.
14. Remove the grease catcher from the axle shaft.

INSPECTION AFTER REMOVAL

Axle Shaft

- Check axle shaft for straightness, cracks, damage, wear and distortion. Replace if necessary.

Axle Case

- Check axle case for yield, deformation and cracks. Replace if necessary. Refer to [RFD-14, "REAR FINAL DRIVE ASSEMBLY"](#).

INSTALLATION

1. Install the grease catcher on the axle shaft.
2. Install the wheel studs through the grease catcher into the axle shaft using a suitable press.

NOTE:

All six wheel studs must be pressed on at the same time and are flush with the grease catcher when installed.

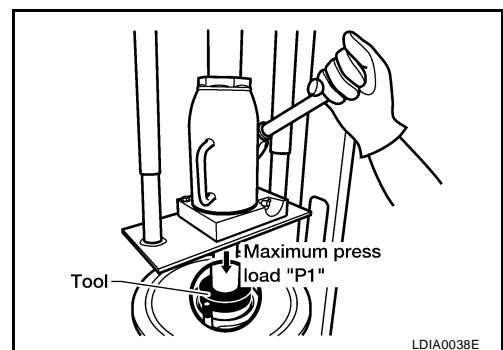
3. Position the new axle bearing on the back plate and torque member.
4. Install the axle bearing studs using a suitable press to attach the axle bearing to the back plate and torque member.

NOTE:

Always replace the axle bearing with a new one.

5. Install the back plate and torque member, new axle bearing and new bearing ring retainer on the axle shaft using a suitable press.

Maximum press load "P1" : 98 kN (10 ton, 11.0 US ton, 9.8 Imp ton)

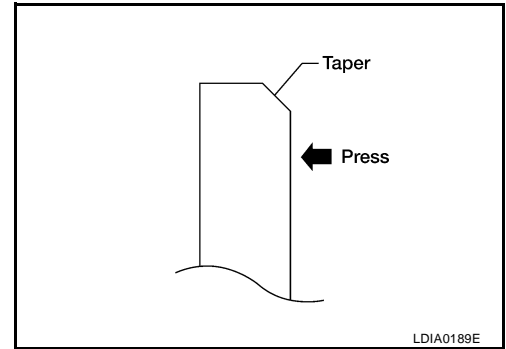


CAUTION:

Press the new bearing ring retainer on the axle shaft with the taper side positioned as shown.

NOTE:

Always replace the bearing ring retainer with a new one.



6. Select the correct size shim washer. Refer to [RAX-14, "Shim Washers"](#) .
 - Select the size of shim washer so that the installed snap ring to shim washer clearance is within specification.

Snap ring to shim washer clearance : 0.2 mm (0.008 in) or less

7. Install a new snap ring on the axle shaft.
 - Do not over spread the snap ring when installing, measure the outer diameter of the snap ring after installation and replace if the snap ring outer diameter exceeds specification.

Snap ring outer diameter installed : 47.5 mm (1.87 in) maximum

NOTE:

Always replace the snap ring with a new one.

8. Check the snap ring to shim washer clearance, repeat steps 7 and 8 as necessary until the installed snap ring to shim washer clearance is within specification.
9. Perform break-in rotation of the wheel bearing.
 - a. Rotate the wheel bearing in the forward direction for a minimum of 10 revolutions at 50-70 RPM.
 - b. Rotate the wheel bearing in the reverse direction for a minimum of 10 revolutions at 50-70 RPM.
10. Measure the rotational torque of the wheel bearing.

Rotational speed : 8-12 RPM

Rotational torque : 1.8 N-m (0.18 kg-m, 16 in-lb)

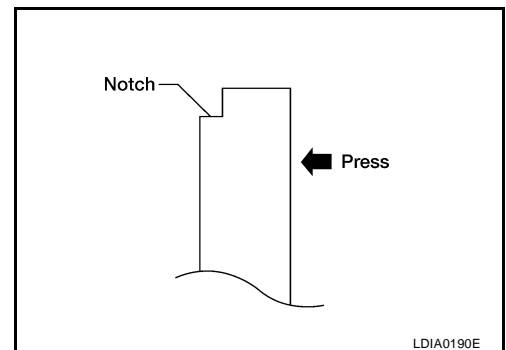
11. Inspect that the wheel bearing is free from axial play relative to the axle shaft.
12. Install a new ABS sensor rotor on the axle shaft using a suitable press.

CAUTION:

Press the new ABS sensor rotor on the axle shaft with the notch side positioned as shown.

NOTE:

Always replace the ABS sensor rotor with a new one.



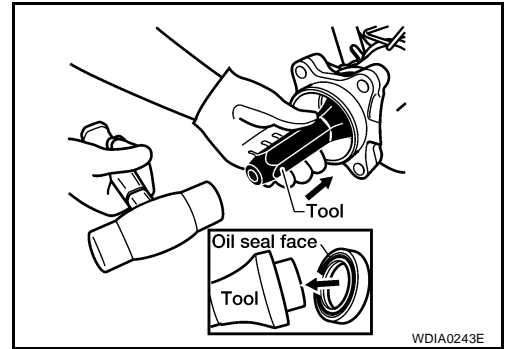
AXLE SHAFT

[C200]

13. Install the new axle seal into the axle case using Tool as shown.

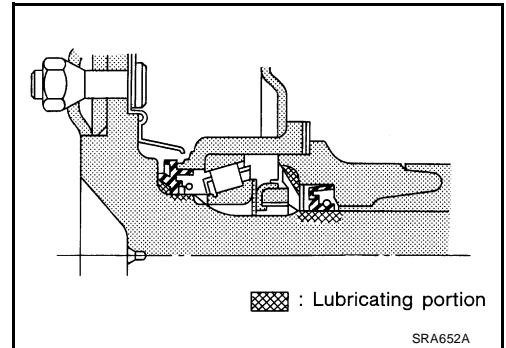
- After installing the new oil seal, coat the sealing lip with oil.
- Install the new oil seal with the seal facing outwards so that the seal is fully seated in the axle case.

Tool number : — (J-34115 part of J-46215)



14. Apply multi-purpose grease to the recess of axle case end as shown.

15. Apply gear oil to the spline of axle shaft. Coat the axle oil seal surface of axle shaft with multi-purpose grease as shown.



16. Insert Tool into the new axle oil seal as a guide.

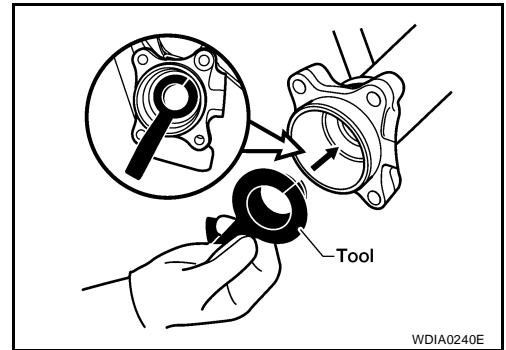
CAUTION:

When inserting axle shaft, be careful not to damage oil seal.

NOTE:

The split ends of the Tool must butt up together and not overlap as shown.

Tool number : — (J-34296-1 part of J-46215)



17. Insert the axle shaft assembly. Tighten the axle shaft nuts evenly in a criss-cross pattern to specification.

- Remove the Tool when the axle shaft assembly is approximately 90% inserted to protect the new axle oil seal.

Tool number : — (J-34296-1 part of J-46215)

18. Install the parking brake assembly on the back plate and torque member. Refer to [PB-6, "Removal and Installation"](#) .

19. Install the rear brake caliper assembly. Refer to [BR-29, "Removal and Installation of Brake Caliper and Disc Rotor"](#) .

20. Install the ABS wheel sensor into the axle case. Refer to [BRC-59, "WHEEL SENSORS"](#) (VDC/TCS/ABS), [BRC-129, "WHEEL SENSORS"](#) (HDC/HSA/VDC/TCS/ABS).

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AXLE BEARING

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Removal and Installation

EDS00333

The axle bearing must be replaced every time the axle shaft is removed and installed. Refer to [RAX-19](#), "[Removal and Installation](#)".

CAUTION:

Do not reuse the axle bearing. The axle bearing must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

AXLE OIL SEAL

PFP:43252

Removal and Installation

EDS00334

The axle oil seal must be replaced every time the axle shaft is removed and installed. Refer to [RAX-19](#), "[Removal and Installation](#)".

CAUTION:

Do not reuse the axle oil seal. The axle oil seal must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

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RAX

SERVICE DATA AND SPECIFICATIONS (SDS)

[C200]

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

Axle Specifications

EDS0033G

Unit: mm (in)

Axial end play	0 - 0.07 (0 - 0.003)
Snap ring to shim washer clearance	0.2 (0.008) or less
Snap ring outer diameter installed	47.5 (1.87) maximum

Shim Washers

EDS00335

Unit: mm (in)

Total end play	0.02 - 0.15 (0.0008 - 0.0059)		
Available shim washers	ID Paint Dot Color	Thickness	Part Number*
	Pink	2.5 (0.098)	43086-EB08C
	Black	2.4 (0.094)	43086-EB07C
	Purple	2.3 (0.091)	43086-EB06C
	Yellow	2.2 (0.087)	43086-EB05C
	Green	2.1 (0.083)	43086-EB04C
	Red	2.0 (0.079)	43086-EB03C
	White	1.9 (0.075)	43086-EB02C
	Blue	1.8 (0.071)	43086-EB01C

*: Always check with the Parts Department for the latest parts information.

PRECAUTIONS

[M226]

PRECAUTIONS

PFP:00001

Precautions

EDS00336

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

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

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PREPARATION

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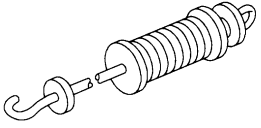
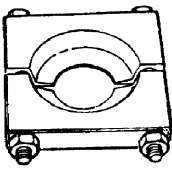
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PREPARATION

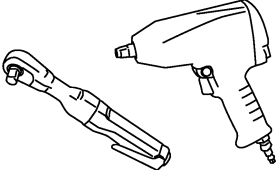
Special Service Tools

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
KV40101000 (J-25604-01) Axle stand  NT159	Removing axle shaft
ST36230000 (J-25840-A) Slide hammer  NT126	Removing axle shaft
205-D002 (—) Bearing splitter  ZZA0700D	Removing axle shaft bearing

Commercial Service Tools

EDS00338

Tool name	Description
Power tools  PBIC0190E	Removing and installing nuts and bolts

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

[M226]

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PF0:0003

NVH Troubleshooting Chart

EDS00339

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

Reference page										
Possible cause and SUSPECTED PARTS										
Symptom	Noise	x	x		x	x	x	x	x	
	Shake	x	x		x		x	x	x	
	Vibration	x	x		x		x	x		
	Shimmy	x	x				x	x	x	
	Shudder	x					x	x	x	
	Poor quality ride or handling	x	x	x			x	x	x	
		Improper installation, looseness	Parts interference	Wheel bearing damage	PROPELLER SHAFT	REAR FINAL DRIVE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES
		RAX-19 (M226 all)	RAX-19 (M226 all)	RAX-19 (M226 all)	PR-3, "NVH Troubleshooting Chart"	RFD-42 (M226 without LD), RFD-77 (M226 with LD)	RSU-4, "NVH Troubleshooting Chart"	WT-4, "NVH Troubleshooting Chart"	WT-4, "NVH Troubleshooting Chart"	BR-5, "NVH Troubleshooting Chart"

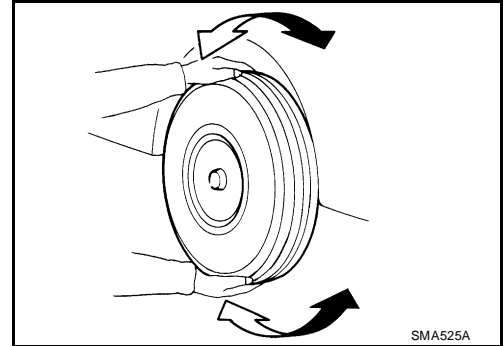
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ON-VEHICLE SERVICE

Rear Axle Parts

- Check the axle parts for excessive play, wear, and damage. Replace as necessary.
- Shake each rear wheel to check for excessive play. Repair as necessary
- Retighten all nuts and bolts to the specified torque. Refer to [RAX-19, "AXLE SHAFT"](#).



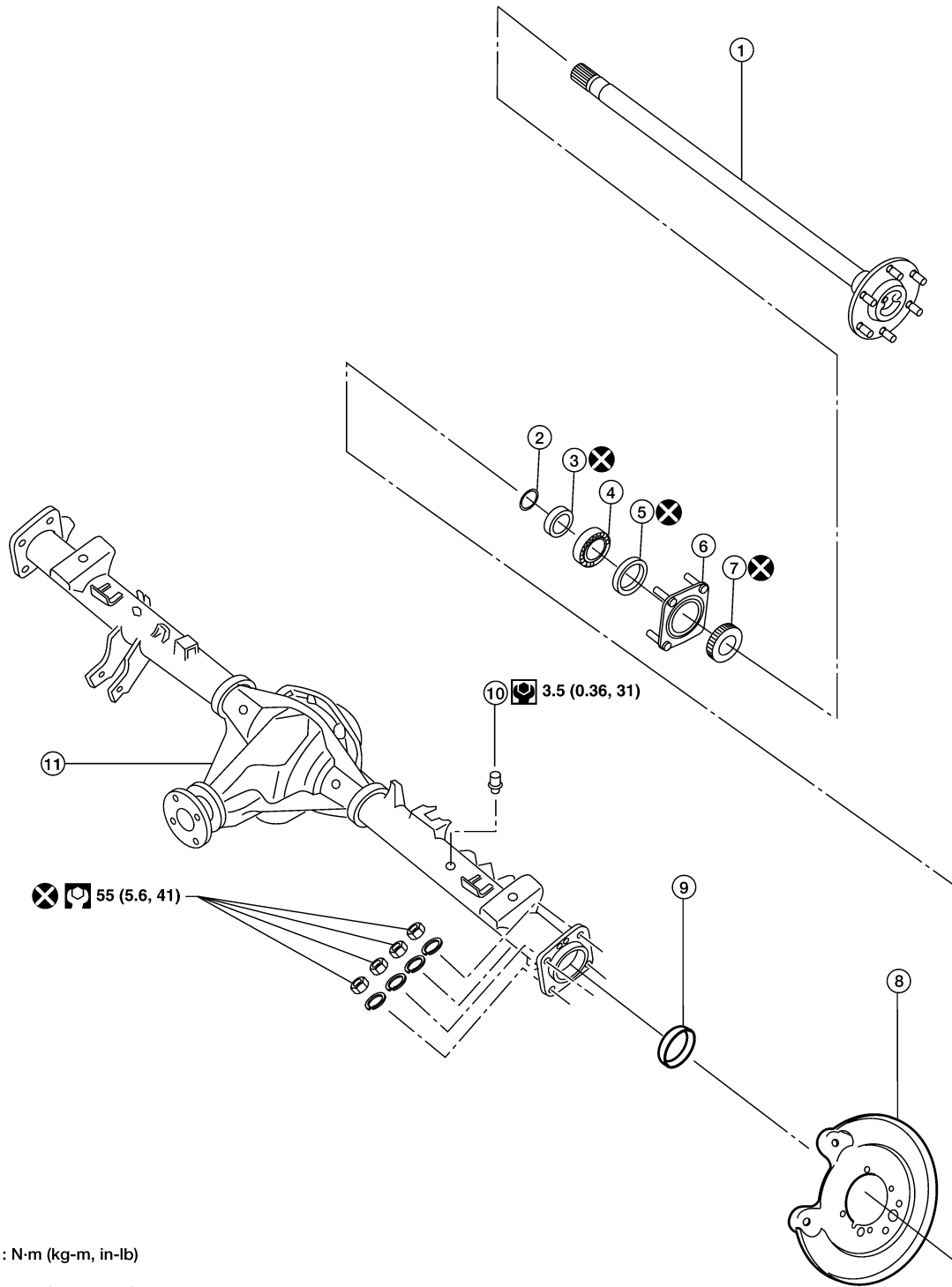
Rear Axle Bearing

- Check that the axle shaft bearing operates smoothly. Replace as necessary.
- Check axial end play.

AXLE SHAFT

Removal and Installation

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: N·m (kg·m, in·lb)

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

- | | | |
|-----------------------|---------------------------------|----------------------------|
| 1. Axle shaft | 2. Snap ring | 3. Bearing ring retainer |
| 4. Axle shaft bearing | 5. Axle oil seal | 6. Axle shaft bearing cage |
| 7. ABS sensor rotor | 8. Back plate and torque member | 9. Axle shaft bearing cup |
| 10. Breather | 11. Rear final drive | |

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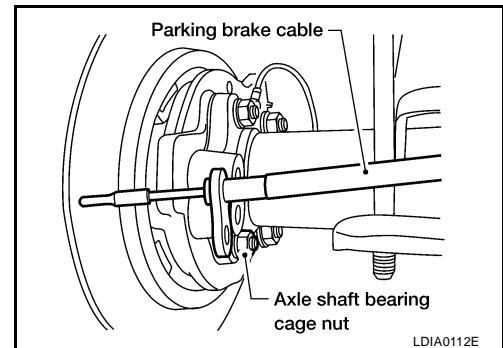
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CAUTION:

Before removing the axle shaft, remove the ABS sensor to reposition the ABS sensor out of the way. Failure to do so may result in damage to the ABS sensor and cause the ABS sensor to become inoperative.

REMOVAL

1. Remove the ABS sensor and position out of the way. Refer to [BRC-129, "WHEEL SENSORS"](#) (HDC/HSA/VDC/TCS/ABS).
2. Remove the rear brake rotor. Refer to [BR-29, "Removal and Installation of Brake Caliper and Disc Rotor"](#).
3. Remove the parking brake assembly from the back plate and torque member. Refer to [PB-5, "Removal and Installation"](#).
4. Remove the four axle shaft bearing cage nuts and lock washers.

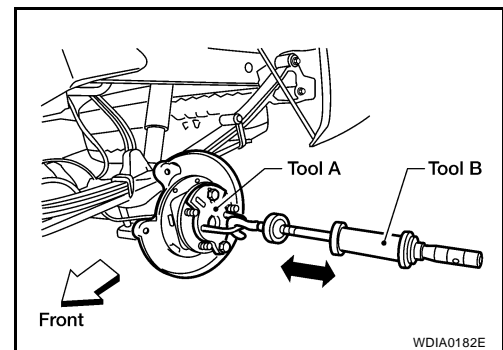


5. Remove the axle shaft assembly using Tools as shown.

CAUTION:

- The axle shaft bearing cup may stay in place in the axle shaft housing. Remove the cup carefully so as not to damage the inner surface of the axle shaft housing.
- Do not reuse the axle oil seal. The axle oil seal must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

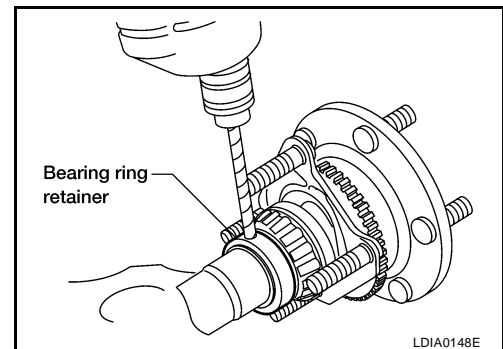
Tool number **A: KV40101000 (J-25604-01)**
 B: ST36230000 (J-25840-A)



6. Remove the back plate and torque member.
7. Remove the snap ring from the axle shaft using suitable snap ring pliers.
8. Secure the axle shaft in a suitable vise, then use a 1/4 in size drill bit to drill a hole approximately 3/4 into the thickness of the bearing ring retainer [3/4 thickness is approximately 6.3 mm (0.25 in) deep].

CAUTION:

- Mount the axle shaft using a soft jaw vise to avoid damaging the axle shaft.
- Do not drill all the way through the bearing ring retainer, the drill may damage the axle shaft surface.



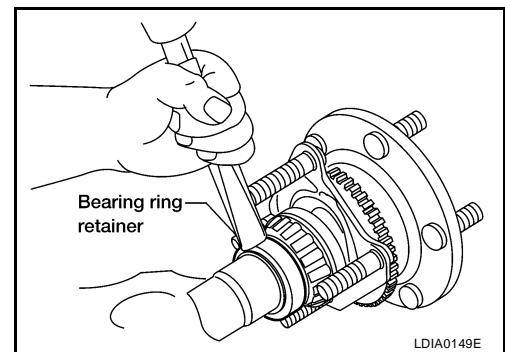
AXLE SHAFT

[M226]

9. Strike the bearing ring retainer using a suitable chisel and hammer, with the chisel positioned across the drilled hole. Break the bearing ring retainer to remove it.

CAUTION:

Do not heat or cut the axle shaft bearing or bearing ring retainer with a torch during removal, doing so will damage the axle shaft.



10. Remove the axle shaft bearing cage studs using a suitable hammer or press.
11. Pull the axle shaft bearing off of the axle shaft using Tool and a suitable press.

Tool number : 205-D002 (—)

CAUTION:

- Do not tighten the Tool against the axle shaft.
- Do not heat or cut the axle shaft bearing or bearing ring retainer with a torch during removal, doing so will damage the axle shaft.

12. Remove the axle oil seal and discard.

CAUTION:

Do not reuse the axle oil seal. The axle oil seal must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

13. Remove the wheel bearing cage.

NOTE:

- If reinstalling the old axle shaft, it may not be necessary to remove the ABS sensor rotor. Inspect the ABS sensor rotor and replace as necessary. Refer to [BRC-130, "SENSOR ROTOR"](#) (HDC/HSA/VDC/TCS/ABS).
- The ABS sensor rotor cannot be reused after it is removed. If replacing the axle shaft, install a new ABS sensor rotor on to the new axle shaft. Refer to [BRC-130, "SENSOR ROTOR"](#) (VDC/TCS/ABS).

INSPECTION AFTER REMOVAL

Axle Shaft

- Clean and remove all nicks and burrs.
- Check for straightness and distortion. Replace if necessary.
- Inspect machined surfaces for evidence of overheating, damage and wear. Replace if necessary.
- Measure the bearing ring retainer axle journal diameter. Replace if necessary.

Bearing ring retainer axle journal diameter (minimum) : 39.726 mm (1.5640 in)

Axle Shaft Bearing and Cup

- Check that the axle shaft bearing and cup roll freely and are free from noise, cracks, pitting and wear. Replace if necessary.

Axle Shaft Bearing Cage

- Check for deformation and cracks. Replace if necessary.

Axle Shaft Housing

- Check the exterior and inner machined surfaces for deformation and cracks. Replace if necessary.

INSTALLATION

1. If installing a new axle shaft, install a new ABS sensor rotor onto the new axle shaft. Refer to [BRC-130, "SENSOR ROTOR"](#) (HDC/HSA/VDC/TCS/ABS).

CAUTION:

Do not reuse the old ABS sensor rotor.

2. Install the studs in the axle shaft bearing cage using a suitable hammer or press.
3. Install the axle shaft bearing cage.

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4. Install a new axle oil seal.

CAUTION:

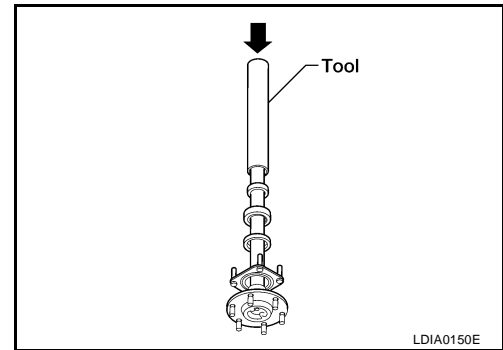
Do not reuse the axle oil seal. The axle oil seal must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

5. Install the axle shaft bearing and cup on the axle shaft.

- Prepare an installer tool from a steel tube measuring 762 mm (30 in) long with an outside diameter of 53.98 mm (2.125 in) and an inside diameter of 41.28 mm (1.625 in).
- Press the axle shaft bearing and cup onto the axle shaft using a suitable press and the installer tool, until a 0.038 mm (.0015 in) feeler gauge does not fit in between the axle shaft bearing cup and seat.

CAUTION:

Make sure the axle shaft bearing and cup, axle oil seal, and axle shaft bearing cage are installed facing in the correct direction.



6. Install the bearing ring retainer onto the axle shaft.
 - Press the bearing ring retainer onto the axle shaft with a minimum force of 31,100 N (3172 kg, 6992 lb) until a 0.038 mm (.0015 in) feeler gauge does not fit between the bearing inner race and the bearing ring retainer in at least one point.
7. Install the snap ring so it is fully seated into the groove on the axle shaft, using suitable snap ring pliers.
8. Install the back plate and torque member.
9. Install the axle shaft assembly into the axle shaft housing.
10. Install the axle shaft bearing cage lock washers and nuts. Tighten the axle shaft bearing cage nuts to specification.
11. Install the parking brake assembly onto the back plate and torque member. Refer to [PB-5, "Removal and Installation"](#).
12. Install the rear brake rotor. Refer to [BR-29, "Removal and Installation of Brake Caliper and Disc Rotor"](#).
13. Install the ABS sensor. Refer to [BRC-129, "WHEEL SENSORS"](#) (HDC/HSA/VDC/TCS/ABS).

AXLE BEARING

PFP:40120

Removal and Installation

EDS0033D

The axle bearing must be replaced every time the axle shaft is removed and installed. Refer to [RAX-19](#), "[Removal and Installation](#)".

CAUTION:

Do not reuse the axle bearing. The axle bearing must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

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AXLE OIL SEAL

PF:43252

Removal and Installation

EDS0033E

The axle oil seal must be replaced every time the axle shaft is removed and installed. Refer to [RAX-19](#), "[Removal and Installation](#)".

CAUTION:

Do not reuse the axle oil seal. The axle oil seal must be replaced every time the axle shaft assembly is removed from the axle shaft housing.

SERVICE DATA AND SPECIFICATIONS (SDS)

[M226]

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Axle Bearing

EDS0033F

Bearing ring retainer axle journal diameter (minimum)	39.726 mm (1.5640 in) minimum
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