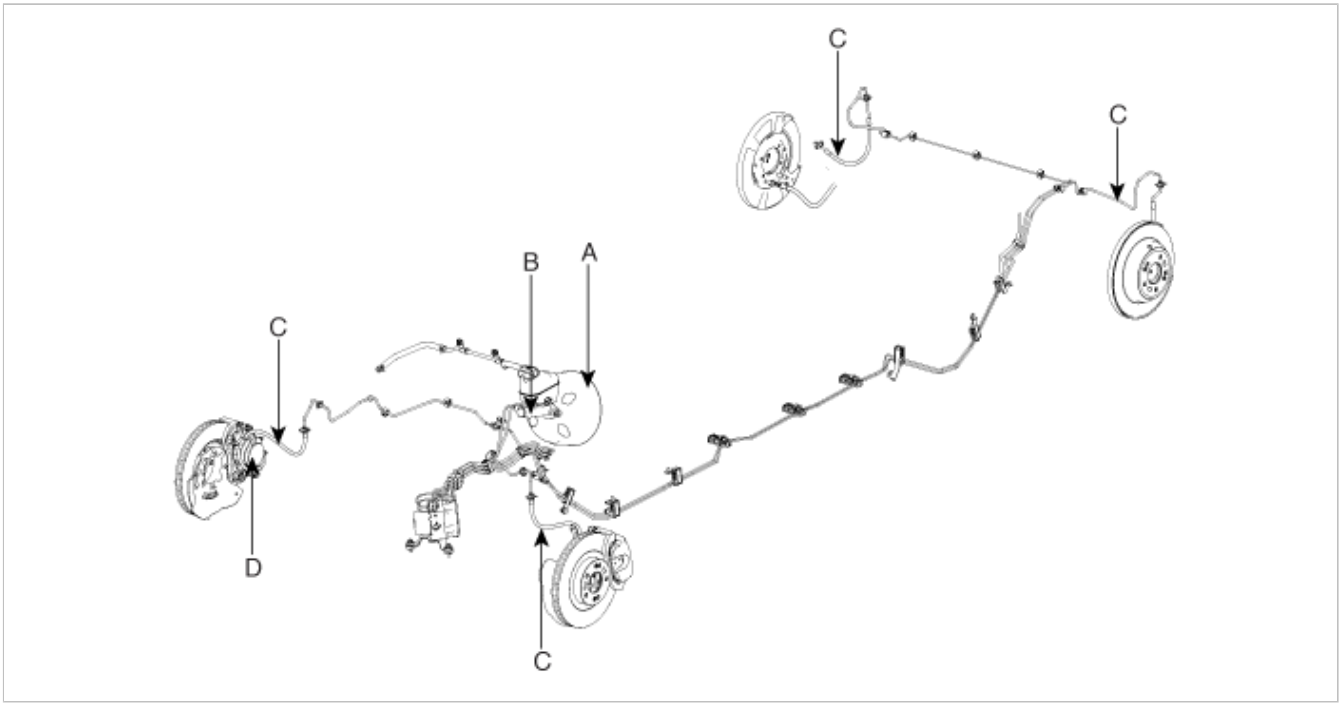
Operation and Leakage Check

Check all of the following items

Component	Procedure
Brake Booster (A)	Check brake operation by applying the brakes during a test drive. If the brakes do not work properly, check the brake booster. Replace the brake booster as an assembly if it does not work properly or if there are signs of leakage.
Piston cup and pressure cup inspection (B)	• Check brake operation by applying the brakes. Look for damage or signs of fluid leakage. Replace the master cylinder as an assembly if the pedal does not work properly or if there is damage or signs of fluid leakage. • Check for a difference in brake pedal stroke between quick and slow brake applications. Replace the master cylinder if there is a difference in pedal stroke.
Brake hoses (C)	Look for damage or signs of fluid leakage. Replace the brake hose with a new one if it is damaged or leaking.
Caliper piston seal and piston boots (D)	Check brake operation by applying the brakes. Look for damage or signs of fluid leakage. If the pedal does not work properly, the brakes drag, or there is damage or signs of fluid leakage, disassemble and inspect the brake caliper. Replace the boots and seals with new ones whenever the brake caliper is disassembled.



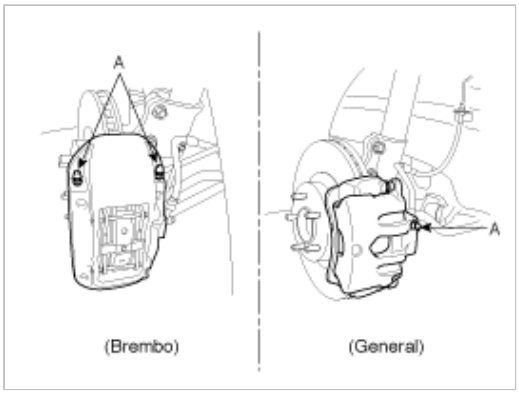
Brake System Bleeding

CAUTION

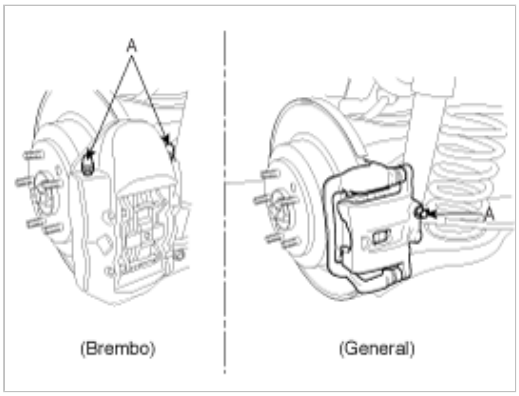
- Do not reuse the drained fluid.
- Always use genuine DOT3/DOT4 brake Fluid.
  Using a non-genuine DOT3/DOT4 brake fluid can cause corrosion and decrease the life of the system.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not spill brake fluid on the vehicle, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- The reservoir on the master cylinder must be at the MAX (upper) level mark at the start of bleeding procedure and checked after bleeding each brake caliper. Add fluid as required.

1. Make sure the brake fluid in the reservoir is at the MAX(upper) level line.
2. Have someone slowly pump the brake pedal several times, and then apply pressure.
3. Loosen the right-rear brake bleed screw (A) to allow air to escape from the system. Then tighten the bleed screw securely.

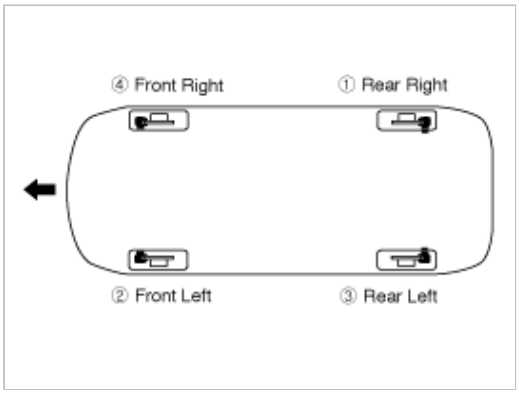
Front



Rear

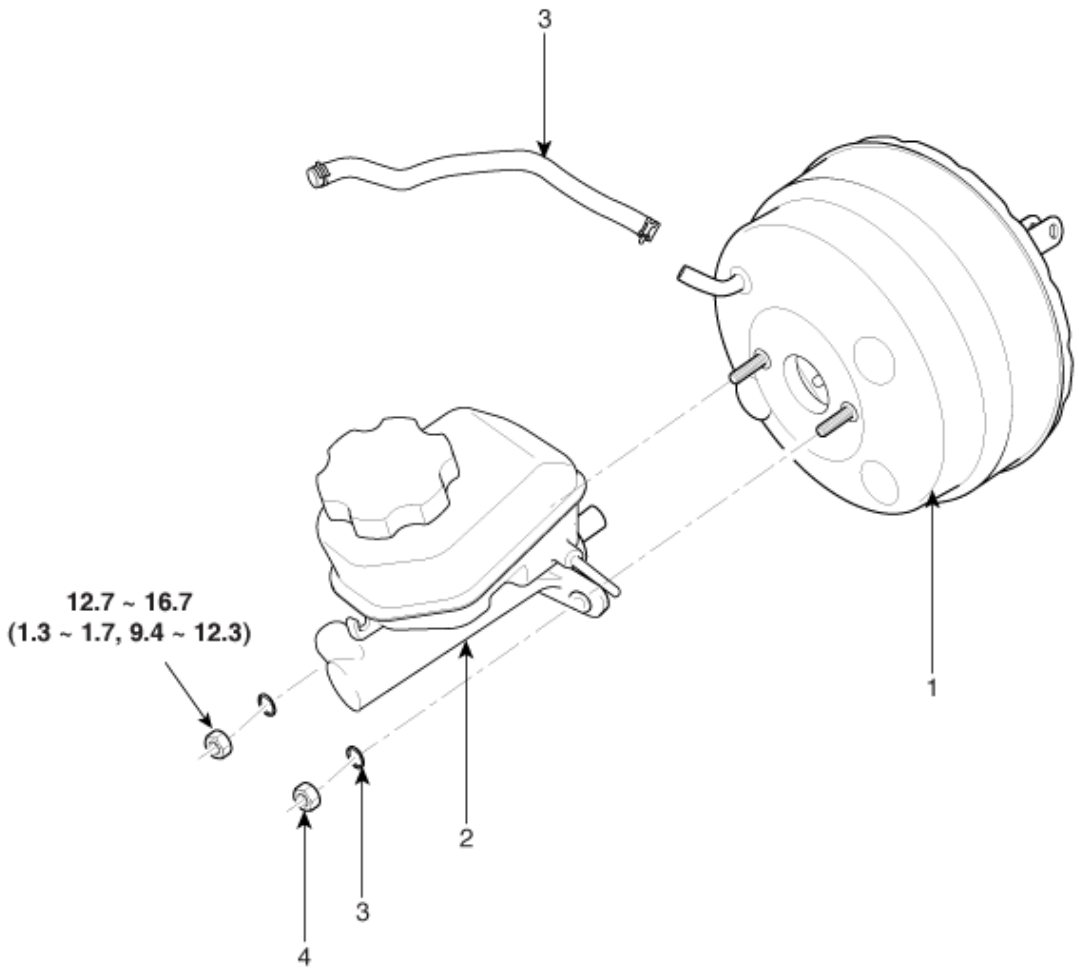


4. Repeat the procedure for wheel in the sequence shown below until air bubbles no longer appear in the fluid.



5. Refill the master cylinder reservoir to MAX(upper) level line.

Components



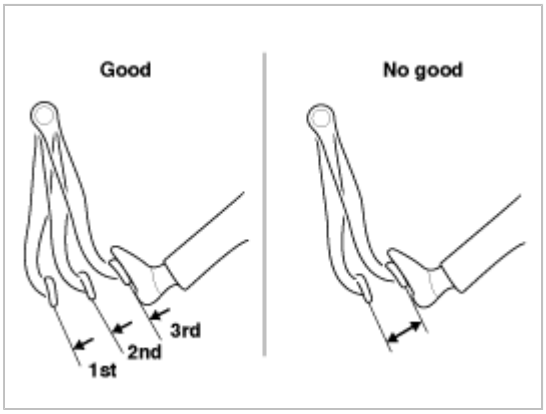
Torque : N.m (kgf.m, lb-ft)

1. Brake booster 2. Master cylinder assembly 3. Washer	4. Nut 5. Vacuum hose

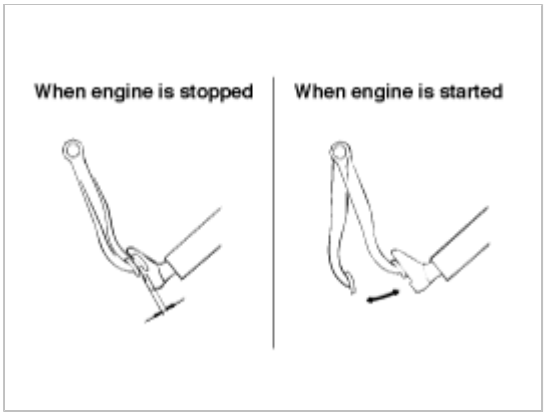
Brake Booster Operating Test

For simple checking of the brake booster operation, carry out the following tests.

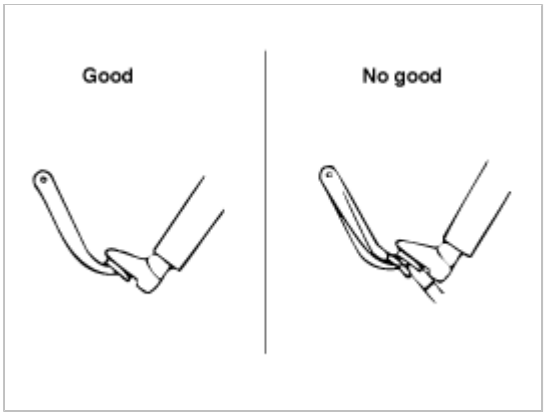
1. Run the engine for one or two minutes, and then stop it. If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly, if the pedal height remains unchanged, the booster is inoperative.



2. With the engine stopped, step on the brake pedal several times.
   Then step on the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is inoperative.

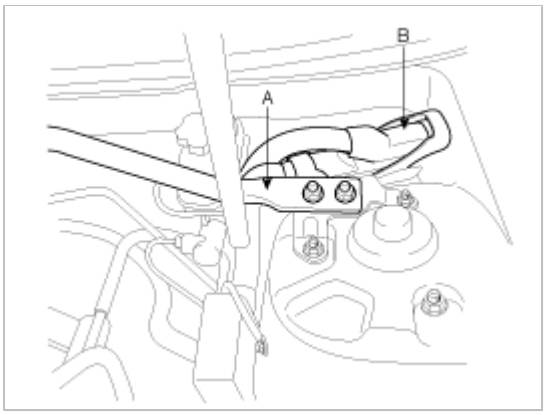


3. With the engine running, step on the brake pedal and then stop the engine.
   Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition, if the pedal rises, the booster is inoperative.
   If the above three tests are okay, the booster performance can be determined as good.
   Even if one of the above three tests is not okay, check the check valve, vacuum hose and booster for malfunction.

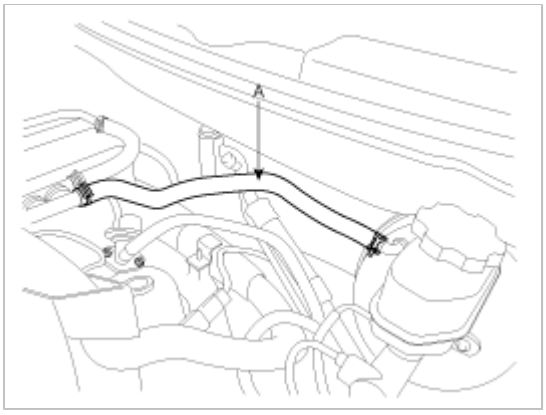


Removal

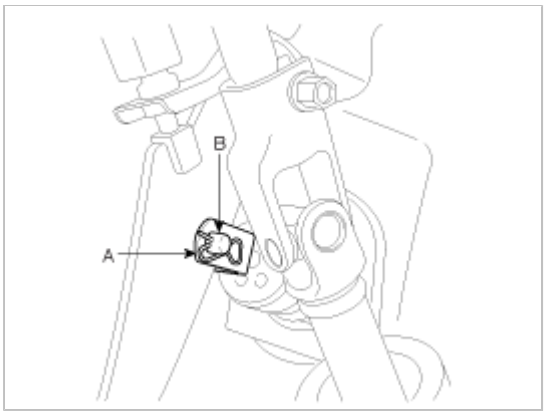
1. Turn ignition switch OFF and disconnect the negative (-) battery cable.
2. Remove the strut bar (A).



3. Disconnect the ECM connector (B). And then take the protector of control harness off.
4. Disconnect the vacuum hose (A) from the brake booster.

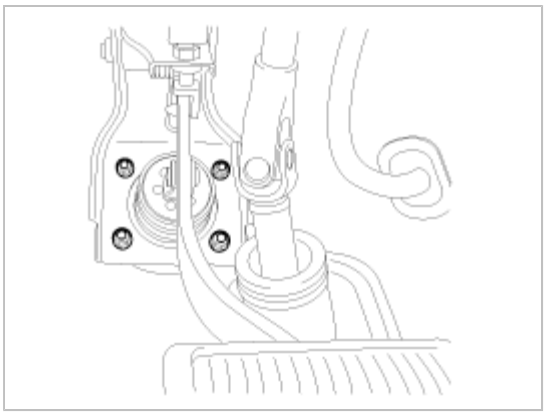


5. Remove the master cylinder. (Refer to Master cylinder)
6. Remove the snap pin (A) and clevis pin (B).



7. Remove the mounting nuts.

Tightening torque :
12.7 ~ 15.7N.m (1.3 ~ 1.6kgf.m, 9.4 ~ 11.6lb-ft)



8. Remove the brake booster.

Inspection

1. Inspect the check valve in the vacuum hose.

> CAUTION
>
> Do not remove the check valve from the vacuum hose.

2. Check the boot for damage.

Installation

1. Installation is the reverse of removal.

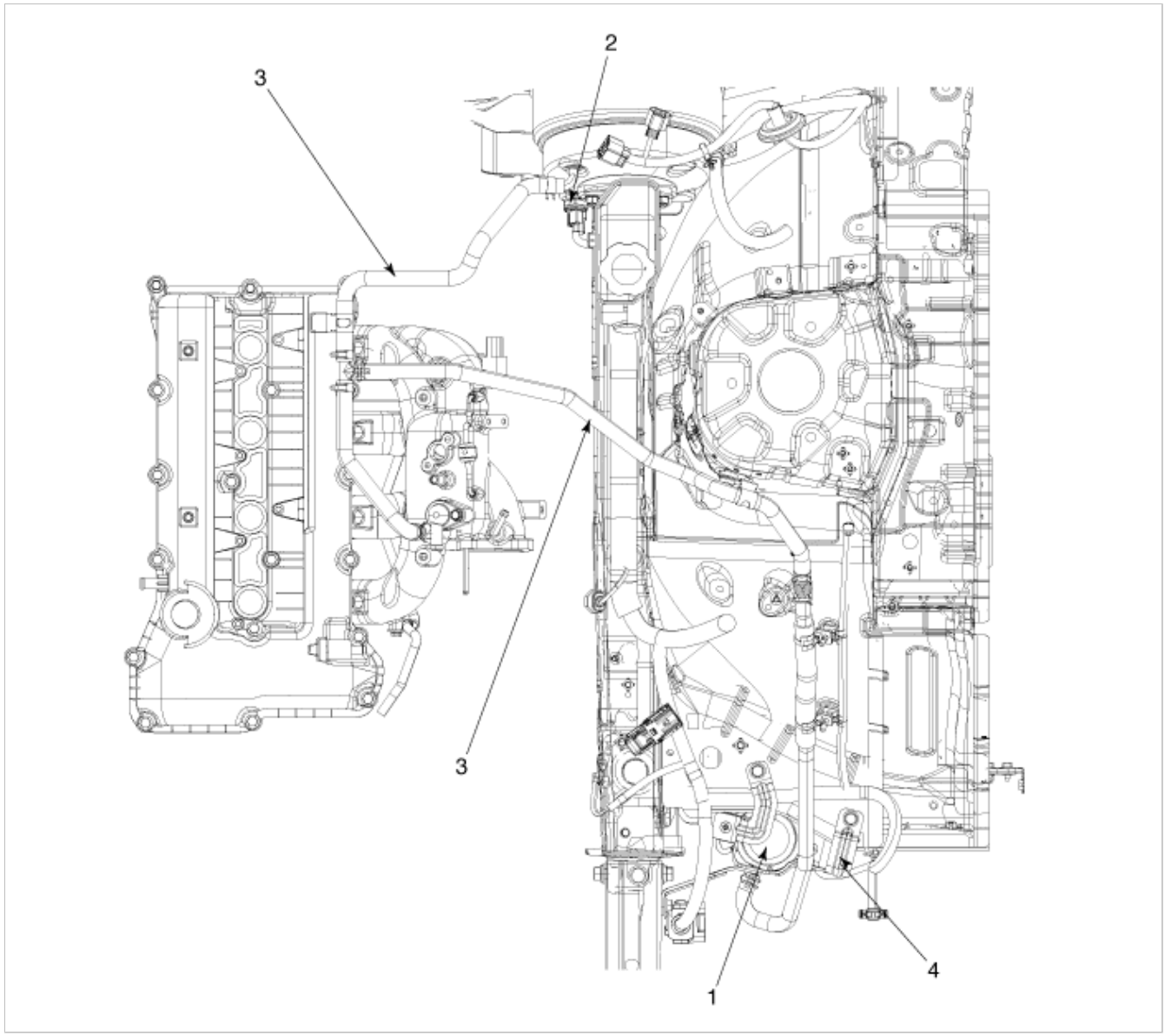
> CAUTION
>
> • Before installing the pin, apply the grease to the joint pin.
> • Use a new snap pin whenever installing.

2. After installing, bleed the brake system. (Refer to Brake system bleeding)
3. Adjust the brake pedal height and free play.
   (Refer to Brake pedal height and free play adjustment)

Description

The Vacuum Pump System is set up in a vehicle in order to make the vacuum enough when a driver presses the brake pedal on the high ground. To operate this system, the vacuum pump is installed on a vehicle.
If the vacuum is not sufficient to press the brake pedal, the HECU senses it through the vacuum switch, which is installed on booster. And then the HECU supplies the power to the vacuum pump by grounding the circuit of the vacuum pump relay. When the vacuum pump is supplied with electric power, it makes the vacuum and supplements it to the booster.

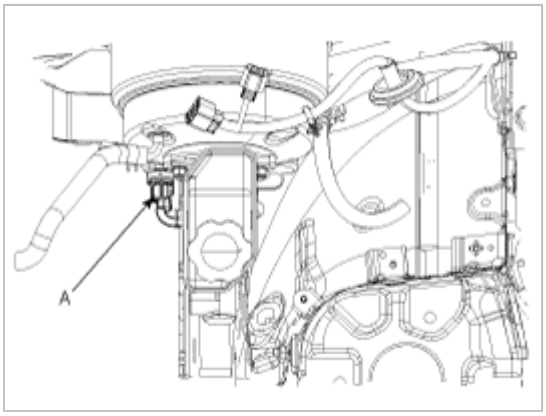
Components



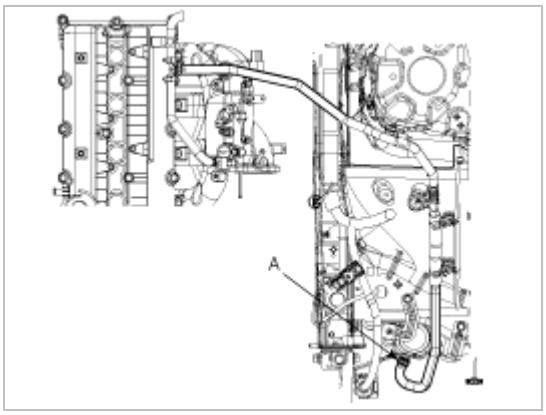
1. Vacuum pump	3. Vacuum hose
2. Vacuum switch	4. Vacuum pump bracket

Removal

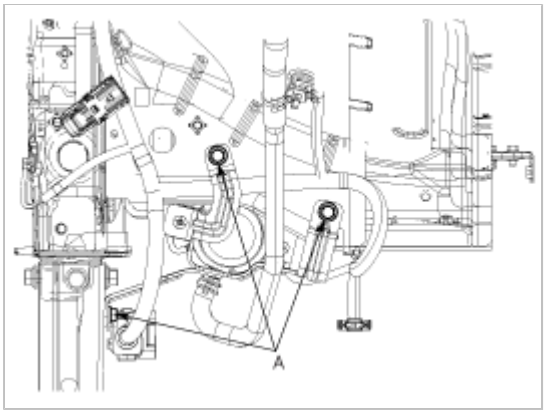
1. Remove the front bumper cover. (Refer to the Body group – bumper)
2. Disconnect the Vacuum pump connector (A).



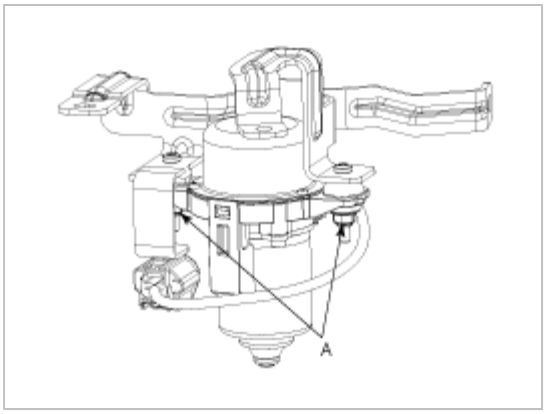
3. Remove the Vacuum hose (A).



4. Remove the mounting bracket bolt A).

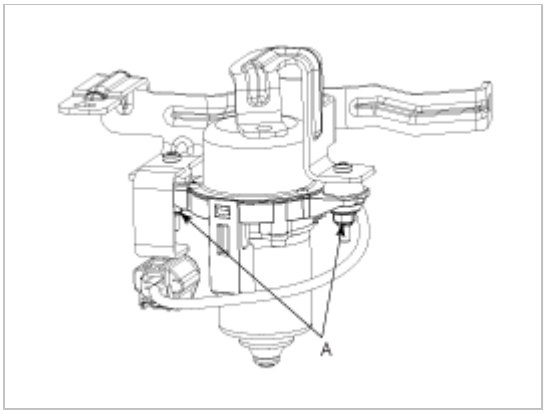


5. Remove the 2 nuts (A) and then remove the bracket from Vacuum pump.

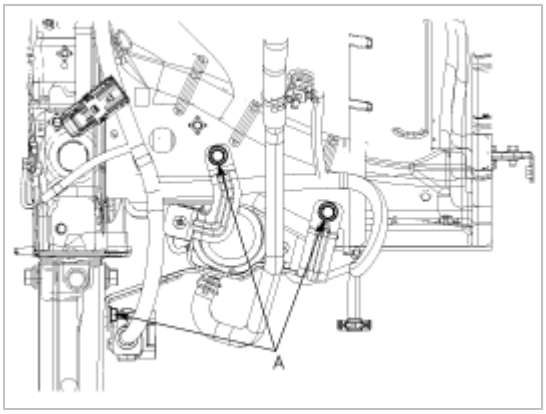


Installation

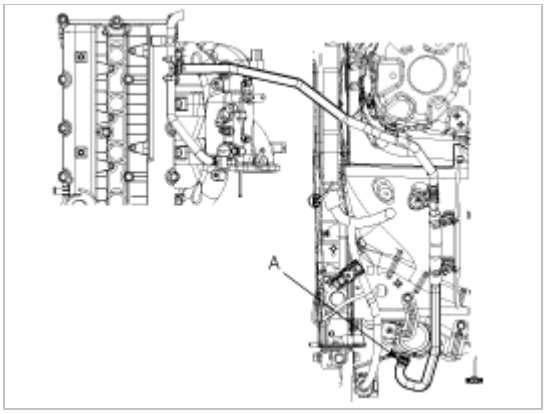
1. Install the Vacuum pump to the bracket.



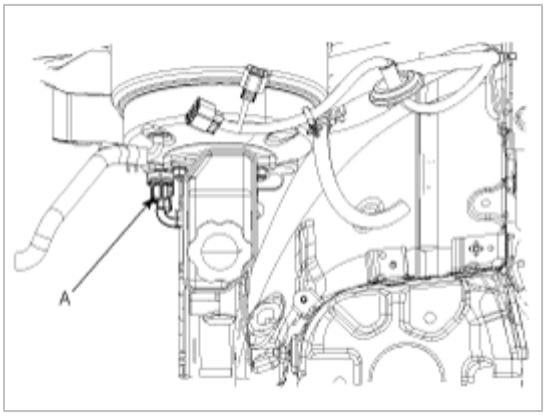
2. Install the Vacuum pump & bracket bolt.



3. Install the Vacuum hose.

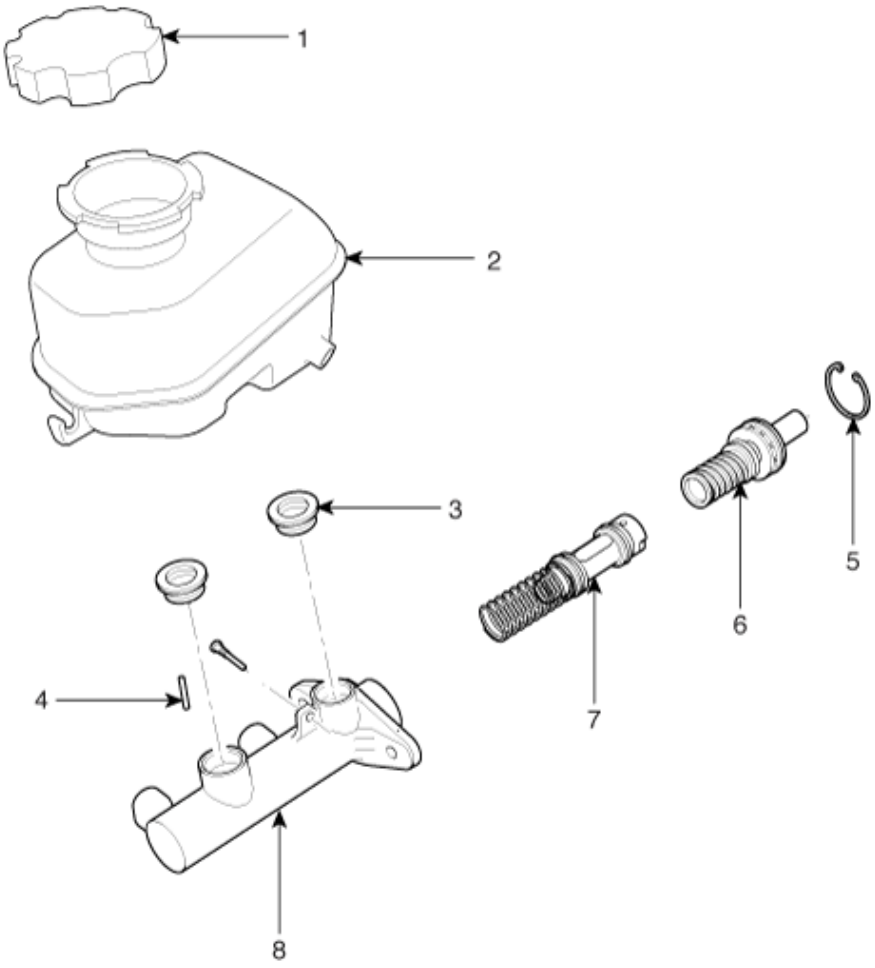


4. Connect the Vacuum pump connector.



5. Install the front bumper cover. (Refer to the Body group – bumper)

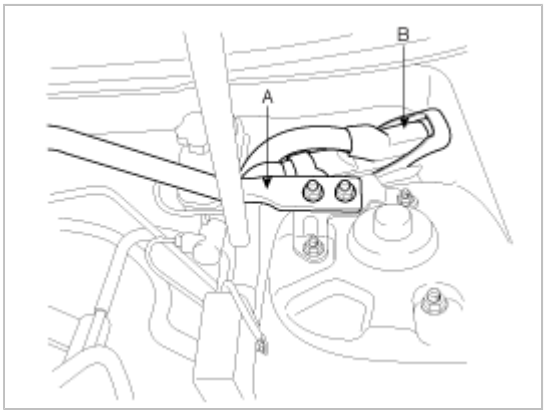
Components



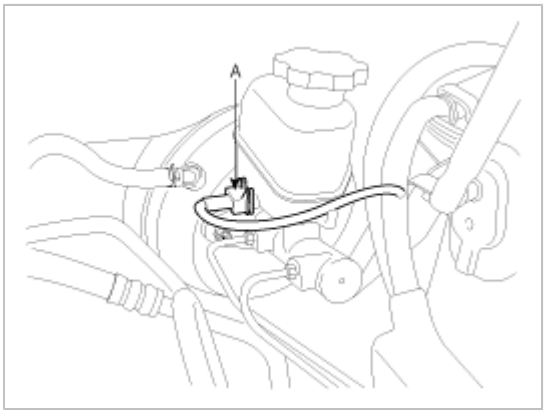
1. Reservoir cap	5. Retainer
2. Reservoir	6. Primary piston assembly
3. Grommet	7. Secondary piston assembly
4. Cylinder pin	8. Master cylinder body

Removal

1. Turn ignition switch OFF and disconnect the negative (-) battery cable.
2. Remove the strut bar (A).



3. Disconnect the ECM connector (B). And then take the protector of control harness off.
4. Disconnect the brake fluid level switch connector (A) from the reservoir.

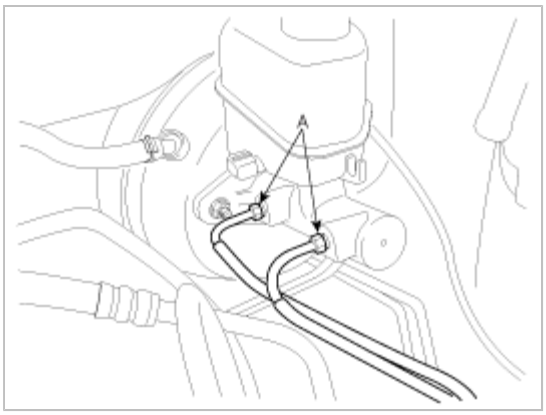


5. Remove the brake fluid from the master cylinder reservoir with a syringe.

> CAUTION
>
> • Do not spill brake fluid on the vehicle, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

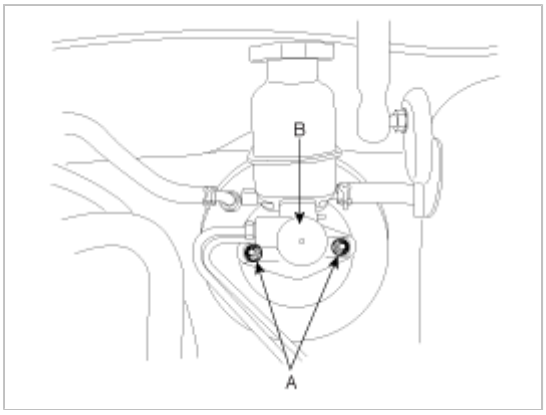
6. Disconnect the brake tube (B) from the master cylinder by loosening the tube flare nut.

Tightening torque :
ABS : 12.7 ~ 16.7 (1.3 ~ 1.7kgf.m, 9.4 ~ 12.3lb-ft)
ESC : 18.6 ~ 22.6N.m (1.9 ~ 2.3kgf.m , 13.7 ~ 16.7lb-ft)



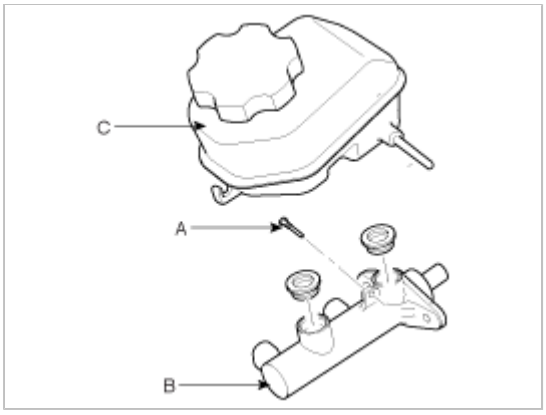
7. Remove the master cylinder (B) from the brake booster after loosening the mounting nuts (C).

Tightening torque :
12.7 ~ 16.7N.m (1.3 ~ 1.7 kgf.m, 9.4 ~ 12.3lb-ft)

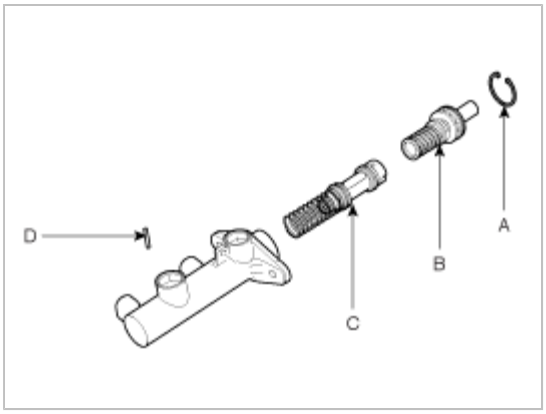


Disassembly

1. Remove the reservoir cap and drain the brake fluid into a suitable container.
2. Remove the reservoir (C) from the master cylinder (B), after remove mounting screw (A).



3. Remove the retainer ring (A) by using the snap ring pliers.
4. Remove the primary piston assembly (B).
5. Remove the pin (D) with the secondary piston(C) pushed completely using a screwdriver. Remove the secondary piston assembly (C).



NOTE

Do not disassemble the primary and secondary piston assembly.

Inspection

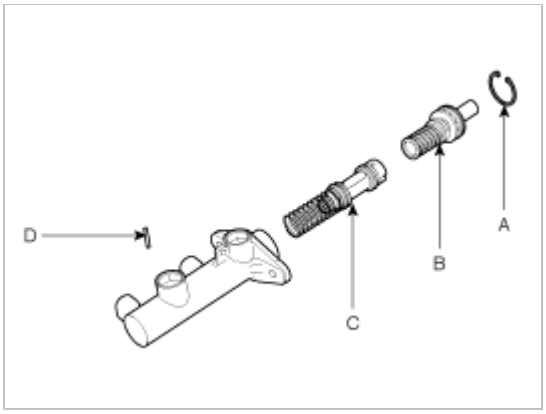
1. Check the master cylinder bore for rust or scratching.
2. Check the master cylinder for wear or damage. If necessary, clean or replace the cylinder.

CAUTION

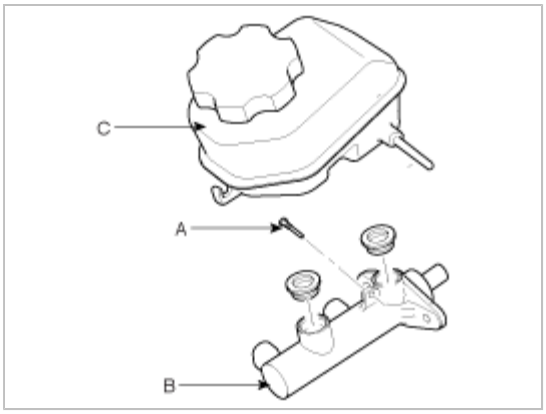
- If the cylinder bore is damaged, replace the master cylinder assembly.
- Wash the contaminated parts in alcohol.

Reassembly

1. Apply genuine brake fluid to the rubber parts of the cylinder kit and grommets.
2. Carefully insert the springs and pistons in the proper direction.
3. Press the secondary piston (C) with a screwdriver and install the cylinder pin (D).



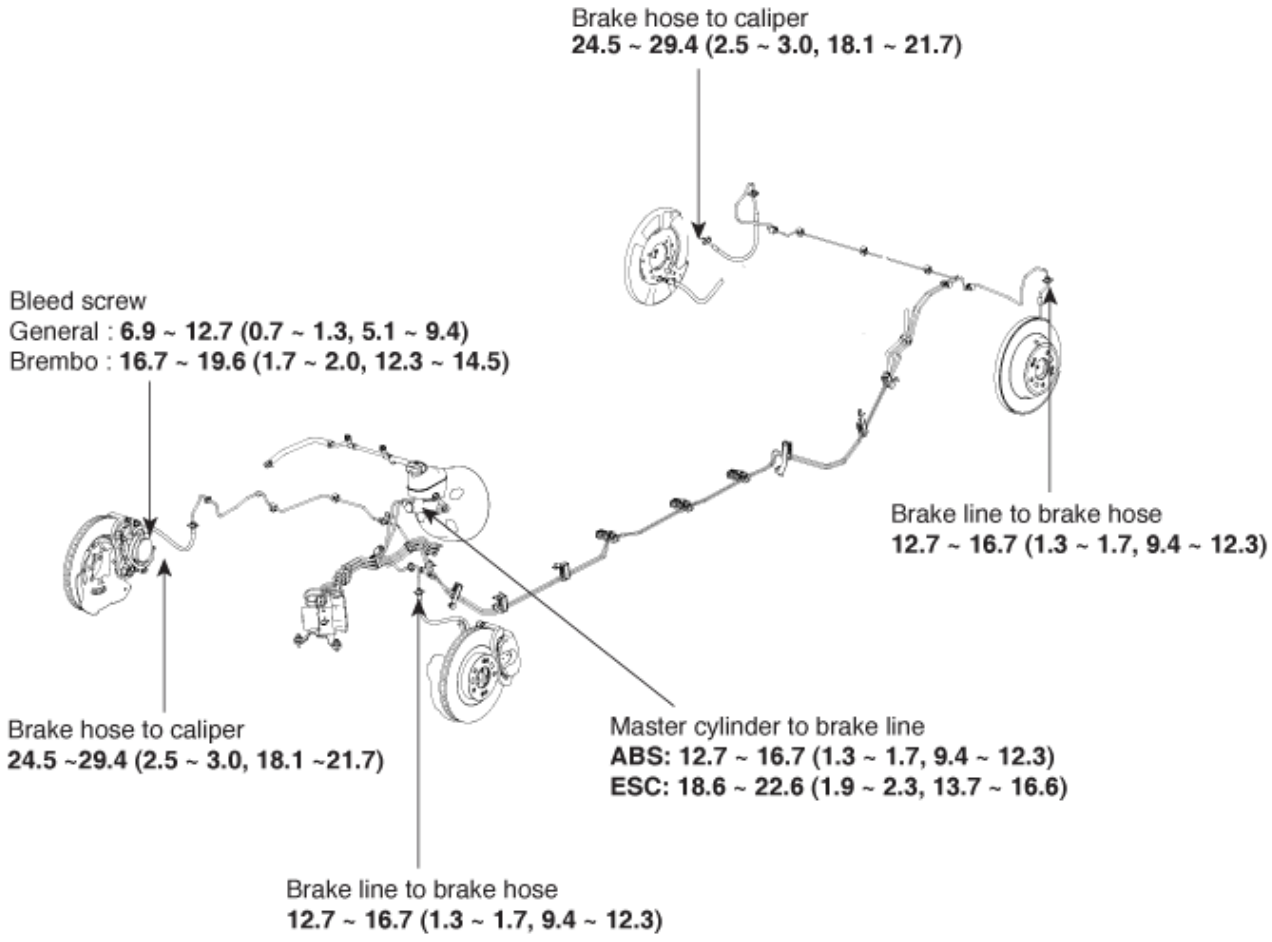
4. Install the retainer ring (A) after installing primary piston assembly (B).
5. Mount two grommets.
6. Install the reservoir (C) on the cylinder (B), and then install the mounting screw (A).



Installation

1. Installation is the reverse of removal.
2. After installation, bleed the brake system. (Refer to Brake system bleeding)

Components



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

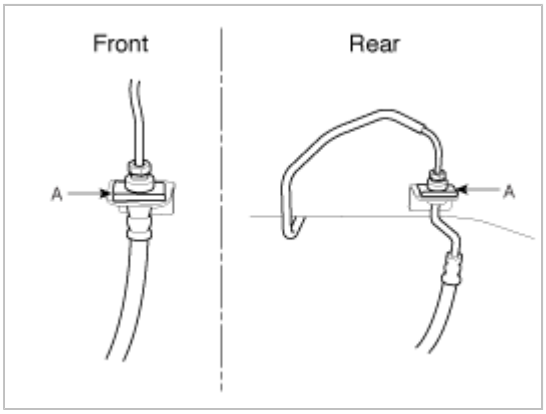
WARNING

When installing brake hose, be sure to comply with the torque specification to prevent twisted hose.

Removal

1. Remove the wheel & tire.
2. Remove the brake hose clip (A).

Front



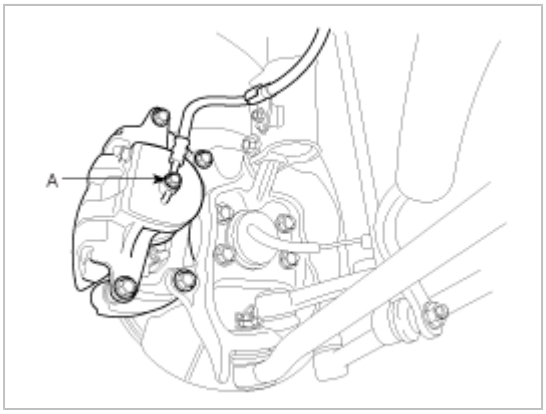
3. Disconnect the brake tube by loosening the tube flare nut.

Tightening torque :
12.7 ~ 16.7N.m (1.3 ~ 1.7kgf.m, 9.4 ~ 12.3lb-ft)

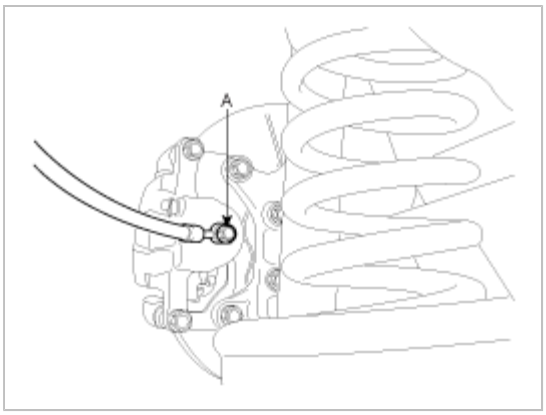
4. Disconnect the brake hose from the brake caliper by loosening the bolt.

Tightening torque :
24.5 ~ 29.4N.m (2.5 ~ 3.0kgf.m, 18.1 ~ 21.7lb-ft)

Front



Rear



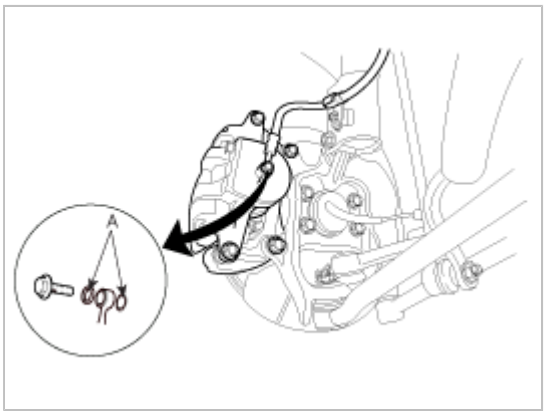
Inspection

1. Check the brake tubes for cracks, crimps and corrosion.
2. Check the brake hoses for cracks, damage and fluid leakage.
3. Check the brake tube flare nuts for damage and fluid leakage.
4. Check the brake hose mounting bracket for crack or deformation.

Installation

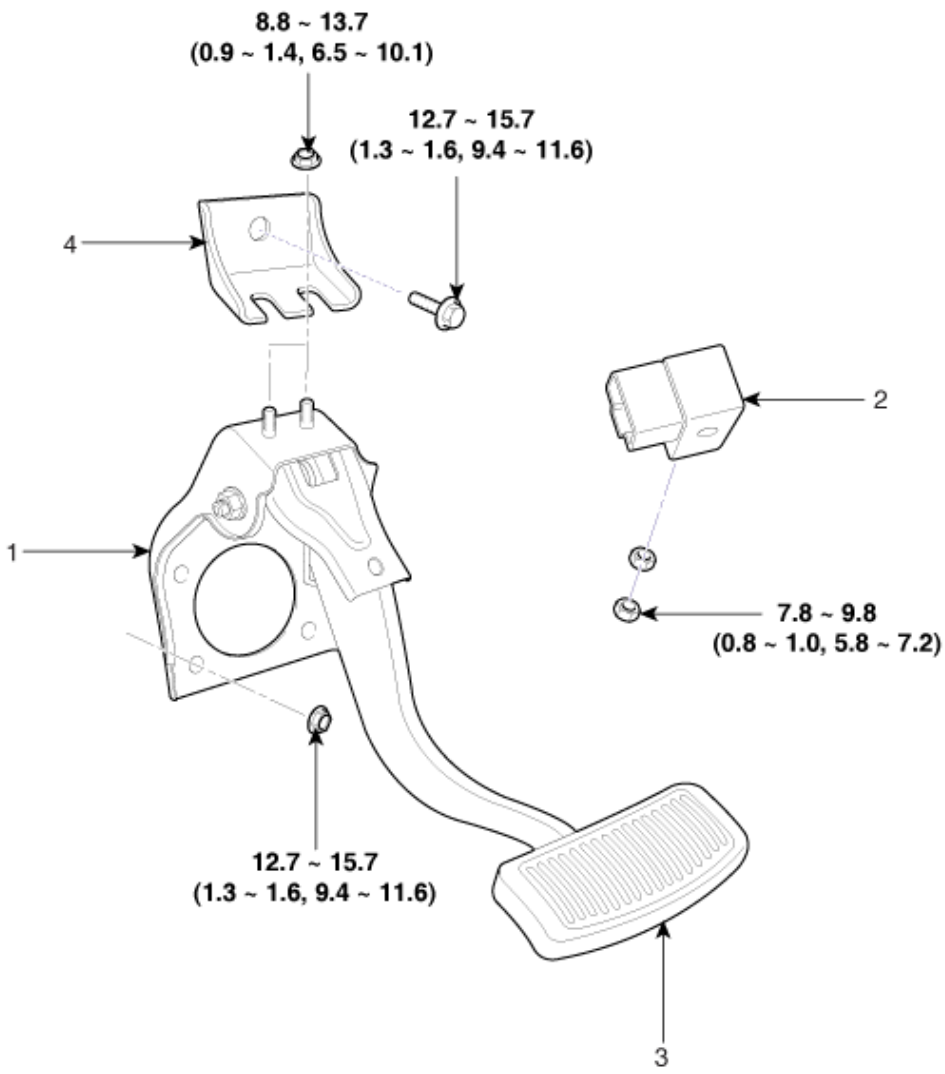
1. Installation is the reverse of removal.

> **CAUTION**
>
> Use a new washer (A) whenever installing.



2. After installation, bleed the brake system. (Refer to Brake system bleeding)
3. Check the spilled brake oil.

Components

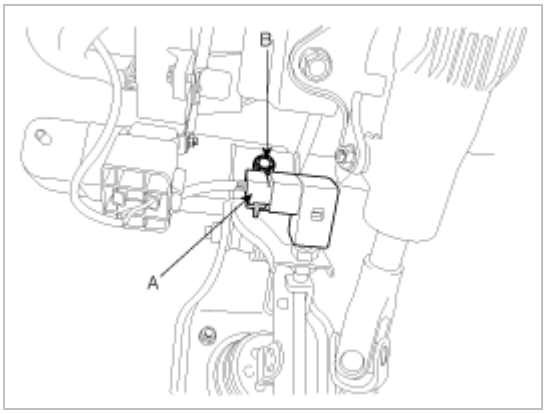


Torque : N.m (kgf.m, lb-ft)

1. Brake pedal member assembly	3. Brake pedal
2. Stop lamp switch	4. Brake bracket

Removal

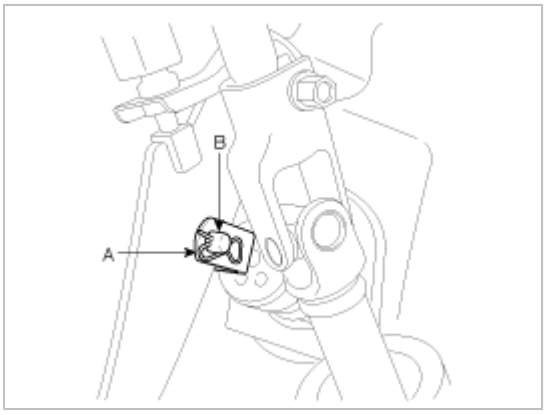
1. Remove the lower crash pad. (Refer to the Body group- crash pad).
2. Disconnect the stop lamp switch connector (A).



3. Remove the mounting bracket bolt (B).

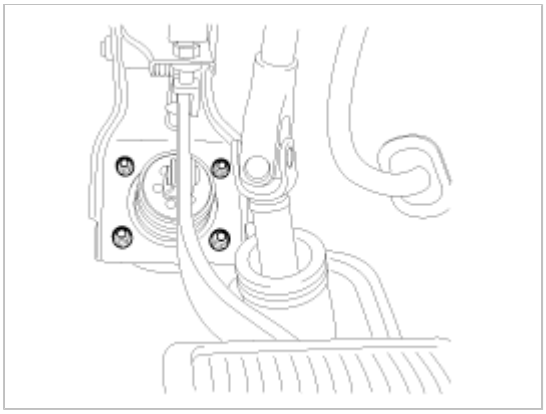
Tightening torque :
12.7 ~ 15.7N.m (1.3 ~ 1.6kgf.m, 9.4 ~ 11.6lb-ft)

4. Remove the snap pin (A) and clevis pin (B).



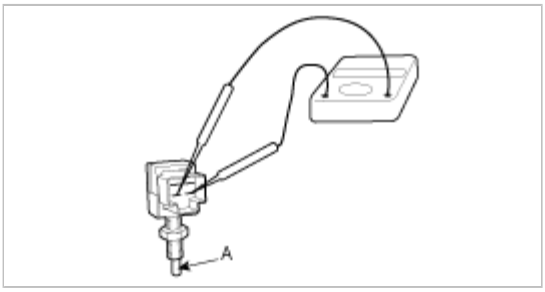
5. Remove the brake pedal member assembly mounting nuts and then remove the brake pedal assembly.

Tightening torque :
12.7 ~ 15.7N.m (1.3 ~ 1.6kgf.m, 9.4 ~ 11.6lb-ft)



Inspection

1. Check the bushing for wear.
2. Check the brake pedal for bending or twisting.
3. Check the brake pedal return spring for damage.
4. Check the stop lamp switch.
   (1) Connect a circuit tester to the connector of stop lamp switch, and check whether or not there is continuity when the plunger of the stop lamp switch is pushed in and when it is released.
   (2) The stop lamp switch is in good condition if there is no continuity when plunger(A) is pushed.



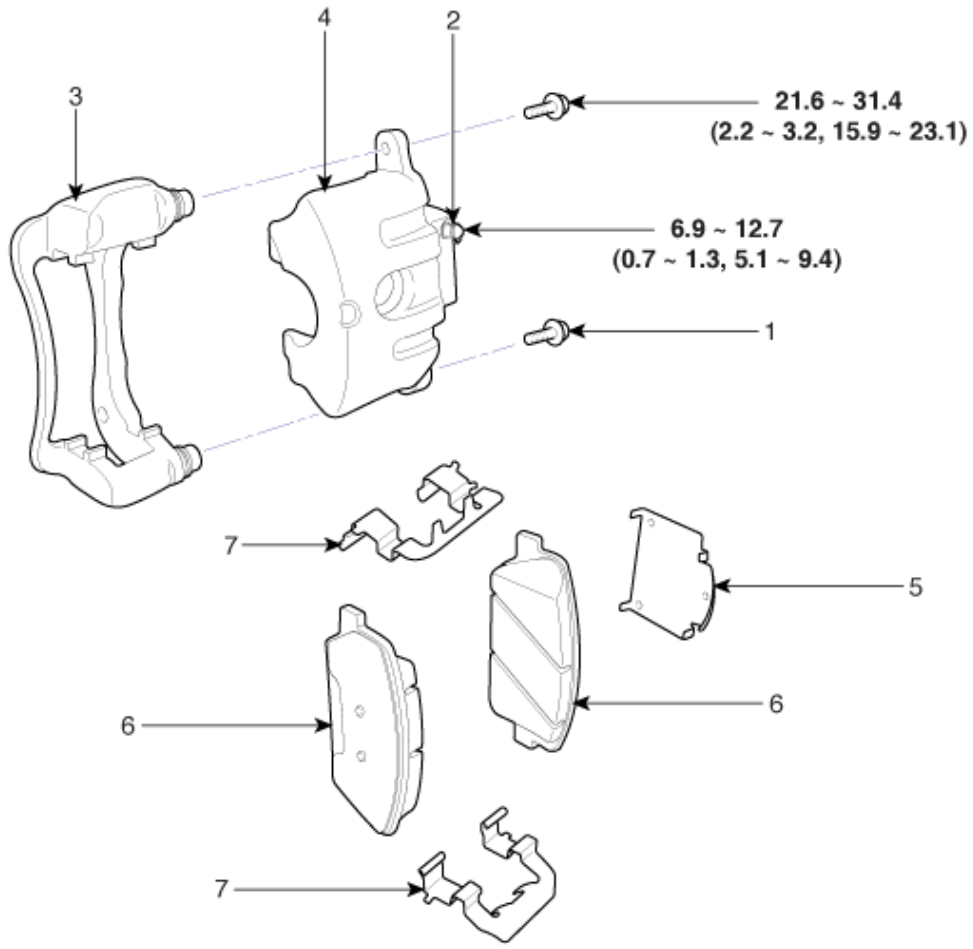
Installation

1. Installation is the reverse of removal.

> CAUTION
>
> • Before installing the pin, apply the grease to the clevis pin.
> • Use a new snap pin whenever installing.

2. Check the brake pedal operation.

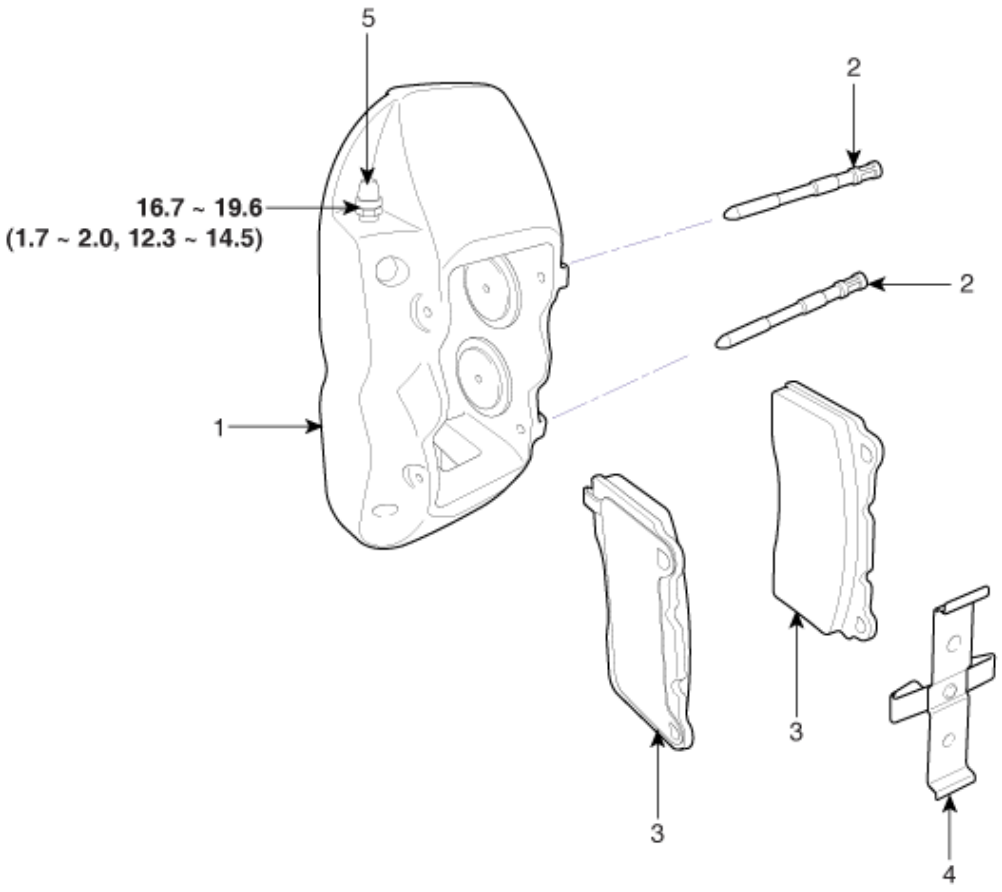
Components (1)



Torque : N.m (kgf.m, lb-ft)

1. Guide rod bolt	5. Inner pad shim
2. Bleed screw	6. Brake pad
3. Caliper bracket	7. Pad retainer
4. Caliper body	

Components (2)



Torque : N.m (kgf.m, lb-ft)

1. Caliper body 2. Guide pin 3. Brake pad	4. Retraction spring 5. Bleed screw

Removal

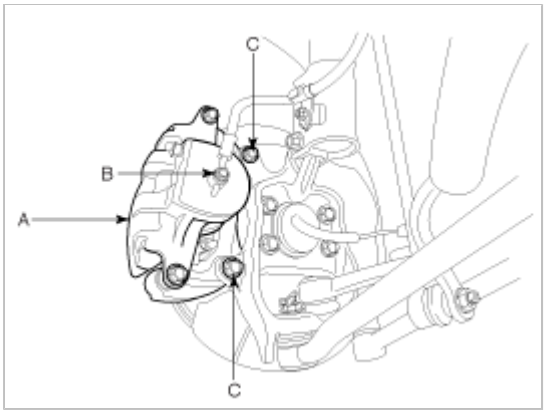
General caliper type

1. Remove the front wheel & tire.

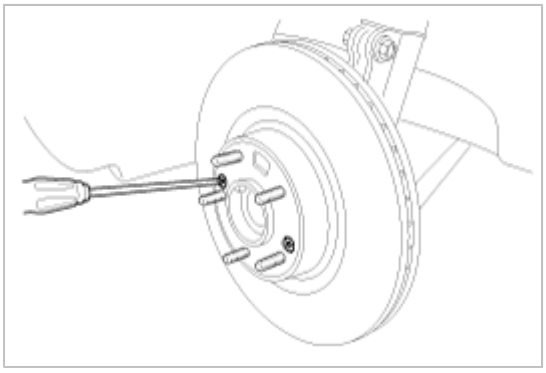
Tightening torque :
88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)

2. Loosen the hose eye-bolt (B) and caliper mounting bolts (C), then remove the front caliper assembly (A).

Tightening torque
Brake hose to caliper (B):
24.5 ~ 29.4N.m (2.5 ~ 3.0kgf.m, 18.1 ~ 21.7lb-ft)
Caliper assembly to knuckle (C):
78.5 ~ 98.1N.m (8.0 ~ 10.0kgf.m, 57.9 ~ 72.3lb-ft)



3. Remove the front brake disc by loosening the screws.



Bremb caliper type

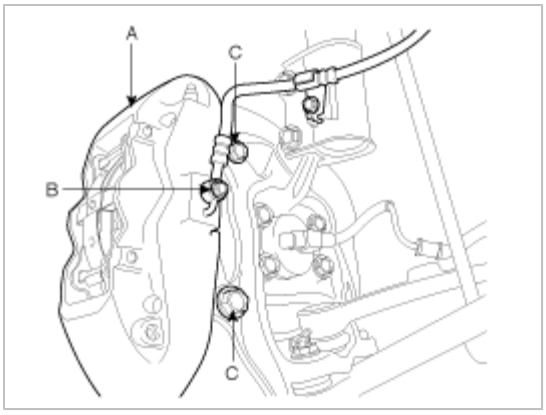
1. Remove the front wheel & tire.

Tightening torque :
88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)

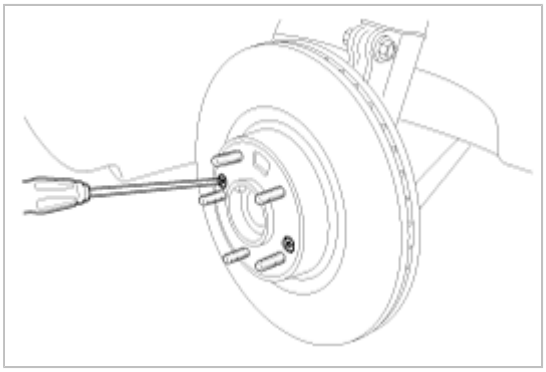
2. Loosen the hose eye-bolt (B) and caliper mounting bolts (C), then remove the front caliper assembly (A).

Tightening torque
Brake hose to caliper (B):
24.5 ~ 29.4N.m (2.5 ~ 3.0kgf.m, 18.1 ~ 21.7lb-ft)

Caliper assembly to knuckle (C):
88.3 ~ 103.0N.m (9.0 ~ 10.5kgf.m, 65.1 ~ 75.9lb-ft)



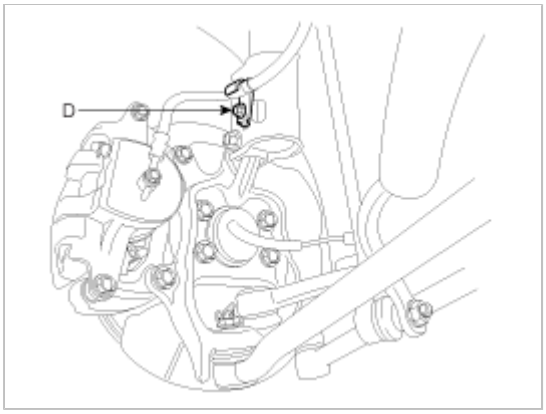
3. Remove the front brake disc by loosening the screws.



Replacement

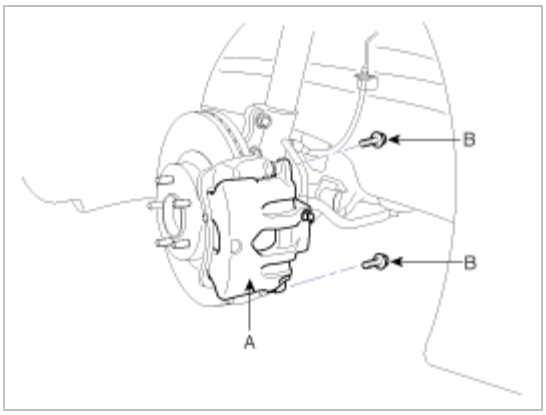
Font Brake Pads (General caliper type)

1. Remove the brake hose mounting bracket (knuckle mounting part : D).

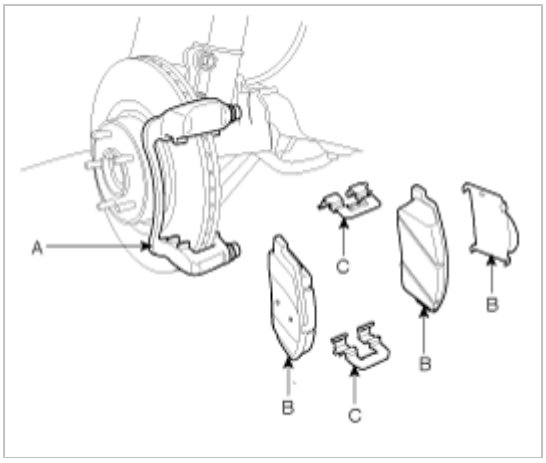


2. Loosen the guide rod bolt (B) and remove the caliper body (A).

Tightening torque :
21.6 ~ 31.4N.m (2.2 ~ 3.2kgf.m, 15.9 ~ 23.1lb-ft)

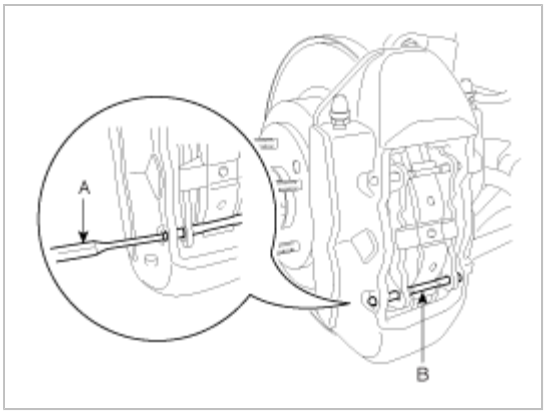


3. Replace pad shim (B), pad retainers (C) and brake pads (B) in the caliper bracket (A).

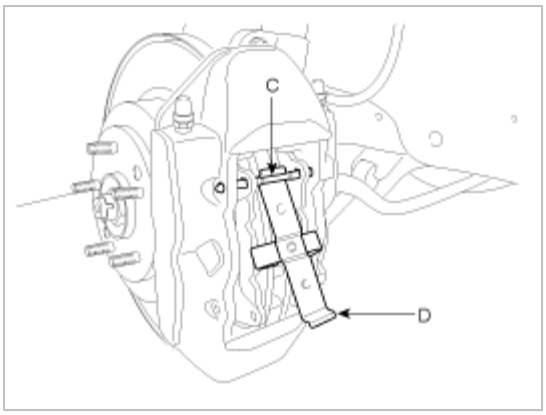


Font Brake Pads (B remb caliper type)

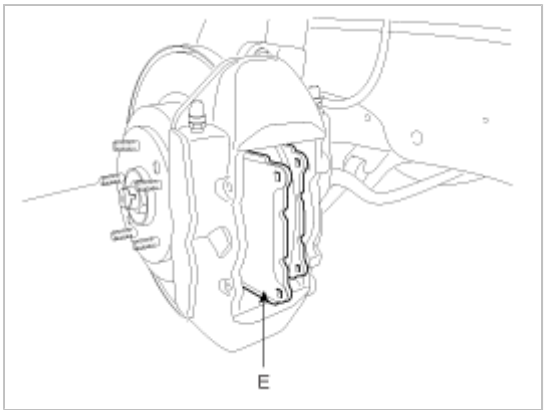
1. Remove the guide pin (B) of the lower part with the pin punch (A).



2. Remove the guide pin (C) of the upper part and retraction spring (D).



3. Replace brake pads (E) at the caliper body.

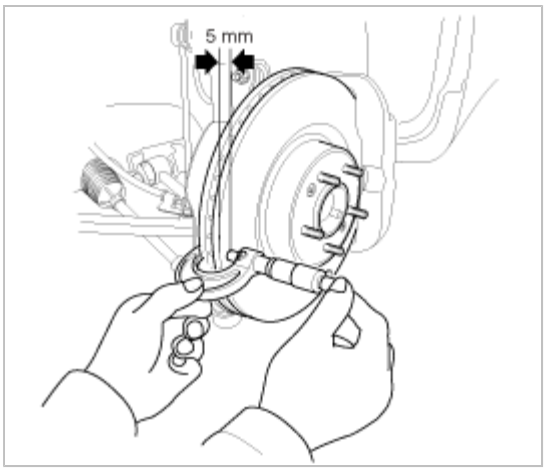


Inspection

Font Brake Disc Thickness Check

1. Check the brake pads for wear and fade.
2. Check the brake disc for damage and cracks.
3. Remove all rust and contamination from the surface, and measure the disc thickness at 8 points, at least, of same distance (5mm) from the brake disc outer circle.

Brake disc thickness
General caliper type
Standard: 28mm (1.10in)
Service limit: 26.4mm (1.04in)
Deviation: Less than 0.005mm (0.0002in) - circumference
Less than 0.01mm (0.0004in) - radius
Brembo caliper type
Standard: 28mm (1.10in)
Service limit: 26mm (1.02in)
Deviation: Less than 0.01mm (0.0004in) - circumference
Less than 0.04mm (0.0016in) - radius



4. If wear exceeds the limit, replace the discs and pad assembly left and right of the vehicle.

Font Brake Pad Check

1. Check the pad wear. Measure the pad thickness and replace it, if it is less than the specified value.

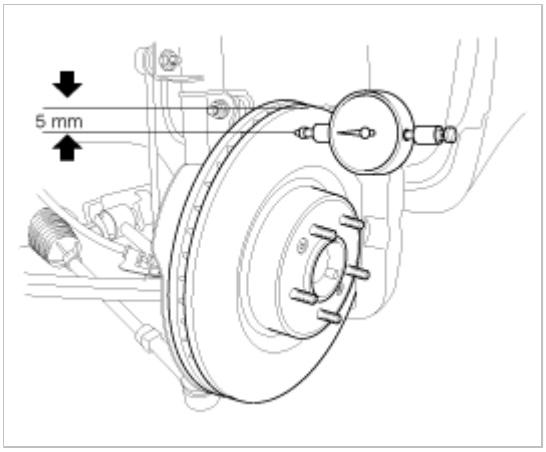
Pad thickness
General caliper type
Standard value : 11mm (0.43in)
Service limit : 2.0mm (0.0787in)
Brembo caliper type
Standard value : 8.5mm (0.33in)
Service limit : 2.0mm (0.0787in)

2. Check that grease is applied, to sliding contact points and the pad and backing metal for damage.

Font Brake Disc Runout Check

1. Place a dial gauge about 5mm (0.2 in.) from the outer circumference of the brake disc, and measure the runout of the disc.

Brake disc runout
Limit : 0.035mm (0.00137in.) or less (new one)

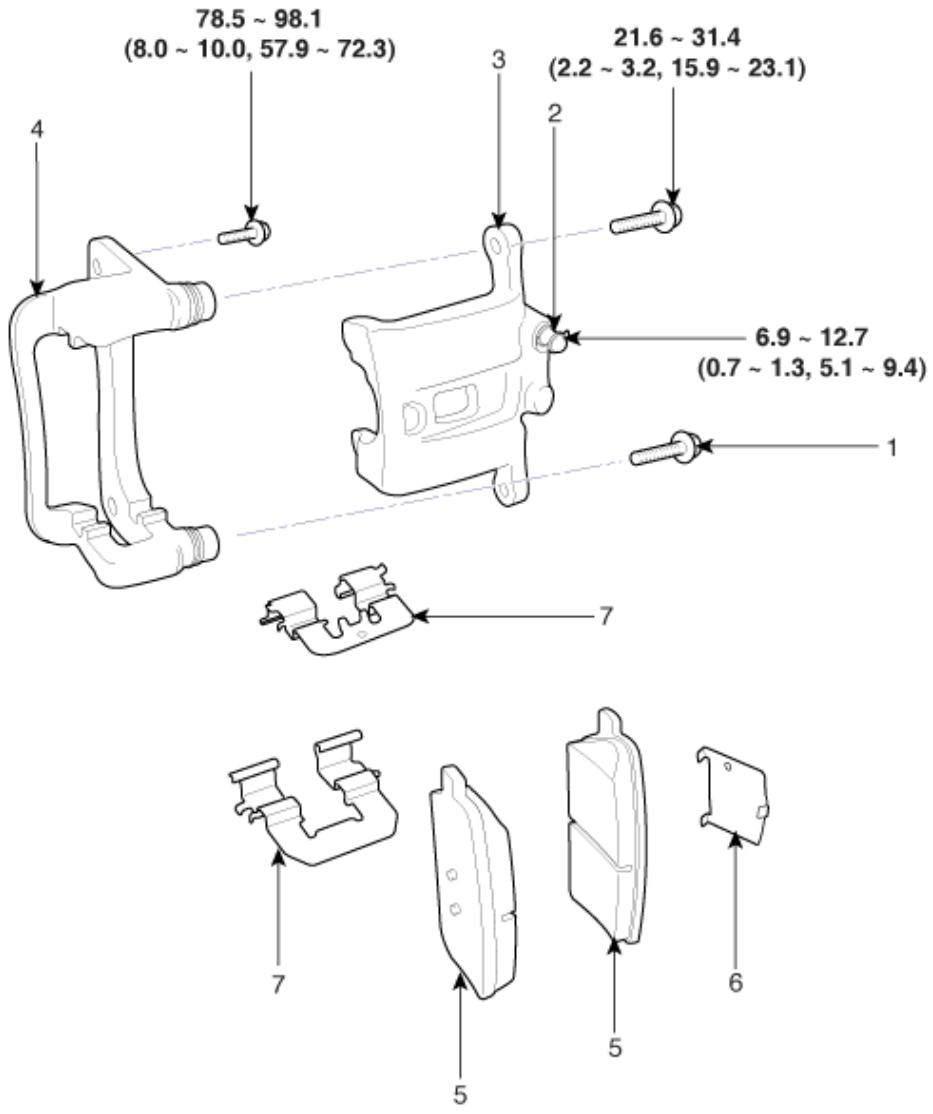


2. If the run out of the brake disc exceeds the limit specification, replace the disc, and then measure the run out again.
3. If the run out does not exceed the limit specification, install the brake disc after turning it and then check the run out of the brake disc again.
4. If the run out cannot be corrected by changing the position of the brake disc, replace the brake disc.

Installation

1. Installation is the reverse of removal.
2. Use a SST (09581-11000) when installing the brake caliper assembly.
3. After installation, bleed the brake system. (Refer to Brake system bleeding)

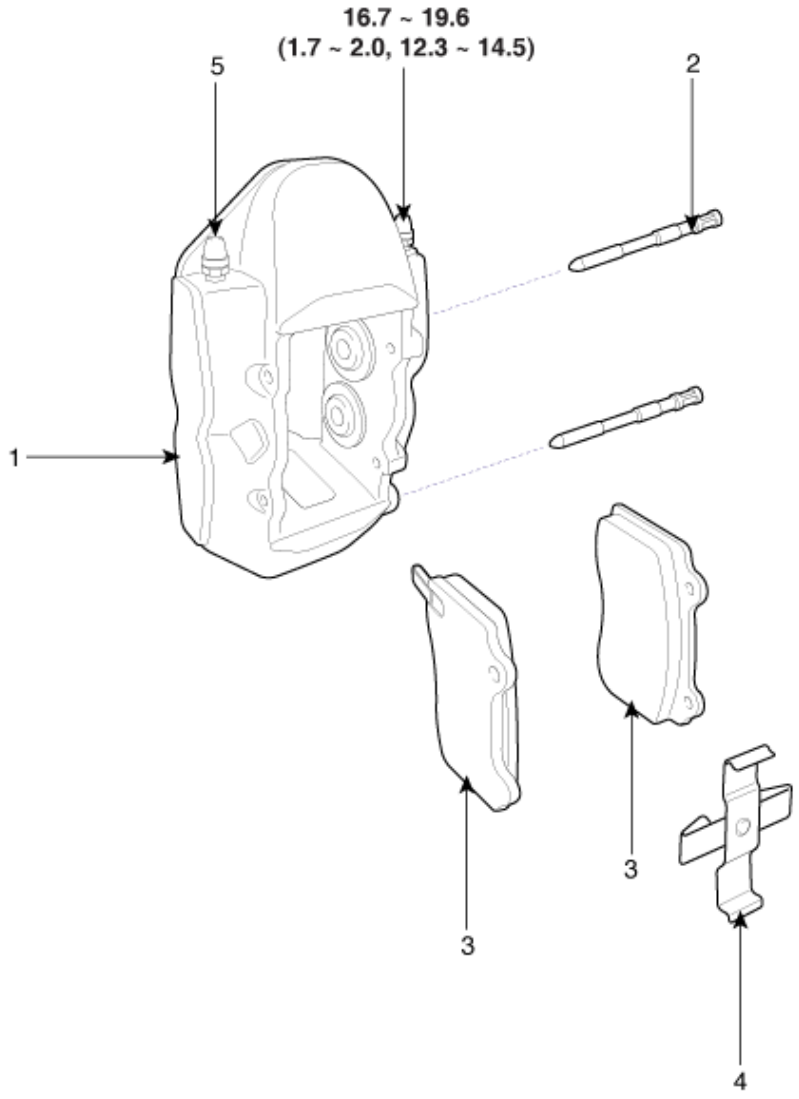
Components (1)



Torque : N.m (kgf.m, lb-ft)

1. Guide rod bolt 2. Bleed screw 3. Caliper body 4. Caliper bracket	5. Inner pad shim 6. Brake pad 7. Pad retainer

Components (2)



Torque : N.m (kgf.m, lb-ft)

1. Caliper body 2. Guide pin 3. Brake pad	4. Retraction spring 5. Bleed screw

Removal

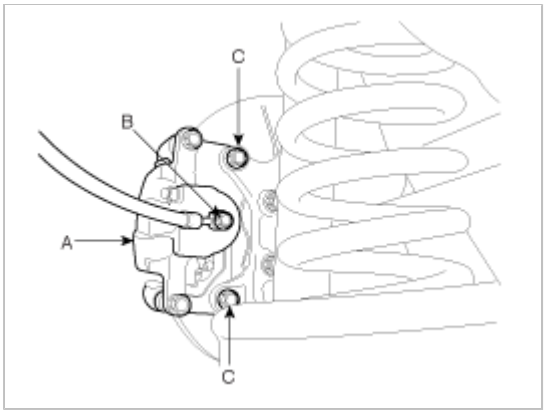
General caliper type

1. Remove the rear wheel & tire.

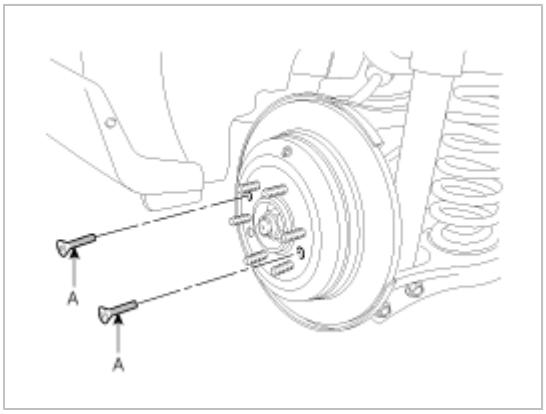
Tightening torque :
88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)

2. Loosen the hose eye-bolt (B) and caliper mounting bolts (C), then remove the rear caliper assembly (A).

Tightening torque
Brake hose to caliper (B):
24.5 ~ 29.4N.m (2.5 ~ 3.0kgf.m, 18.1 ~ 21.7lb-ft)
Caliper assembly to carrier (C):
78.5 ~ 98.1N.m (8.0 ~ 10.0kgf.m, 57.9 ~ 72.3lb-ft)



3. Remove the rear brake disc by loosening the screws (A).



Bremb caliper type

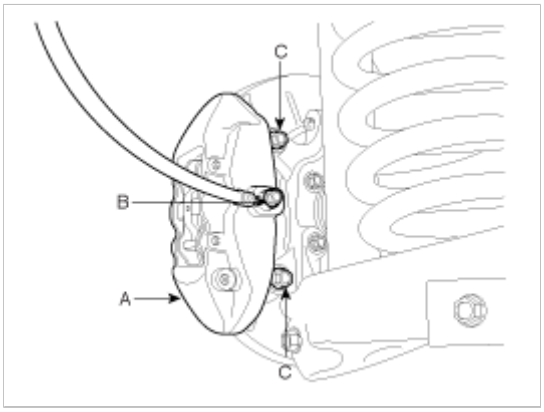
1. Remove the rear wheel & tire.

Tightening torque :
88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)

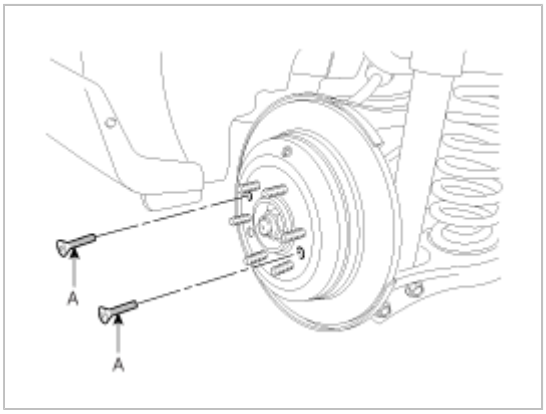
2. Loosen the hose eye-bolt (B) and caliper mounting bolts (C), then remove the rear caliper assembly (A).

Tightening torque
Brake hose to caliper (B):

24.5 ~ 29.4N.m (2.5 ~ 3.0kgf.m, 18.1 ~ 21.7lb-ft)
Caliper assembly to carrier (C):
78.5 ~ 98.1N.m (8.0 ~ 10.0kgf.m, 57.9 ~ 72.3lb-ft)



3. Remove the rear brake disc by loosening the screws (A).

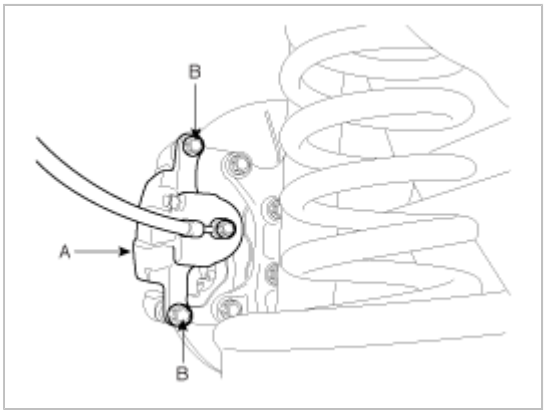


Replacement

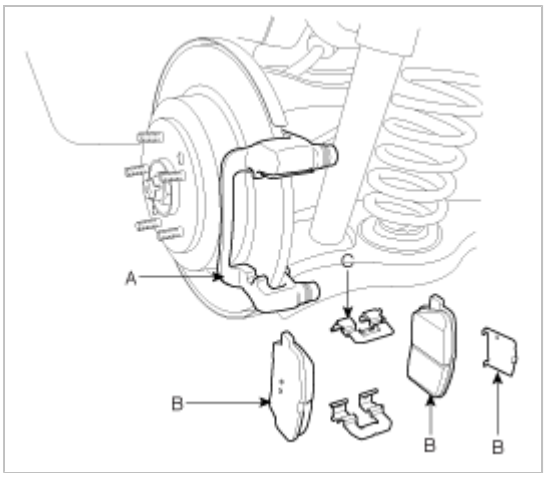
Rear Brake Pads (General caliper type)

1. Loosen the guide rod bolt (B) and remove the caliper body (A).

Tightening torque :
21.6 ~ 31.4N.m (2.2 ~ 3.2kgf.m, 15.9 ~ 23.1lb-ft)



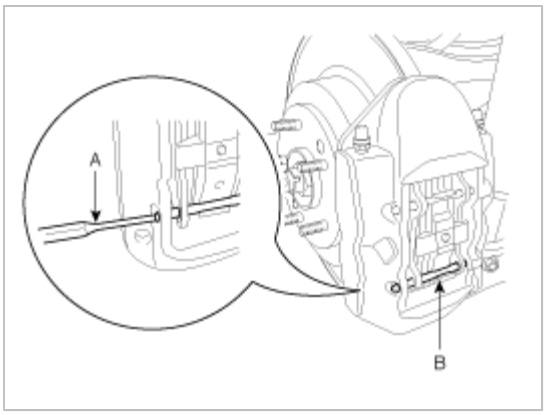
2. Replace pad shim, pad retainers (C) and brake pads (B) in the caliper bracket (A).



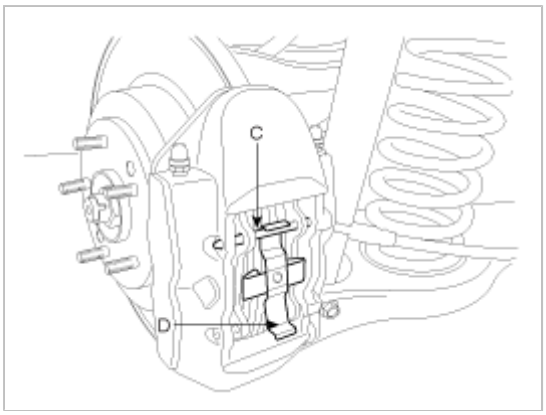
Rear Brake Pads (Bremb caliper type)

1. Remove the guide pin (B) of the lower part with the pin punch (A).

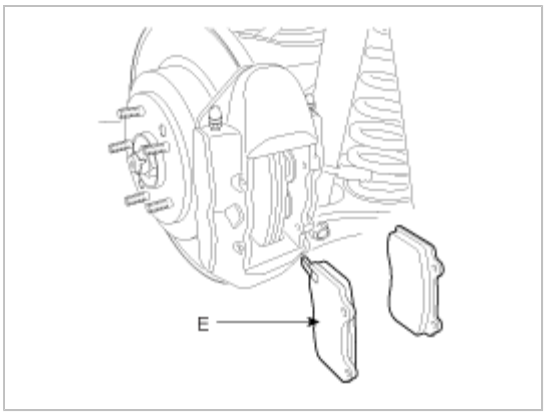
Tightening torque :
21.6 ~ 31.4N.m (2.2 ~ 3.2kgf.m, 15.9 ~ 23.1lb-ft)



2. Remove the guide pin (C) of the upper part and the retraction spring (D).



3. Replace brake pads (E) at the caliper body.

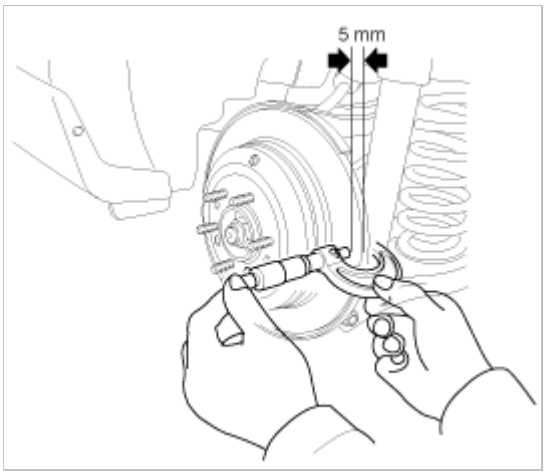


Inspection

Rear Brake Disc Thickness Check

1. Check the brake pads for wear and fade.
2. Check the brake disc for damage and cracks.
3. Remove all rust and contamination from the surface, and measure the disc thickness at 8 points, at least, of same distance (5mm) from the brake disc outer circle.

Brake disc thickness
General caliper type
Standard: 13mm (0.51in)
Service limit: 11.4mm (0.45in)
Deviation: Less than 0.005mm (0.0002in) - circumference
Less than 0.01mm (0.00039in) - radius
Brembo caliper type
Standard: 20mm (0.79in)
Service limit: 18mm (0.71in)
Deviation: Less than 0.01mm (0.0004in) - circumference
Less than 0.04mm (0.0016in) - radius



4. If wear exceeds the limit, replace the discs and pad assembly left and right of the vehicle.

Rear Brake Pad Check

1. Check the pad wear. Measure the pad thickness and replace it, if it is less than the specified value.

Pad thickness
General caliper type
Standard value: 9mm (0.354in)

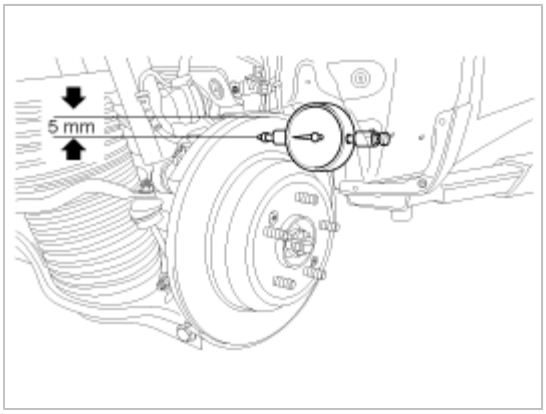
Service limit : 2.0mm (0.0787in)
Brembo caliper type
Standard value : 9.1mm (0.358in)
Service limit : 2.0mm (0.0787in)

2. Check that grease is applied, to sliding contact points and the pad and backing metal for damage.

Rear Brake Disc Runout Check

1. Place a dial gauge about 5mm (0.2 in.) from the outer circumference of the brake disc, and measure the runout of the disc.

Brake disc runout
Limit: 0.035mm (0.00137in.) or less (new one)



2. If the runout of the brake disc exceeds the limit specification, replace the disc, and then measure the runout again.
3. If the runout exceeds the limit specification, install the brake disc after turning it 180° and then check the runout of the brake disc again.
4. If the runout cannot be corrected by changing the position of the brake disc, replace the brake disc.

Installation

1. Installation is the reverse of removal.
2. Use a SST (09581-11000) when installing the brake caliper assembly.
3. After installation, bleed the brake system. (Refer to Brake system bleeding)