

Suspension System

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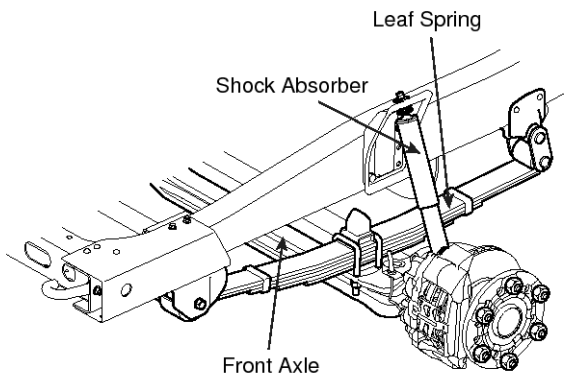
Suspension System

General

Description

Front Suspension

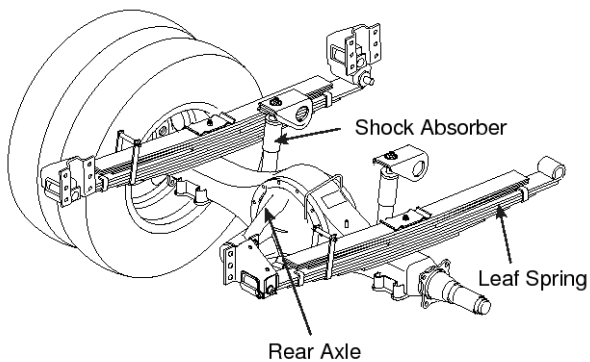
The front suspension comprises of the leaf spring, the shock absorber, the frame and the axle bumper. The front suspension supports the weight of vehicle. It absorbs the vibration and shock forces transmitted from the road surface to prevent the forces from affecting to the vehicle and reduce the irregular vibration from the wheel. As a result, it is possible to ensure the safe driving condition.



EMTSS5001A

Rear Suspension

The rear suspension comprises of the leaf spring, the shock absorber and the bumper stopper. The rear suspension supports the weight of vehicle. It prevents the vibration and shock forces of the road surface from transmitting to the body of the vehicle directly.



EMTSS5002A

General

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Specification

Front suspension system

Item			Specification
Type			Semi-elliptic, laminated leaf springs with shock absorber
Shock Absorber	Type		Hydraulic double acting telescopic type.
	Max. Stroke (mm)		543
	Min. Stroke (mm)		321
	Damping force at 0.3m/s	Expansion	146±21
		Compression	53±10
Leaf spring	Spring size (Length×Width×Thick- ness-Number of leaves)	HD65	Narrow : 1200×70×10t – 1 1200×70×11t – 3 Wide : 1200×70×10t – 4 1200×70×11t – 1
		HD72	1200×70×10t – 3 1200×70×11t – 2
		HD78	1200×70×10t – 3 1200×70×11t – 2

Rear suspension system

Item			Specification
Type			Semi-laminated leaf springs with shock absorber
Shock Absorber	Type		Hydraulic double acting telescopic type.
	Max. Stroke (mm)		451
	Min. Stroke (mm)		275
	Damping force at 0.3m/s	Expansion (kg)	191±27
		Compression (kg)	58±11
Leaf spring	Spring size (Length×Width×Thick- ness-Number of leaves)	HD65	Narrow Main : 1250×70×10t – 2 1250×70×11t – 3 Helper : 990×70×13t – 3
			Wide Main : 1250×70×10t – 6 Helper : 990×70×13t – 3
		HD72	Main : 1250×70×10t – 1 1250×70×11t – 5 Helper : 990×70×12t – 2 990×70×11t – 2
		HD78	Main : 1250×70×10t – 1 1250×70×11t – 5 Helper : 990×70×12t – 2 990×70×11t – 2

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Suspension System

Service Standard

Item	Reference Value mm (□ is the reference diameter)	Limit Value mm	Remedy and Remarks
Bushing gap between the spring pin and the upper portion of the spring shackle	[28] 0.04 ~ 0.14	0.5	Replace the bushing
Bushing gap between the spring shackle pin and the lower portion of the spring shackle	[28] 0.09 ~ 0.15	0.5	Replace the bushing
Gap between the spring shackle and the spring hanger	0.1 ~ 0.7	1.0	Replace
Gap between the spring hanger and the spring pin	0.1 ~ 1.0	1.0	Replace

Tightening Torque(Except D4GA Engine)

Item		Tightening Torque		
		Nm	Kgf·m	lb.f·ft
Front Suspension	U-bolt	196~226	20~23	145~166.3
	Front Spring Pin Flange Nut	235~294	24~30	173.5~216.9
	Front Spring Shackle Assembly Tightening Nut	93~127	9.5~13	68.7~94.0
	Double Nut at Upper of Shock Absorber	13~17	1.3~1.7	9.4~12.2
Rear Suspension	U-bolt	226~255	23~26	166.3~188.0
	Bumper Stopper Flange Nut (HD65 narrow)	23~34	2.3~3.5	17~25.3
	Rubber Stopper Flange Nut	23~34	2.3~3.5	17~25.3
	Spring Pin Flange Nut	28~38	2.9~3.9	20.9~28.2
	Rear Spring Shackle Pin Tightening Nut	148~201	15.1~20.5	109.2~148.2
	Flange Nut at Lower of Shock Absorber	26~33	2.7~3.4	19.5~24.5
	Double Nut at Upper of Shock Absorber	13~17	1.3~1.7	9.4~12.3

General

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TIGHTENING TORQUE(D4GA Engine-RHD)

Item		Tightening Torque		
		Nm	Kgf·m	lb.f·ft
Front Suspension	U-bolt	196~226	20~23	145~166.3
	Front Spring Pin Flange Nut	216~287.3	22~29.3	159.1~212
	Front Spring Shackle Assembly Tightening Nut	98~127.4	10~13	72.3~94
	Double Nut at Upper of Shock Absorber	13~17	1.3~1.7	9.4~12.2
Rear Suspension	U-bolt	226~275	23~28	166~203
	Bumper Stopper Flange Nut (HD65 narrow)	23~34.3	2.3~3.5	17~25.3
	Rubber Stopper Flange Nut	23~34.3	2.3~3.5	17~25.3
	Spring Pin Flange Nut	39.2~57	4~5.8	29~42
	Rear Spring Shackle Pin Tightening Nut	165~204	16.8~20.8	122~150.4
	Flange Nut at Lower of Shock Absorber	26.4~32.3	2.7~3.3	19.5~24
	Double Nut at Upper of Shock Absorber	13~17	1.3~1.7	9.4~12.3

Lubricant

Item	Nominal Lubricant
Leaf Spring Grease Nipple	Chassis Grease (NIGI No. 2)

Troubleshooting

NOTICE

Check the front and rear suspension at the same time

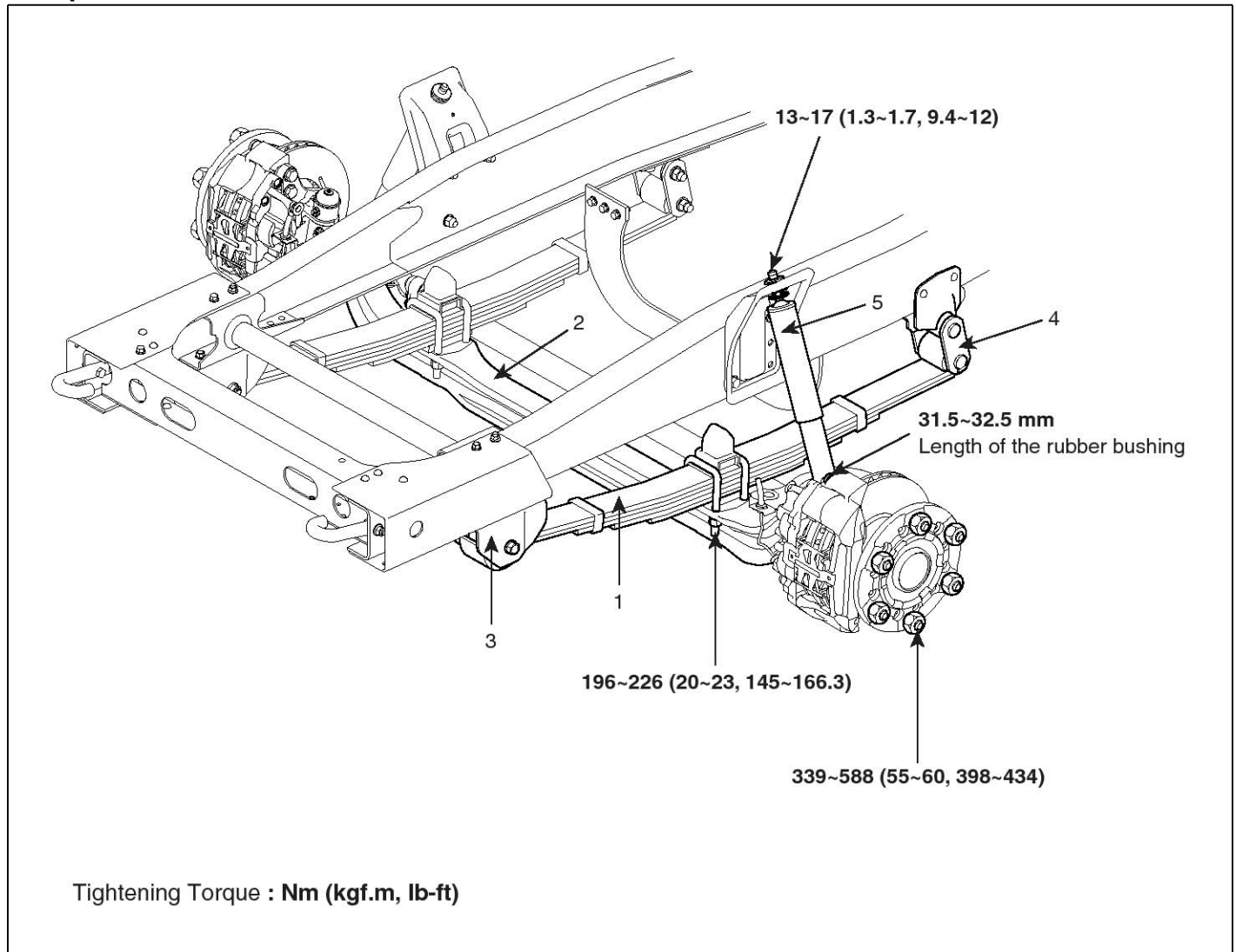
Item	Causes of Troubles	Remarks and Remedy
Sponge Symptom (feel that it sinks down)	Shock absorber is defective.	Replace
Frequently spring up	The tire is worn unevenly.	Replace
	The balance between the wheel and tire is not appropriate.	Replace
Shock from the road is transmitted directly	The tire air pressure is too low.	Replace
	The leaf spring is cracked or damaged.	Replace
The vehicle makes large noise when it has small amount of load. The leaf spring is broken.	The leaf spring is broken.	Replace
	The spring rubber bushing is worn.	Replace
	The shock absorber rubber bushing is worn.	Replace
	The shock absorber is loosened.	Replace
The vehicle makes large noise when it has large amount of load.	The spring bracket is damaged.	Replace
	The U-bolt is loosened.	Tighten again
	The rubber bumper or the bumper stopper is damaged	Replace

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Suspension System

Front Suspension System

Components location



SUDSSA001L

1. Leaf Spring Assembly
2. Front Axle Assembly
3. Front Spring Pin Assembly
4. Front Spring Shackle Assembly
5. Front Shock Absorber Assembly

⚠ CAUTION

- a. Be careful that the brake hose is not twisted or wrenched when it is removed.
- b. To prevent the foreign material from intruding, the end portion of the removed hose should be closed with a plug.
- c. The arrow making craved at the rubber bumper stopper should be headed to the front direction of the vehicle, when it is assembled.

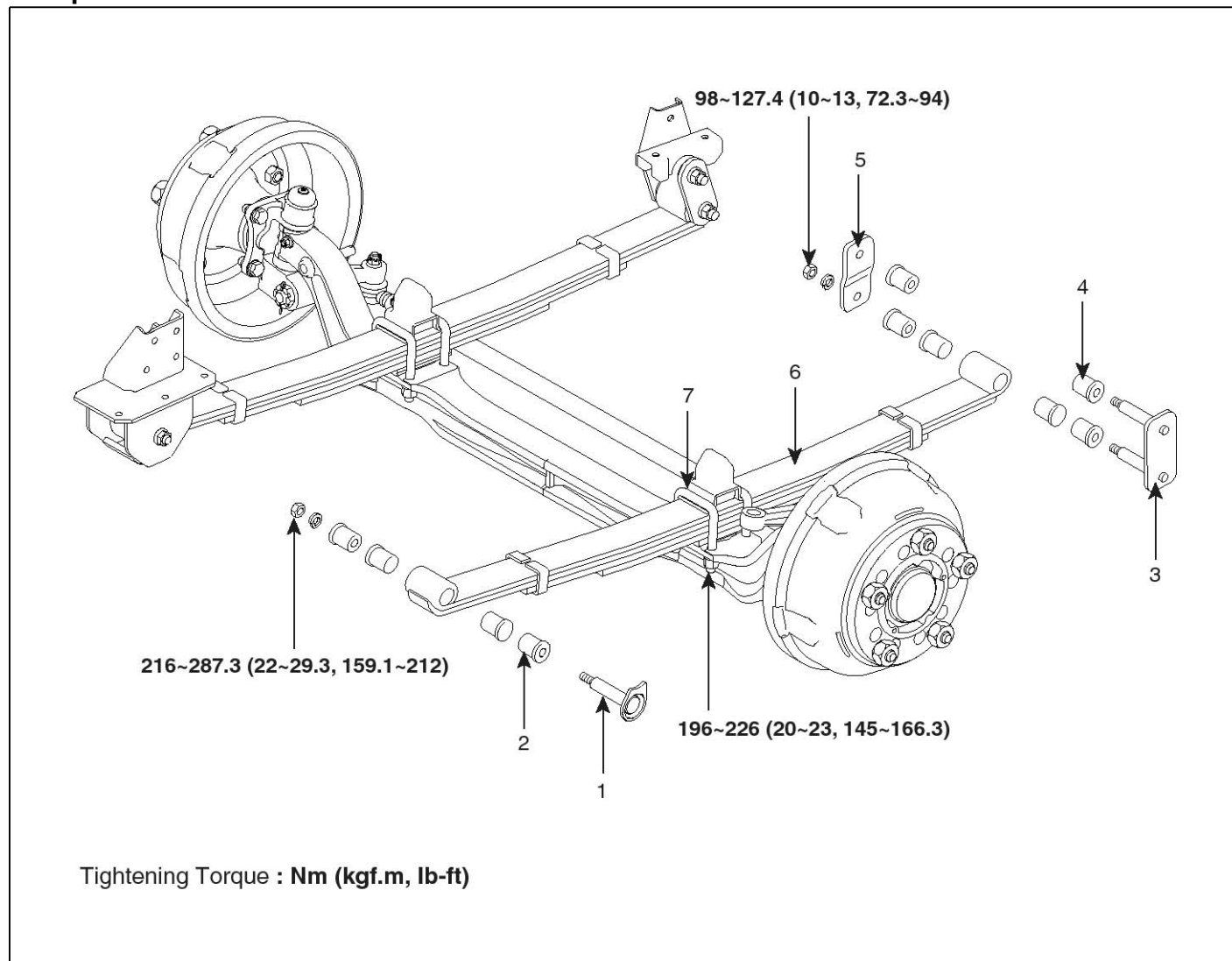
- d. The eye part's wrapper of the leaf spring should be headed to the front direction of the vehicle.
- e. Chassis grease (NLGi No.2) should be applied to the thread portion of the U-bolt.
- f. When tightening the U-bolt, the slit-out of the leaf spring should be fixed.

Front Suspension System

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Leaf Spring

Components



SUDSSA002L

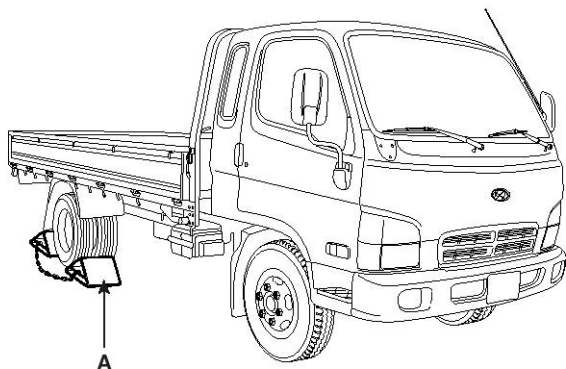
1. Front Spring Pin
2. Rubber Bushing
3. Front Spring Shackle Assembly
4. Rubber Bushing
5. Spring Shackle Plate
6. Leaf Spring Assembly
7. U-bolt

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Suspension System

Removal

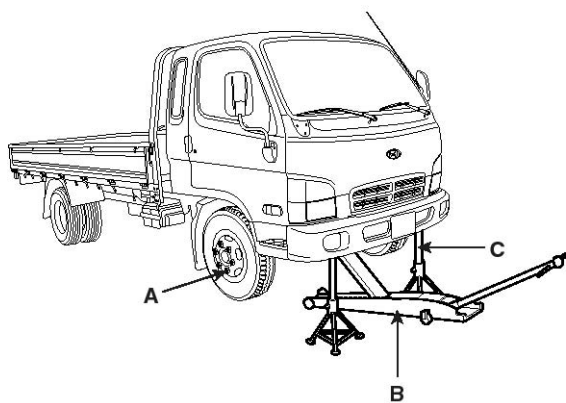
1. Place wooden block (A) at front and rear side of the rear tire.



KMTPA201A

2. Loosen the wheel nut (A).

Using a garage jack (B), lift up the vehicle and support the frame with a safety stand (C).

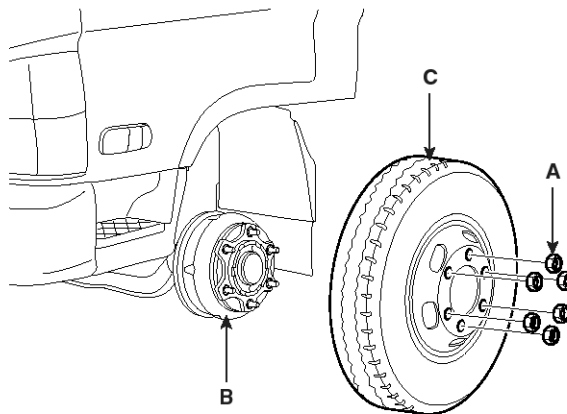


KMTPA202A

3. After removing the wheel nut (A), remove the wheel and tire (C) from the hub (B).

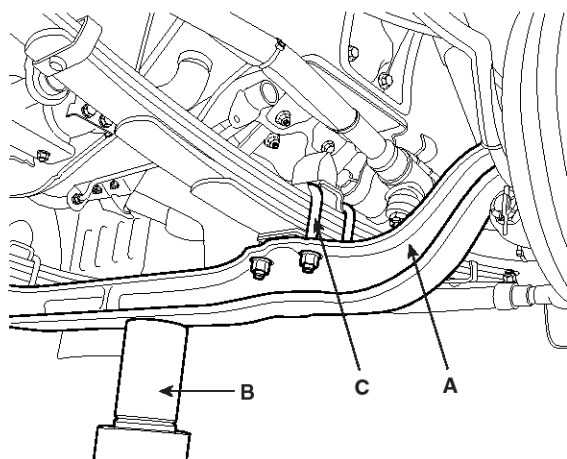
CAUTION

Be careful that the hub bolt is not defective during removing the wheel and tire (C).



KMTPA203A

4. Set the garage jack (B) at the center of the front axle (A) and support it with a safety stand.
5. Remove the U-bolt (C).

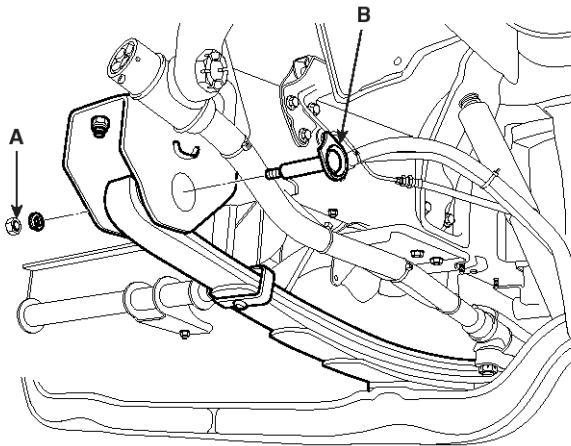


KFS1001A

Front Suspension System

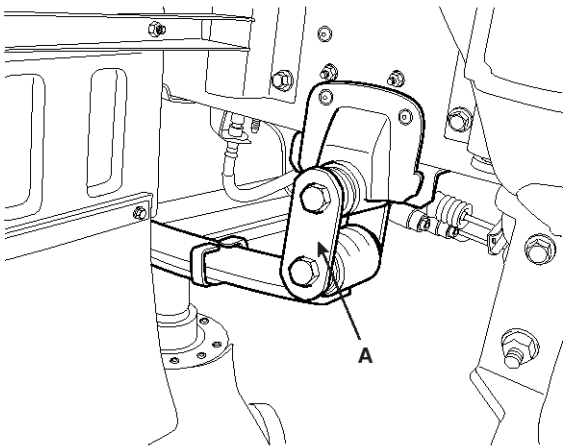
SS-9

6. Remove the front spring pin flange nut (A) and the flange bolt (B).



KFS1002A

7. Remove the front spring shackle assembly (A).



KFS1003A

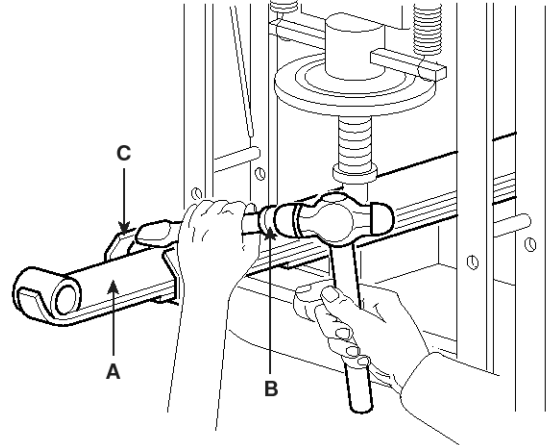
8. Remove the leaf spring assembly.

⚠ CAUTION

When removing the leaf spring, be careful of the safety. Do not drop the leaf spring down to the ground.

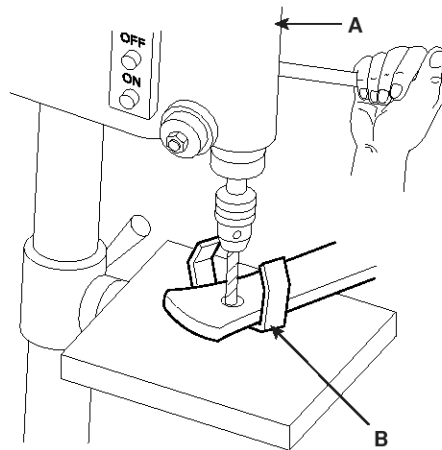
Disassembly

1. Make an alignment mark on the front leaf spring (A).
Fixing the spring, disassemble the clip (C) using a wedge (B) and then remove the center bolt.



KFS1004A

2. By drilling the rivet with a boring machine (A), remove the clip (B).



KFS1005A

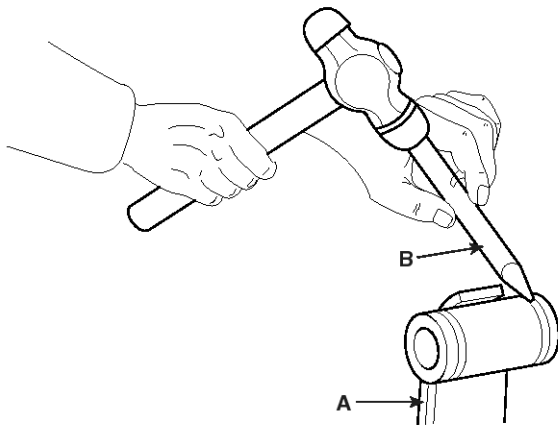
3. Remove the rubber bushing.
 - 1) Fix the spring (A) a vise.
 - 2) Using a chisel (B), remove the one side of the rubber bushing, and then, push the another side by a rod to remove it.

⚠ CAUTION

The removed rubber bushing should not use again.

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Suspension System

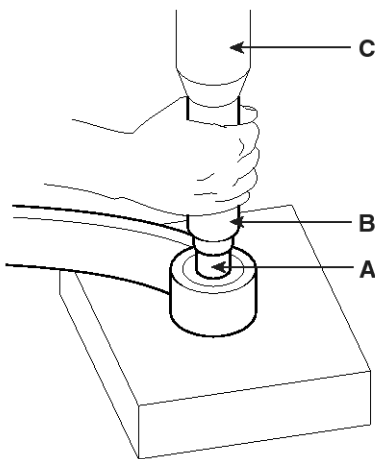


KFS1006A

4. Install a new rubber bushing.

NOTICE

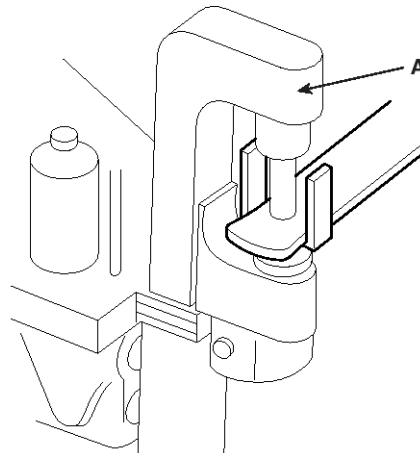
When installing the rubber bushing (A), set the rod (B) at the bushing, and press (C) the rod to fit-in the bushing.



KFS1007A

Reassembly

1. Cook the rivet using a riveting machine (A)



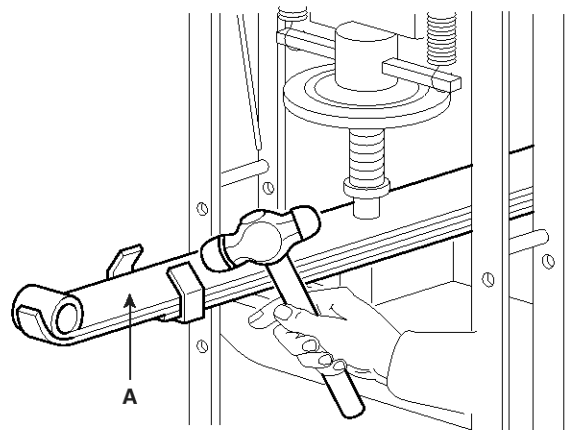
KFS1008A

2. When replacing the leaf spring assembly, install it after checking that the height of left and right ones and the camber ID number.

	1	2	3	4	5
LH	+	+	○	○	-
RH	+	○	○	-	-

3. Pressing the leaf spring (A) by a press, assemble the center bolt and the clip bolt.

Tightening Torque: 29~35 Nm (3.0~3.6 kgf·m, 22~26 lb-ft)



Front Suspension System

SS-11

KFS1010A

Installation

The installation is performed in the reverse order of removal.

1. Setting the center bolt of the leaf spring assembly the front axle beam hole, install the U-bolt.

Tightening Torque : 196~226 Nm(20~23 kgf.m, 145~166.3 lb-ft)

NOTICE

- a. When installing the spring, the wrapper of the spring eye part should be assembled with heading to the front direction.
 - b. The chassis grease (NLGI No.2) should be applied to the thread portion of the U-bolt. Tighten the U-bolt with the specified torque.
2. Install the front spring shackle rubber bushing and the shackle plate. And then, install the shackle assembly mounting nut.

Tightening Torque : 98~127.4 Nm (10~13 kgf.m, 72.3~94 lb-ft)

3. Install the front spring pin flange bolt and then tighten the flange nut.

Tightening Torque : 216~287.3 Nm (22~29.3 kgf.m, 159.1~212 lb-ft)

NOTICE

Before assembling the spring pin to the bush, the anticorrosive grease should be coated on the outer surface of the spring pin and the inner surface of the rubber bushing.

4. Install the wheel and tire.

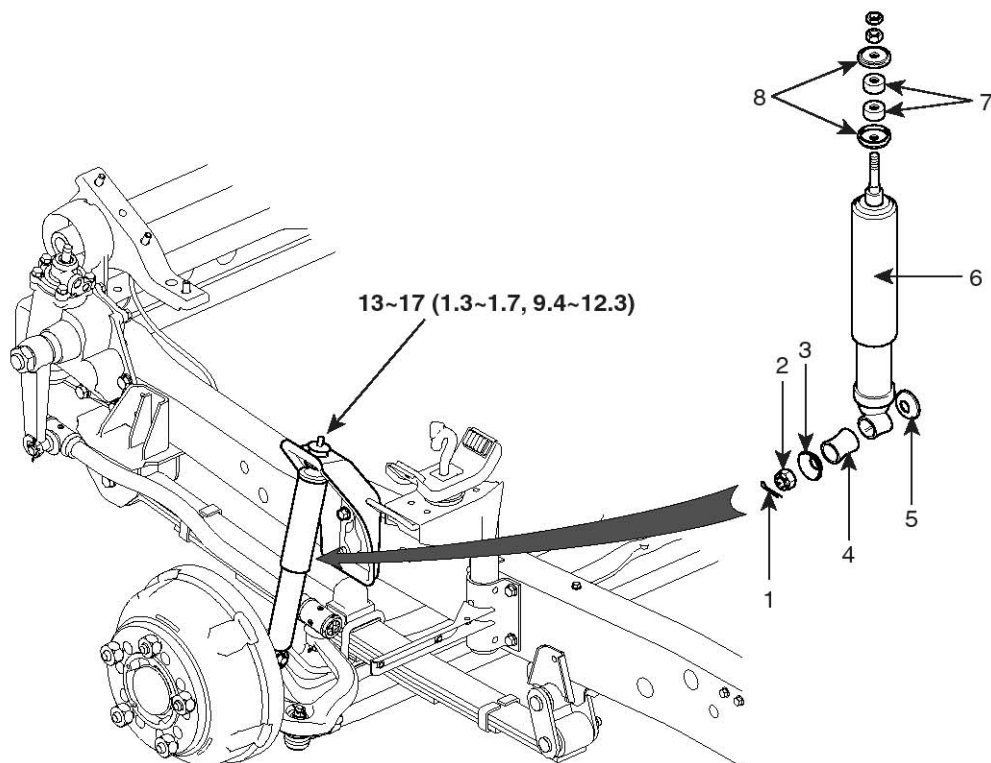
Tightening Torque : 539~588 Nm (55~60 kgf.m, 398~434 lb-ft)

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Suspension System

Shock Absorber

Components



Tightening Torque : Nm (kgf.m, lb-ft)

SUDSSA007L

1. Split Pin
2. Castle Nut
3. Eye Washer
4. Rubber Bushing
5. Plain Washer
6. Shock Absorber
7. Side upper Rubber Bushing
8. Washer

⚠ CAUTION

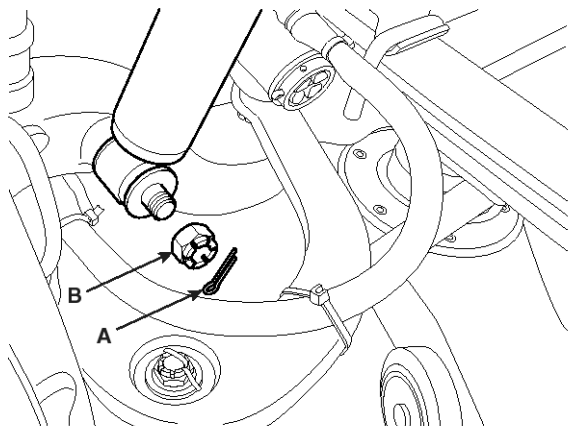
Do not disassemble or heat the shock absorber.

Front Suspension System

SS-13

Removal

1. Take off the split pin (A). Remove the shock absorber lower castle nut (B).

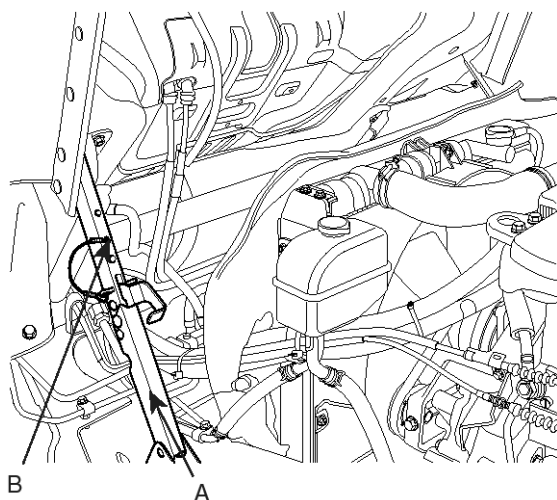


KFS1012A

2. Lift up the cap.

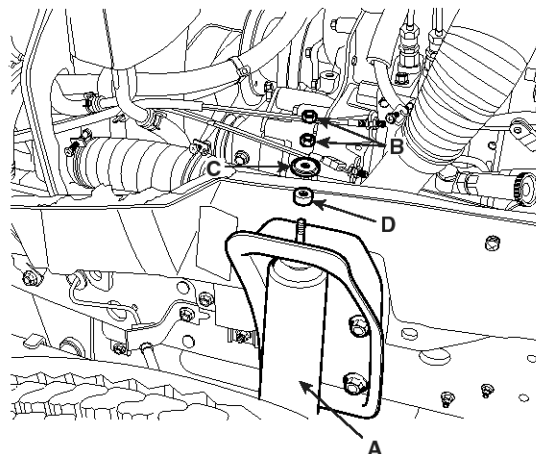
CAUTION

Insert a safety pin into the fixing hole of the cap stay for preventing the cap from going down.



KMTTM5601A

3. Remove the shock absorber (A).
 - a. Remove the shock absorber upper double nut (B).
 - b. After removing the washer (C) and the side upper rubber bushing (D), remove the shock absorber (A).



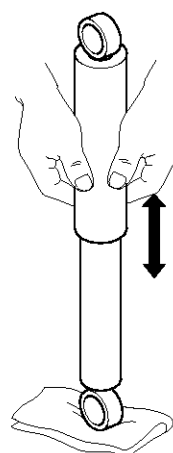
KFS1013A

Inspection

1. Repeating to push and pull the shock absorber, check if it makes an abnormal resistance or noise during operation.

CAUTION

Do not disassemble or heat the shock absorber.



CSFSA57A

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Suspension System

2. Check if the shock absorber has the oil leakage or the deformation.

Installation

The installation is performed in the reverse order of the removal.

NOTICE

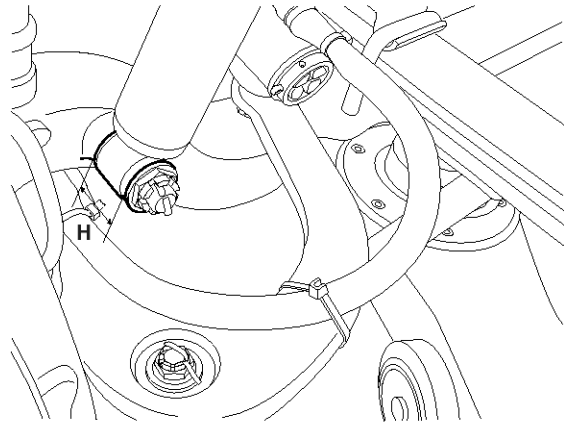
- a. When assembling the shock absorber plain washer and washer, check the assembling direction.
- b. When installing the shock absorber, set the height of rubber bushing with the specification and then, tighten the shock absorber upper double nut (A) with the specified torque, as shown in the following figure.

Tightening Torque : 13~17 Nm (1.3~1.7 kgf-m, 9.4~12.3 lb-ft)

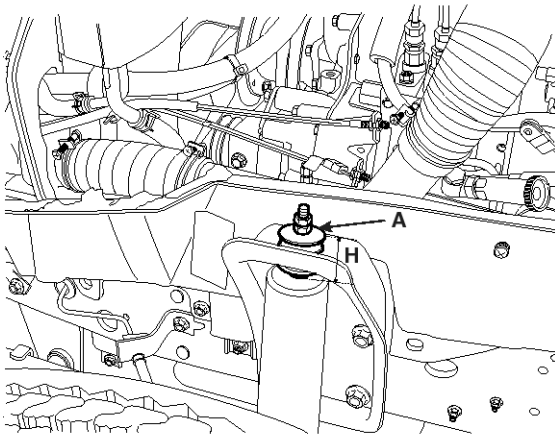
Reference Weight of Rubber Bushing (H) : $32 \pm 0.5\text{mm}$

- c. After tightening the shock absorber lower rubber bushing to satisfy the specified length (H), insert the split pin and fix it firmly.

Length of Rubber Bushing (H) : $32 \pm 0.5\text{mm}$



KFS1016A



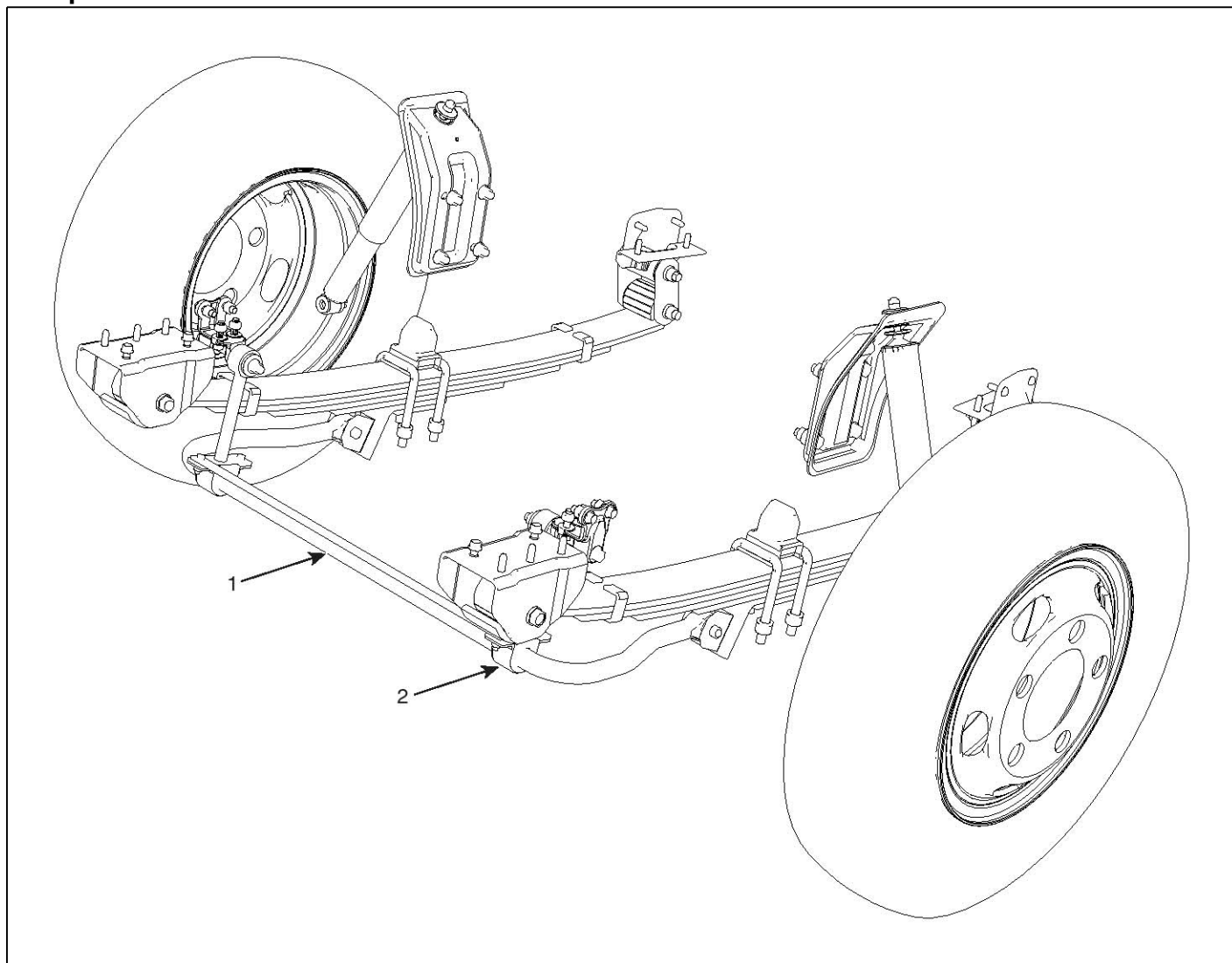
KFS1015A

Front Suspension System

SS-15

Stabilizer Bar

Components Location



SUDSSA005L

1. Stabilizer bar assembly
2. Stabilizer clamp

Removal

1. Remove the flange bolt of stabilizer bar end part.
2. Remove the clamp mounting bolt of stabilizer bar rod assembly.

Installation

1. Installation is the reverse of removal.

CAUTION

After tightening the flange bolt of stabilizer bar end part, tighten the self lock nut until the length of projected bolt is within the standard value.

Standard(A) : 2.0 ~ 3.0 mm

Inspection

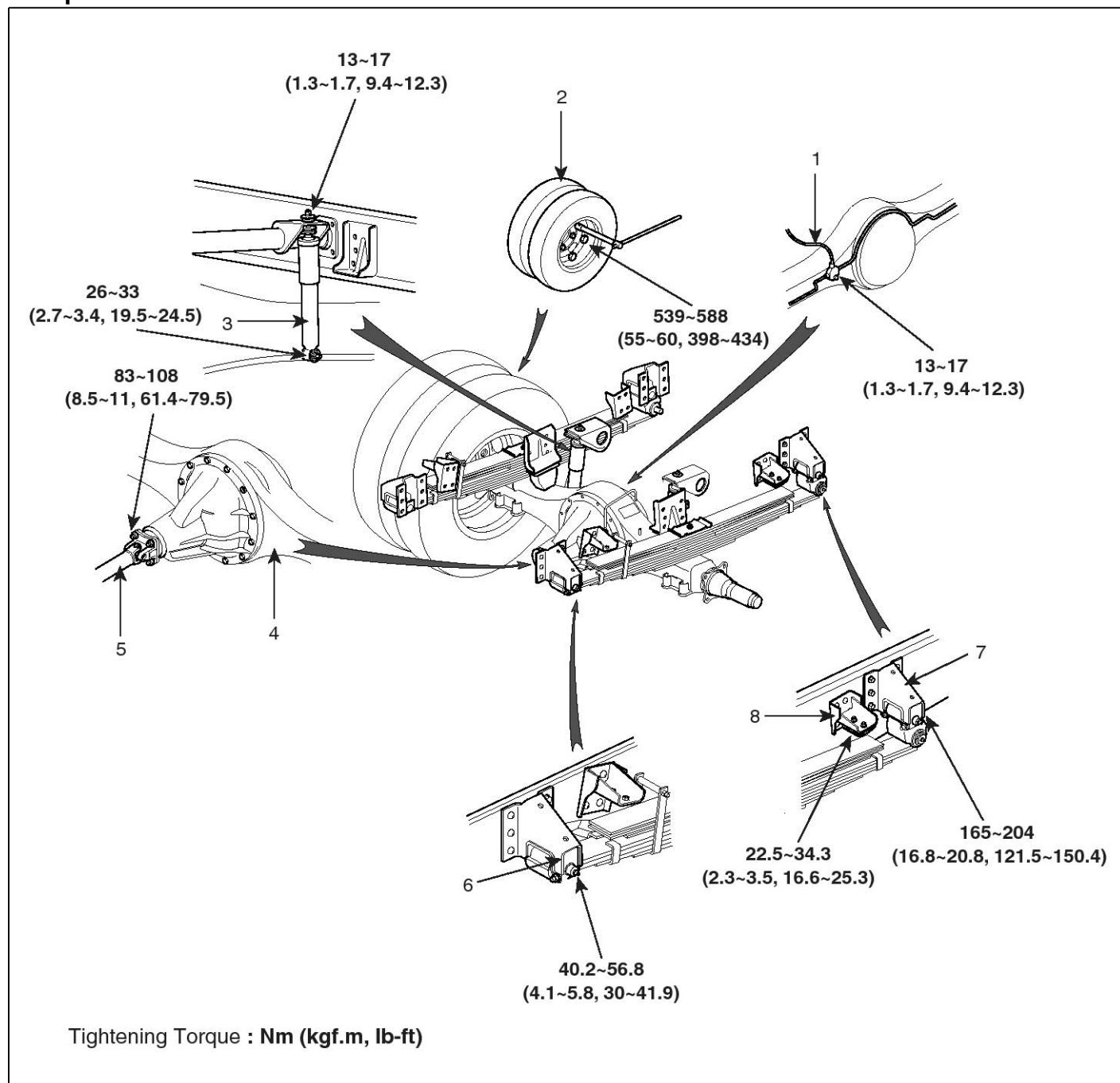
1. Check the stabilizer bar parts for deformation.
2. Check the bushing and washer of the stabilizer bar end part for deformation.
3. Check the stabilizer bar bushing for wear or cracks.

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Suspension System

Rear Suspension System

Component location



SUDSSA003L

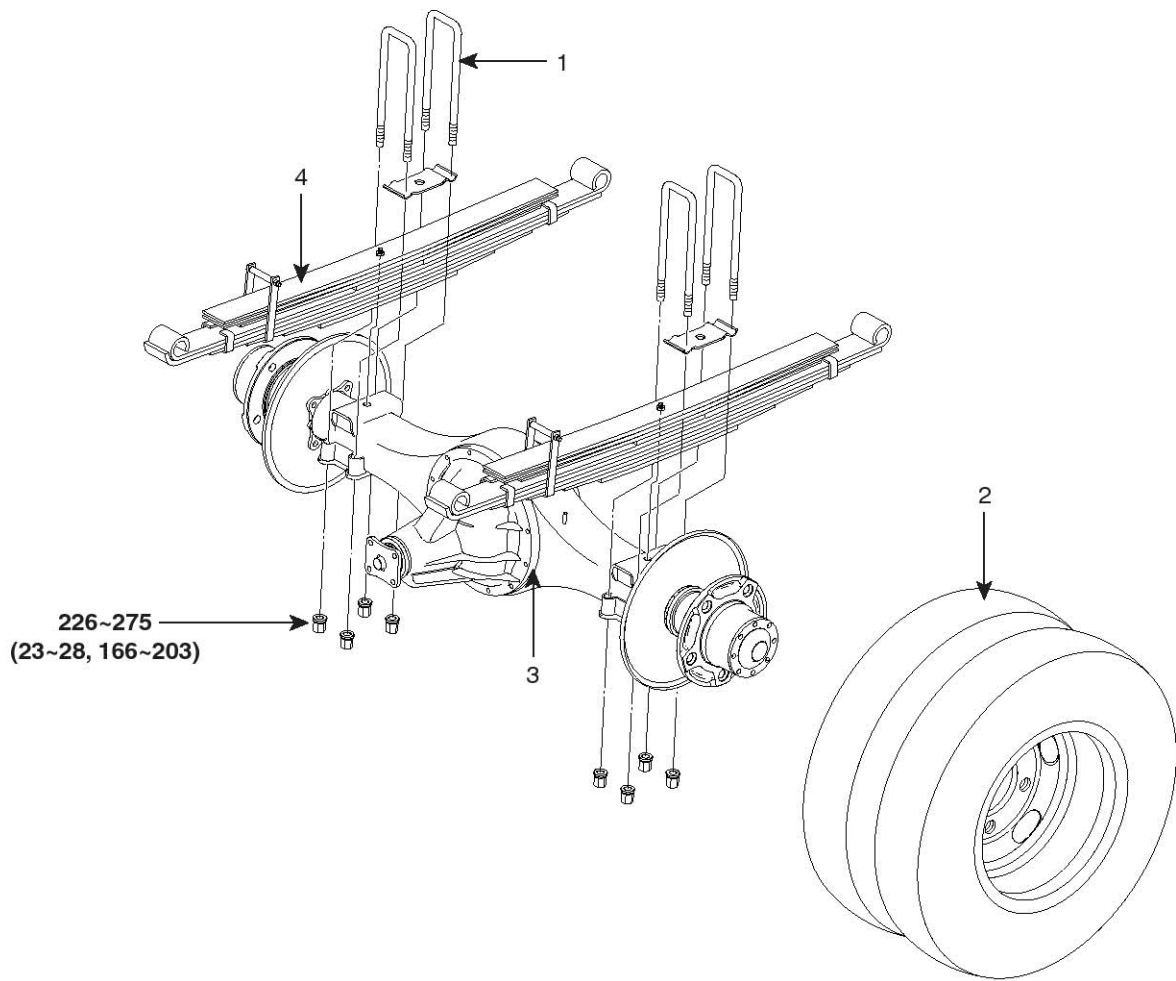
1. Brake Hose
2. Wheel and Tire
3. Shock Absorber
4. Rear Axle

5. Propeller Shaft
6. Rear Spring Pin Assembly
7. Rear Spring Shackle Pin Assembly
8. Rear Stopper

Rear Suspension System

SS-17

Components



Tightening Torque : Nm (kgf.m, lb-ft)

SUDSSA004L

1. U-bolt
2. Wheel and Tire
3. Rear Axle Assembly
4. Leaf Spring Assembly

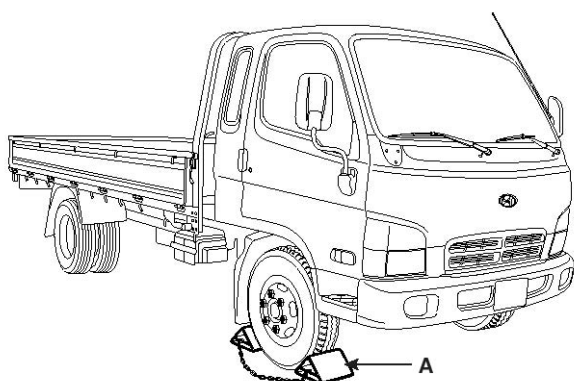
SS-18

Suspension System

Leaf Spring

Removal

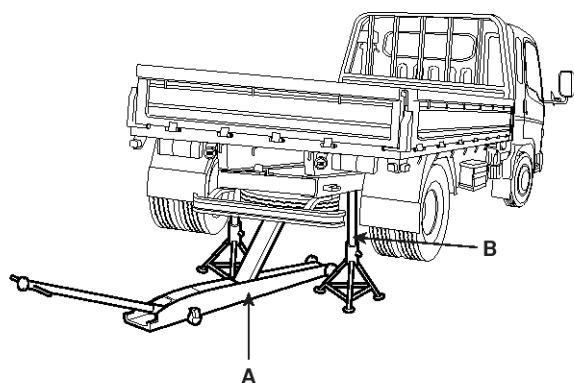
1. Place a wooden block (A) at the front and rear side of the front tire.



KMTPA401A

2. Loosen the wheel nut.

Using a garage jack (A), lift the vehicle up. Support the frame by the safety stand (B).

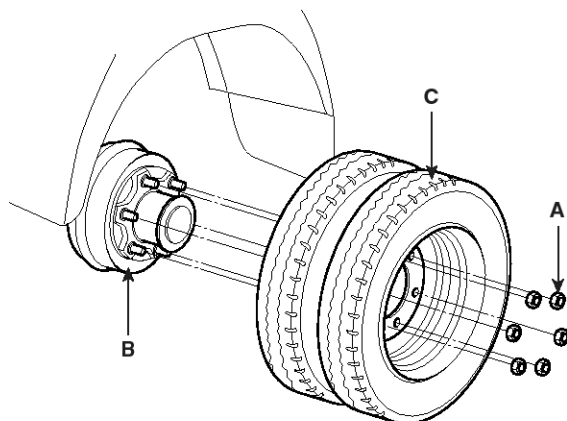


KMTPA402A

3. After removing the wheel nut (A), remove the wheel and tire (C) from the hub (B).

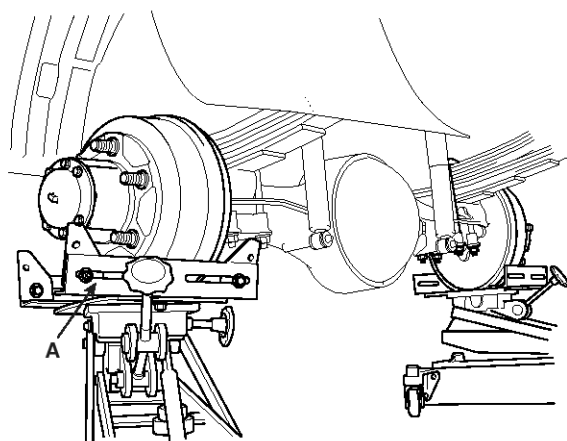
CAUTION

When removing the wheel and tire (C), be careful that the hub bolt is not damaged.



KMTPA403A

4. With the same method, remove the other side wheel and tire.
5. Support the both hubs with the jack (A).

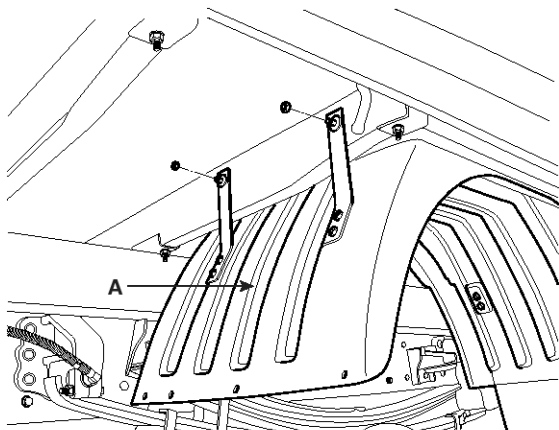


KMTPA501A

Rear Suspension System

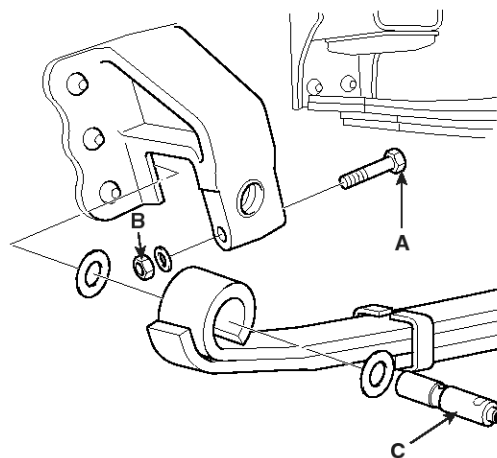
SS-19

6. Remove the 4 mounting nuts of the rear wheel. Remove the wheel house (A).



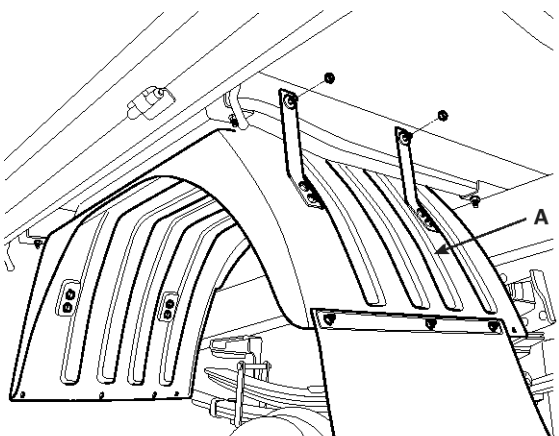
KFS1019A

7. Remove the spring pin fixing bolt (A) and nut (B). Remove the spring pin (C).

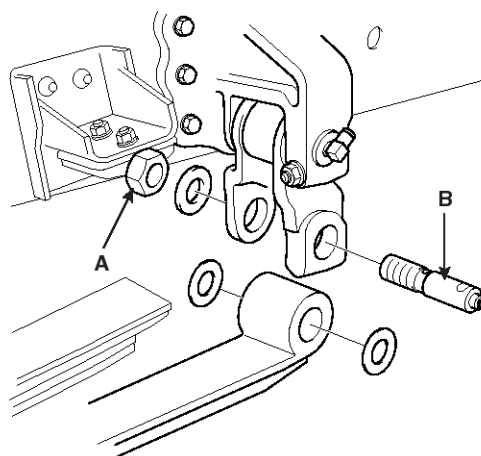


KFS1021A

8. Remove the rear spring shackle pin mounting nut (A). Remove the shackle pin (B).



KFS1020A

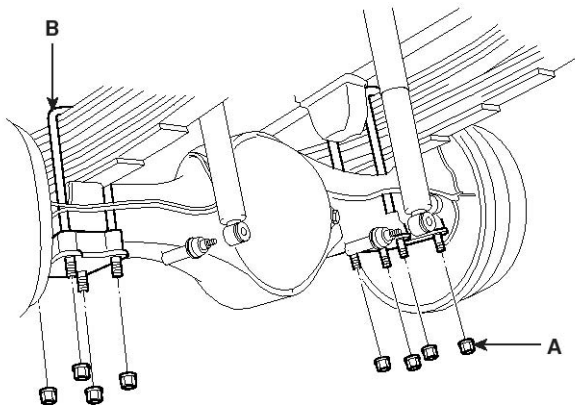


KFS1022A

SS-20

Suspension System

9. After loosen the tightening nut (A) for the U-bolt, remove the U-bolt (B).



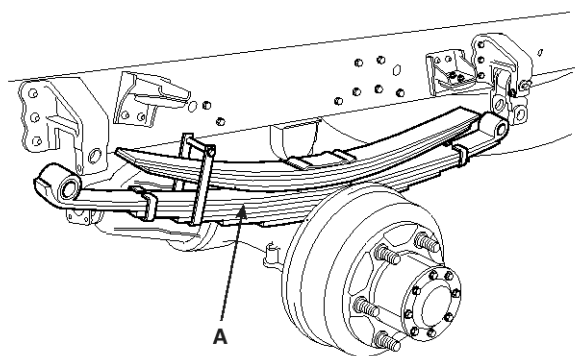
KMTPA504A

10. Remove the leaf spring assembly (A).

CAUTION

When removing the leaf spring, be careful of the safety.

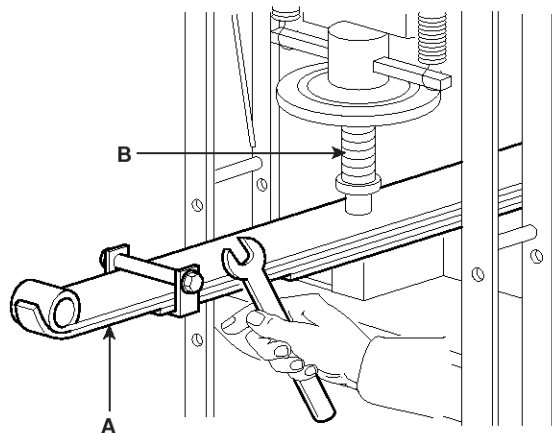
Do not drop down the leaf spring to the ground.



KFS1023A

Disassembly

1. Compress the spring (A) using a press (B), remove the clip bolt and the center bolt.

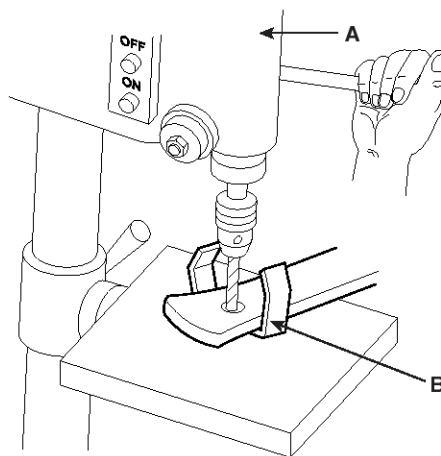


KFS1024A

2. Using a drill press (A), drill out the rivet. Remove the clip (B).

CAUTION

Do not use the removed rivet and clip again.



KFS1025A

Rear Suspension System

SS-21

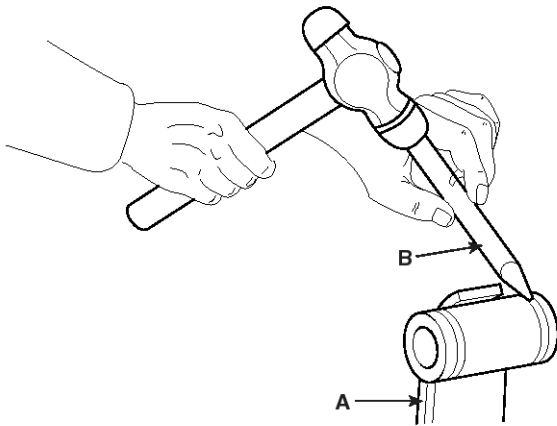
3. Remove the rubber bushing.

- 1) Fix the spring (A) at a vise.
- 2) Using a chisel(B), remove the one side of the rubber bushing.

Using a rod, push the other side to remove the rubber bushing

⚠ CAUTION

Do not use the removed rubber bushing again.

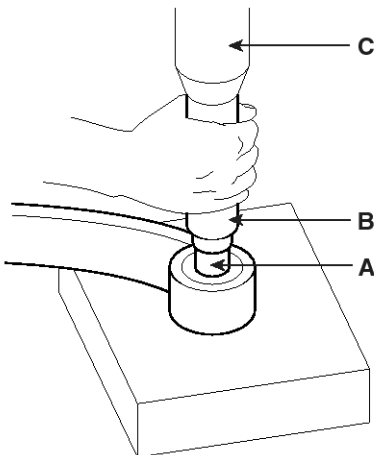


KFS1006A

4. Install a new rubber bushing.

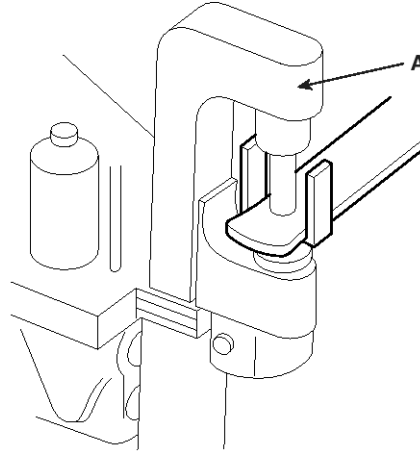
📖 NOTICE

When install the rubber bushing (A), set the rod (B) on the bushing and press the rod with a press (C) to fit-in the bushing.



Reassembly

1. Caulk the rivet using a riveting machine (A).

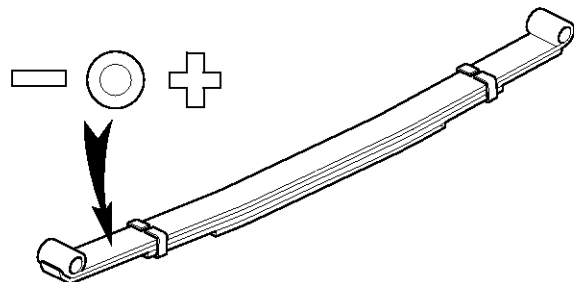


KFS1007A

KFS1008A

2. When replacing the leaf spring assembly, check the heights of the left and right sides and the camber mark before installation.

	1	2	3	4	5
LH	+	+	○	○	-
RH	+	○	○	-	-



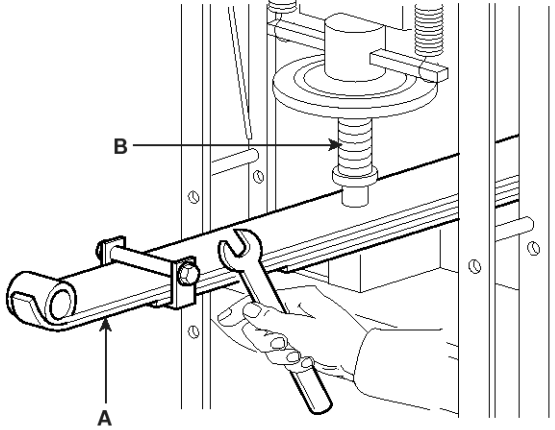
KFS1009A

SS-22

Suspension System

3. Pressing the leaf spring (A) with a press (B), assemble the center bolt and clip bolt.

Tightening Torque : 29~35 Nm (3.0~3.6kgf·m, 22~26 lb-ft)



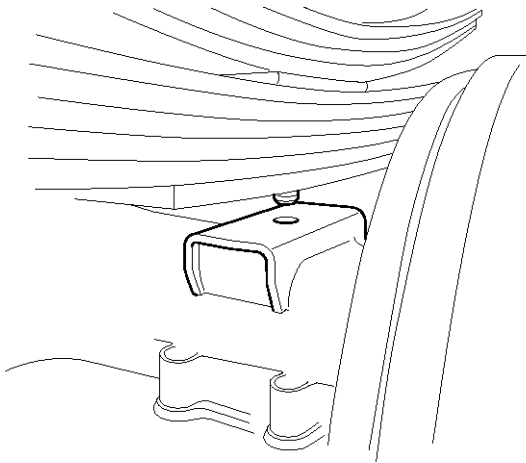
KFS1024A

Installation

The installation is performed in the reverse order of the removal.

1. Setting the leaf spring assembly center bolt to the rear axle housing center hole, install the U-bolt.

Tightening Torque : 225.5~274.5 Nm (23~28 kgf·m, 166.3~202.5 lb-ft)



KMTPA510A

NOTICE

- a. When assembling the spring, the spring eye part wrapper should be faced to the front direction.
- b. With applying the chassis grease (NLGI No.2) at the thread portion of the U-bolt, tightening the U-bolt with the specified torque.

2. Install the spring pin. Install the rear shackle spring pin.

Spring Pin Mounting Nut : 39.2~56.8 Nm (4~5.8 kgf·m, 28.9~41.9 lb-ft)

Rear Shackle Spring Pin Mounting Nut : 165~204 Nm (16.8~20.8 kgf·m, 121.5~150.4 lb-ft)

3. Install the rear wheel house.

4. Install the wheel and tire.

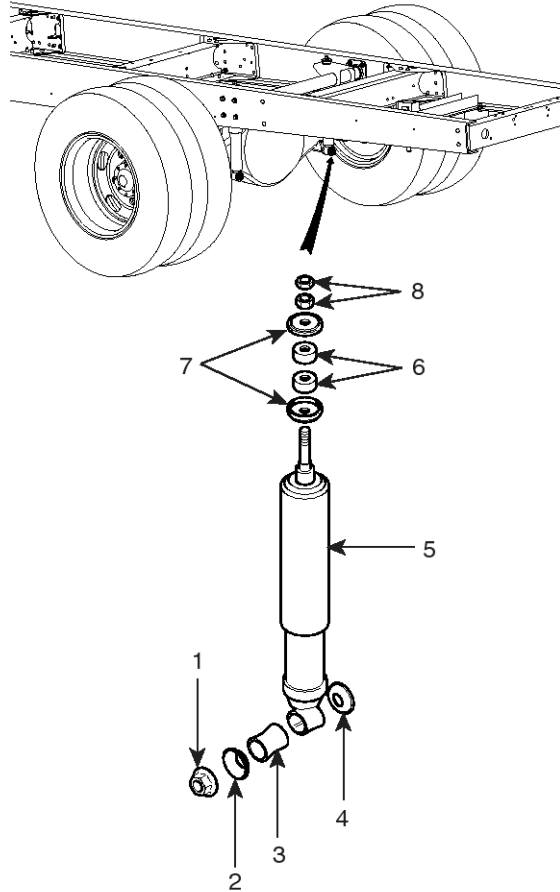
Tightening Torque : 539~588 Nm (55~60 kgf·m, 398~434 lb-ft)

Rear Suspension System

SS-23

Shock Absorber

Components



SUDSSA008L

1. Shock Absorber Lower Flange Nut
2. Eye Washer
3. Rubber Bushing
4. Plain Washer
5. Rear Shock Absorber
6. Side Upper Rubber Bushing
7. Washer
8. Double Nut

CAUTION

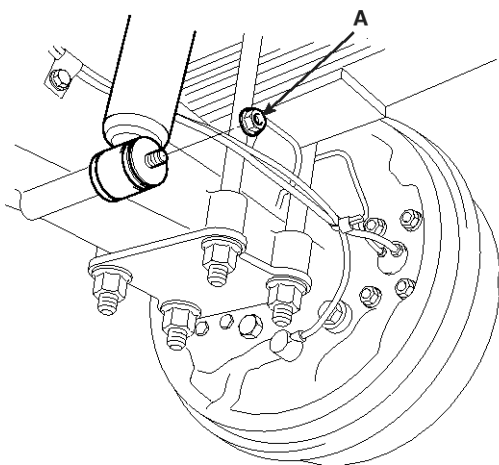
Do not disassemble or heat the shock absorber.

SS-24

Suspension System

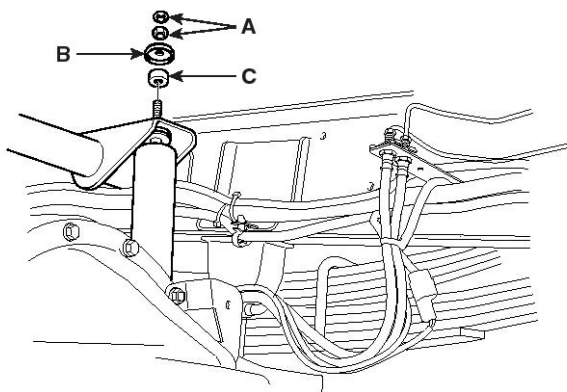
Removal

1. Remove the shock absorber lower flange nut (A).



KFS1027A

2. Remove the shock absorber.
 - a. Remove the shock absorber upper double nut (A).
 - b. Remove the washer (B) and the side upper rubber bushing (C). Then, remove the shock absorber.



KFS1028A

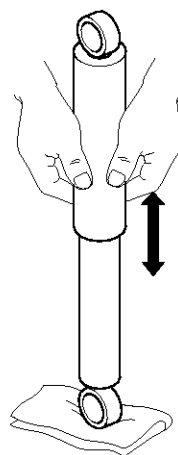
Inspection

1. Repeating to push and pull the shock absorber, check if it makes an abnormal resistance or noise during operation.



CAUTION

Do not disassemble or heat the shock absorber.



CSFSA57A

2. Check if the shock absorber has the oil leakage or the deformation.

Rear Suspension System

SS-25

Installation

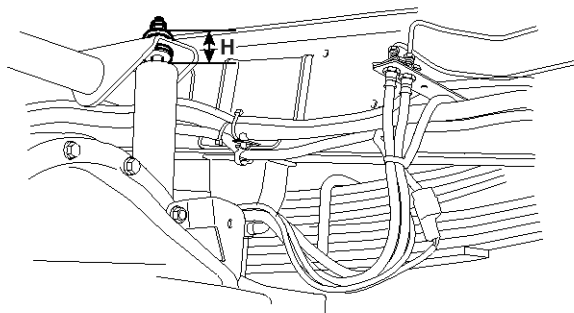
The installation is performed in the reverse order of the removal.

NOTICE

- When assembling the shock absorber plain washer and washer, check the assembling direction.
- When installing the shock absorber, set the height of rubber bushing with the specification and then, tighten the shock absorber upper double nut (A) with the specified torque, as shown in the following figure.

Tightening Torque : 13~17 Nm (1.3~1.7 kgf·m, 9.4~12.3 lb-ft)

Reference Weight of Rubber Bushing (H): $34 \pm 0.3\text{mm}$

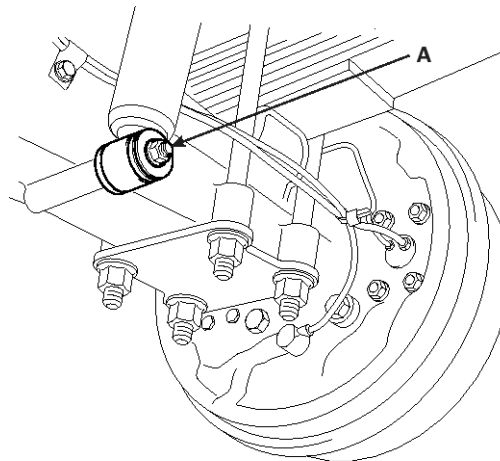


KFS1029A

- After setting the shock absorber lower flange nut (A), tighten it with specified torque.

Tightening Torque : 26~33Nm (2.7~3.4 kgf·m, 19.5~24.5lb-ft)

Reference Weight of Rubber Bushing (H): 31.7~32.3mm



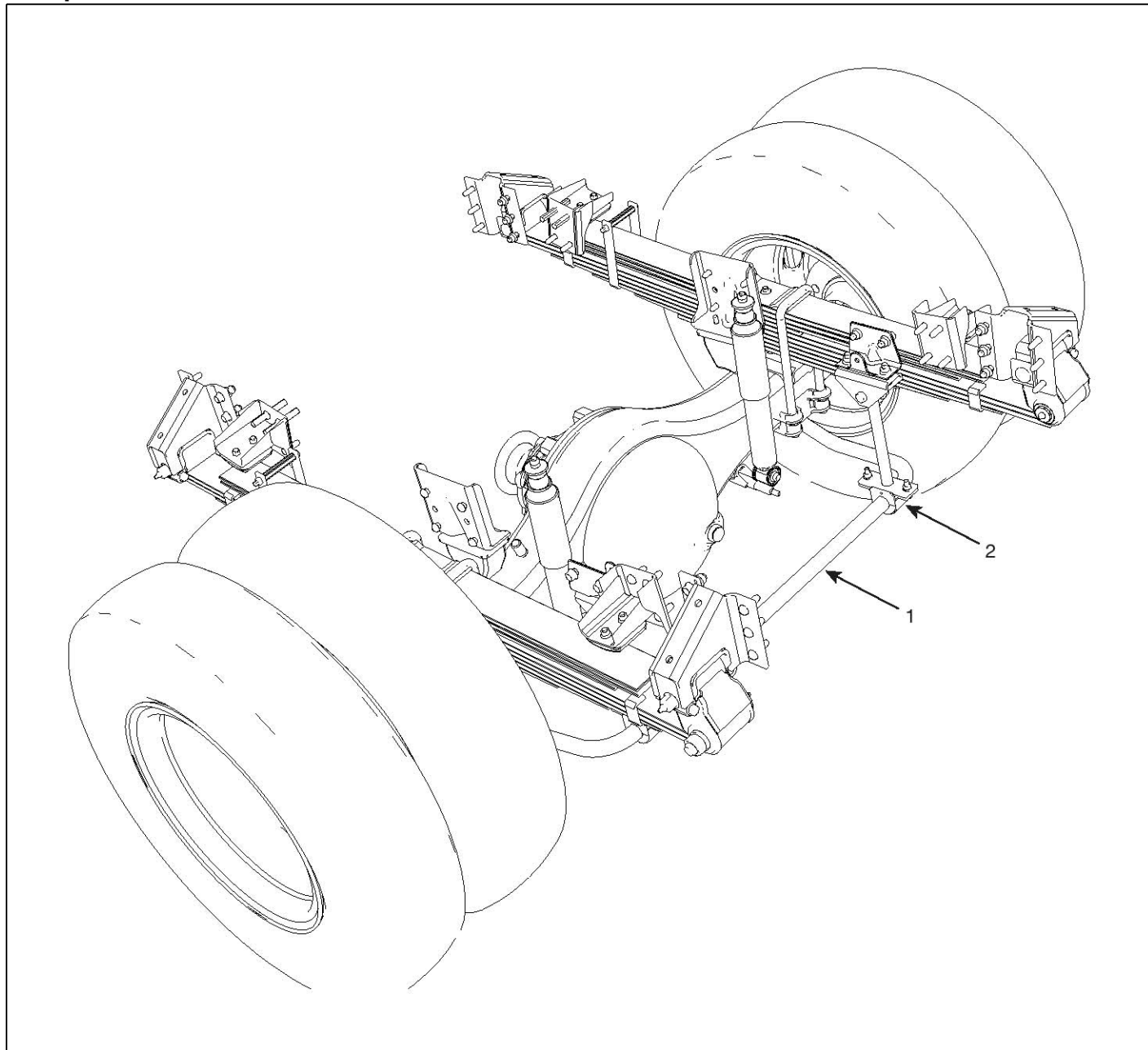
KFS1030A

SS-26

Suspension System

Stabilizer Bar

Components Location



SUDSSA006L

1. Stabilizer bar assembly
2. Stabilizer clamp

Removal

1. Remove the rear stabilizer bar and rod assembly attaching bolt.
2. Remove the rear stabilizer clamp and rubber bushing.

Installation

1. Installation is the reverse of removal.

Inspection

1. Check the stabilizer bar parts for deformation.
2. Check the stabilizer rubber parts for wear or cracks.