

Troubleshooting

Problem Symptoms Table

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem.

Check each part in order.

If necessary, replace these parts.

Symptom	Expected cause	Countermeasure
Lower pedal or sponge pedal	Brake system (oil leakage)	Repair
	Brake system (air inflow)	Air bleeding out procedure
	Piston seal (worn out or damaged)	Replace
	Rear brake shoe separation (faulty adjustment)	Adjust
	Master cylinder (malfunction)	Replace
Brake drag	Brake pedal free separation (minimum)	Adjust
	Parking brake cable length (adjustment trouble)	Adjust
	Parking brake cable (trapped)	Repair
	Rear brake shoe separation (adjustment trouble)	Adjust
	Pad and lining (twisted or cracked)	Replace
	Piston (trapped)	Replace
	Piston (frozen)	Replace
	Anker or return spring (malfunction)	Replace
	Booster system (Vacuum leaks)	Repair
	Master cylinder (malfunction)	Replace
Uneven brake	Piston (trapped)	Replace
	Pad and lining (oil stain, cracked or twisted)	Replace
	Brake system (oil leakage, air inflow)	Perform air bleeding procedure
	Pad or lining (worned out)	Replace

Heavy pedal and brake trouble	Pad or lining (cracked or twisted)	Replace
	Rear brake shoe separation (adjustment trouble)	Adjust
	Pad or lining (oil stain)	Replace
	Pad or lining (slippery)	Replace
	Disc (scratched)	Replace
	Booster system (Vacuum leaks)	Repair
Noise from brake	Pad or lining (cracked or twisted)	Replace
	Looseness of wheel bolt and caliper	Adjust
	Pad sliding trouble (Pad uneven worn out)	Replace
	Pad or lining (dirty)	Cleaning
	Pad or lining (slippery)	Pad replacement
	Anker or return spring (malfunction)	Replace
	Brake pad shim (damaged)	Replace
	Hold down spring (damaged)	Replace
	Foreign substance stucked between disc and pad	Cleaning
	Corrosion on disc	Test drive vehicle to get rid of corrosion between rotor and pads.
Poor braking performance (at highway speeds)	Caved disc	Replace
	Pad or lining (worned out)	Replace
Brake vibration	Master cylinder (malfunction)	Replace
	Brake booster (Vacuum leaks)	Repair
	Pedal free separation	Adjust
	Master cylinder (malfunction)	Replace
	Damaged on master cylinder cap	Replace
	Damaged on brake line	Replace

	Caliper returning trouble (while tire is turning, check the noise)	Replace
	Transformed disc	Replace

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Specifications

Item		Specification
Master cylinder	Type	Tandem
	I.D. mm (in)	22.22 mm (0.87 in)
	Piston stroke mm (in)	45 mm (1.77 in)
Brake booster	Type	11" Tie-rod
	Boosting ratio	10.5 : 1
Front disc brake (16 inch)	Type	Ventilated disc
	Disc O.D	305 mm (12.01 in)
	Disc thickness	25 mm (0.98 in)
	Cylinder type	Single piston
	Cylinder I.D.	Ø 60.6 mm (2.39 in)
Front disc brake (17 inch)	Type	Ventilated disc
	Disc O.D	325 mm (12.80 in)
	Disc thickness	30 mm (1.18 in)
	Cylinder type	Single piston
	Cylinder I.D.	Ø 60.6 mm (2.39 in)
Rear disc brake	Type	Solid disc
	Disc O.D	300 mm (11.8 in)
	Disc thickness	10 mm (0.39 in)
	Cylinder type	Single piston
	Cylinder I.D.	Ø38 mm (1.50 in)
Parking brake	Type	Lever, pedal, Electronic Parking Brake (EPB)
HECU	System	4 Channel 4 Sensor control system (Total control ABS, TCS, EBD, ESP)
	Type	valve relay intergrated type (ECU, TCU and CAN)Motor,
	Operating Voltage	8 ~ 16V
	Operating Temperature	-40 - 110°C (-40 ~ 230°F)

	Motor power	300 W
Active Wheel speed sensor	Supply voltage	DC 4.55 ~ 16 V
	Output current (low)	7 +1.4/-1.12 mA
	Output current (high)	41 +2.8/-1.12 mA
	Output range	0 ~ 2500 Hz
	Tone wheel	Front : 48 teeth, Rear : 47 teeth
	Air gap	0.4 - 1.5 mm (0.02 - 0.06 in)
Steering Wheel Angle Sensor	Operating Voltage	8 ~ 16V
	Current Consumption	150 mA Max.
	Output measurement range	~ + 779.9°-780
	Operating Angular velocity	0 ~ 1016°/sec

Service Standard

Items	Standard value
Brake pedal height	135 mm (5.31 in)
Brake pedal Full stroke	176 mm (6.93 in)
Stop lamp switch clearance	1 - 2 mm (0.04 in - 0.08 in)
Brake pedal free play	2 - 4 mm (0.08 in - 0.16 in)
Front brake disc pad thickness	11 mm (0.43 in)
Front brake disc pad service limit	2.0 mm (0.07 in)
Front brake disc thickness [16 inch]	25 mm (0.98 in)
Front brake disc service limit [16 inch]	23 mm (0.90 in)
Front brake disc thickness [17 inch]	30 mm (1.18 in)
Front brake disc service limit [17 inch]	28 mm (1.10 in)
Rear brake disc pad thickness	10 mm (0.31 in)
Rear brake disc pad service limit	2.0 mm (0.07 in)
Rear brake disc thickness	10 mm (0.39 in)
Rear brake disc service limit	8.0 mm (0.32 in)

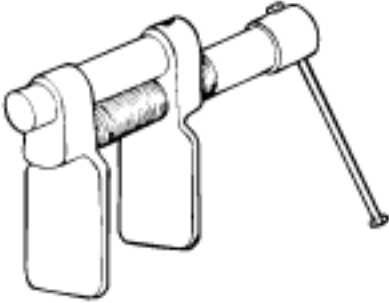
Tightening Torques

Items	N.m	kgf.m	lb-ft
Master cylinder to brake booster	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Brake booster mounting nuts	16.7 - 25.5	1.7 - 2.6	12.3 - 18.8
Air bleeding screw	6.9 - 12.7	0.7 - 1.3	5.1 - 9.4
Brake tube flare nut, brake hose	13.7 - 16.7	1.4 - 1.7	10.1 - 12.3
Front caliper guide rod bolts	21.6 - 31.4	2.2 - 3.2	15.9 - 23.1
Rear caliper guide rod bolts	21.6 - 31.4	2.2 - 3.2	15.9 - 23.1
Front caliper assembly mounting bolt	98.1 - 117.7	10.0 - 12.0	72.3 - 86.8
Rear caliper assembly mounting bolt	78.5 - 98.1	8.0 - 10.0	57.9 - 72.3
Brake hose to caliper	24.5 - 29.4	2.5 - 3.0	18.1 - 21.7
Brake pedal member bracket bolt	16.7 - 25.5	1.7 - 2.6	12.3 - 18.8
Wheel speed sensor mounting bolt	8.8 - 13.7	0.9 - 1.4	6.5 - 10.1

Lubricants

Items	Recommended	Quantity
Brake fluid	DOT 4	As required
Brake pedal bushing and bolt	Chassis grease	As required
Parking brake shoe and backing plate contacting surface	Heat resistance grease	As required

Special Service
Tools

Tool (Number and Name)	Illustration	Use
09581-11000 Piston expander		Spreading the front disc brake piston
09527 - 2W110 Sensor cap installer		Used for installing wheel speed sensor cap (Use with 09231-H1100)
09231 - H1100 Handle		(Use with 09527-2W110)

Brake System
Bleeding

Nomal Brake System

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This work is to be performed by two people.

- Main worker : Bleeds the system by manually opening and closing the bleed screw and detecting air coming out of brake lines.
- Assistant : Brake pedal operation and scanner operation inside the vehicle.

1. Connect the brake fluid filler to the reservoir tank.

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- Do not reuse the drained fluid.
- Always use genuine DOT4 brake Fluid.
Using a non-genuine 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.

2. Remove the wheel and tire.

(Refer to Suspension System - "Wheel")

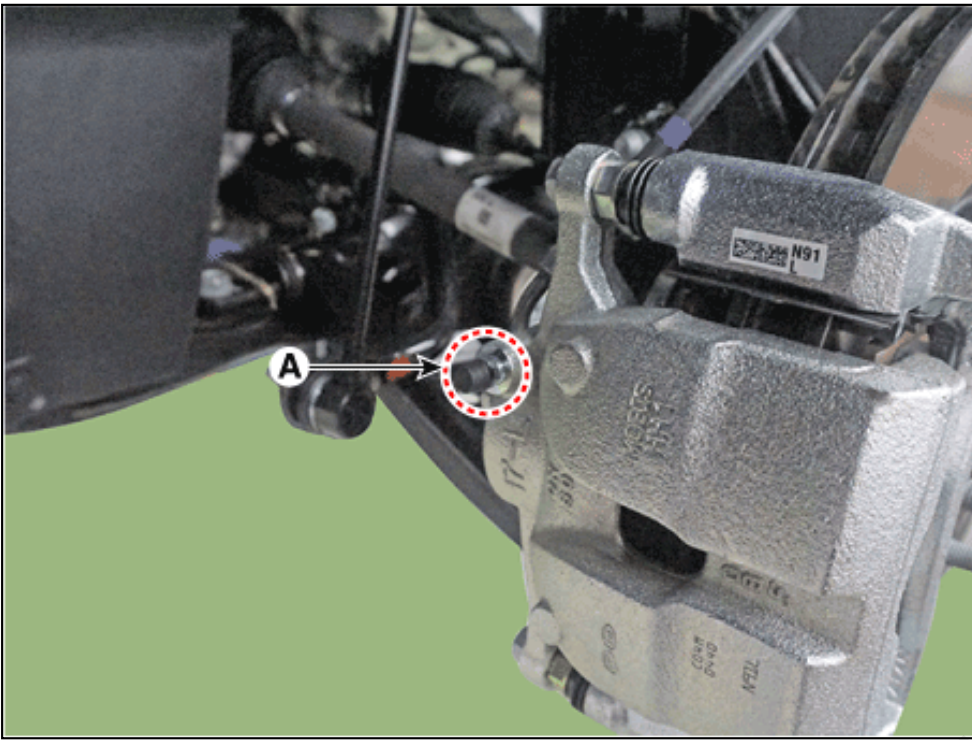
3. The main worker connects the clear hose to the wheel bleeder screw (A) and sends a signal to assistant to depress the brake pedal.
4. The assistant ro pump the brake pedal 2 times with normal brake force and then keep the brake pedal depressed.
5. While the assistant is depressing the brake pedal, remove the bleed screw (A) momentarily to remove the air, and then fasten it again.

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- The bleed screw opens and closes only a quarter of a turn.

[Front]

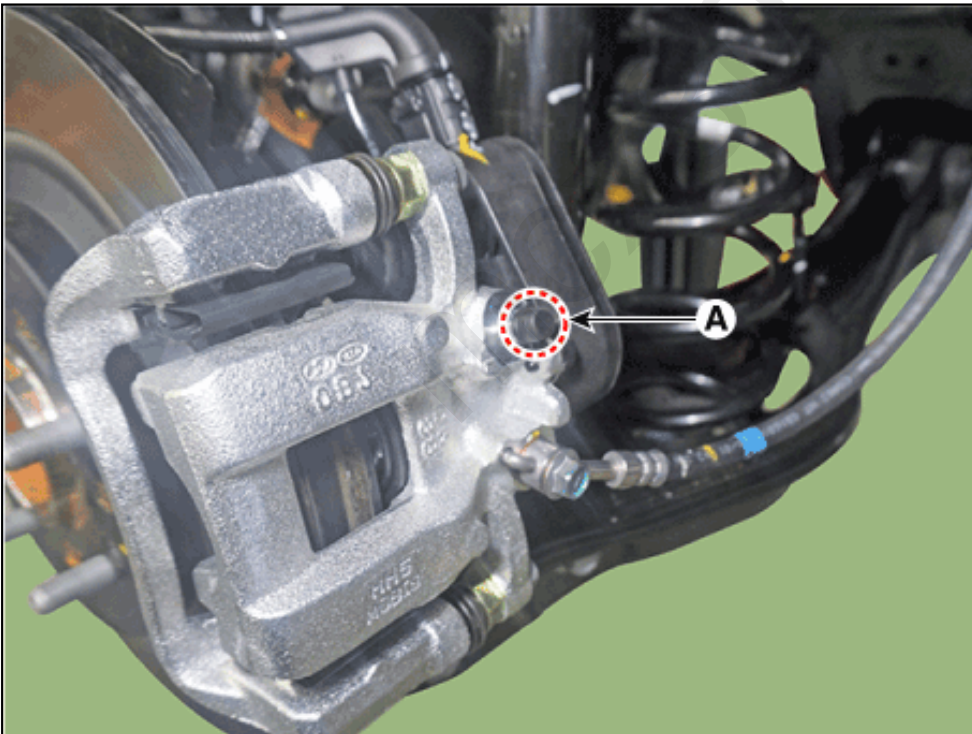
Tightening torque :
6.8 - 12.7 N.m (0.7 - 1.3 kgf.m, 5.0 - 9.4 lb-ft)



[Rear]

Tightening torque :

6.8 - 12.7 N.m (0.7 - 1.3 kgf.m, 5.0 - 9.4 lb-ft)



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

ESC Bleeding of Brake System

This procedure should be followed to ensure adequate bleeding of air and filling of the ESC unit, brake lines and master cylinder with brake fluid.

1. Connect the brake fluid filler to the reservoir tank.



- Do not reuse the drained fluid.
- Always use genuine DOT4 brake Fluid.
Using a non-genuine 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.

2. Connect the self-diagnosis to the data link connector located underneath the dash panel.

3. Connect a clear plastic tube to the wheel cylinder bleeder plug and insert the other end of the tube into a half filled clear plastic bottle.

4. Connect the self-diagnosis S to the data link connector located underneath the dash panel.

5. Select the "HCU Air Bleeding Mode".



■ BVM



■ Multi Function Camera



Do not touch any system buttons while performing this function.

S/W Management



• HCU Air Bleeding Mode

Purpose	To bleed air in the brake system and Hydraulic Electric Control Unit(HECU) after HECU is replaced or work is done on brake system.
Enable Condition	1.Solenoid Valve Status : Closed 2.Motor Pump Status : OFF
Concerned Component	Hydraulic Electric Control Unit(HECU)
Concerned DTC	-
Fail Safe	-
Etc	-

OK



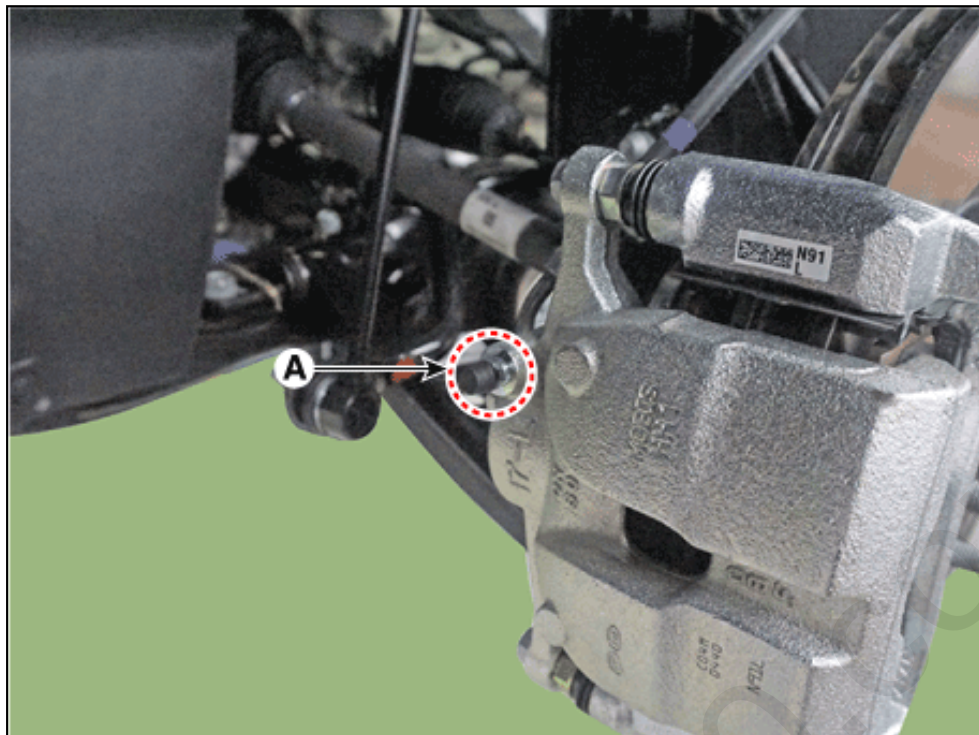
Do not touch any system buttons while performing this function.

6. When HCU is operated forcibly, keep the wheel bleeder screw (A) with opened state.

[Front]

Tightening torque :

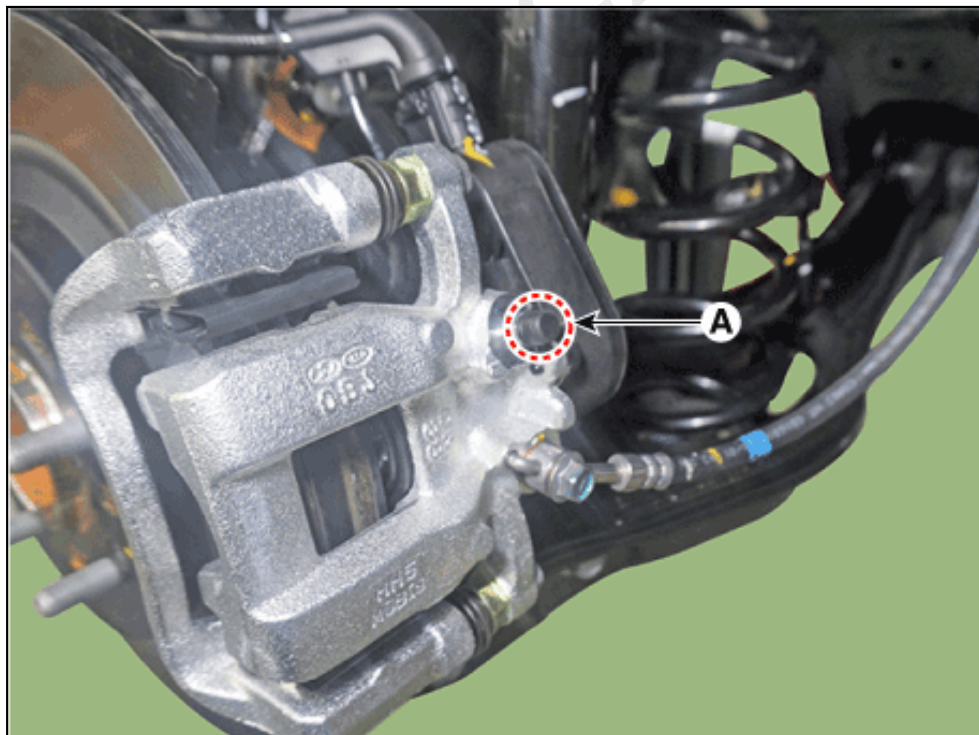
6.8 - 12.7 N.m (0.7 - 1.3 kgf.m, 5.0 - 9.4 lb-ft)



[Rear]

Tightening torque :

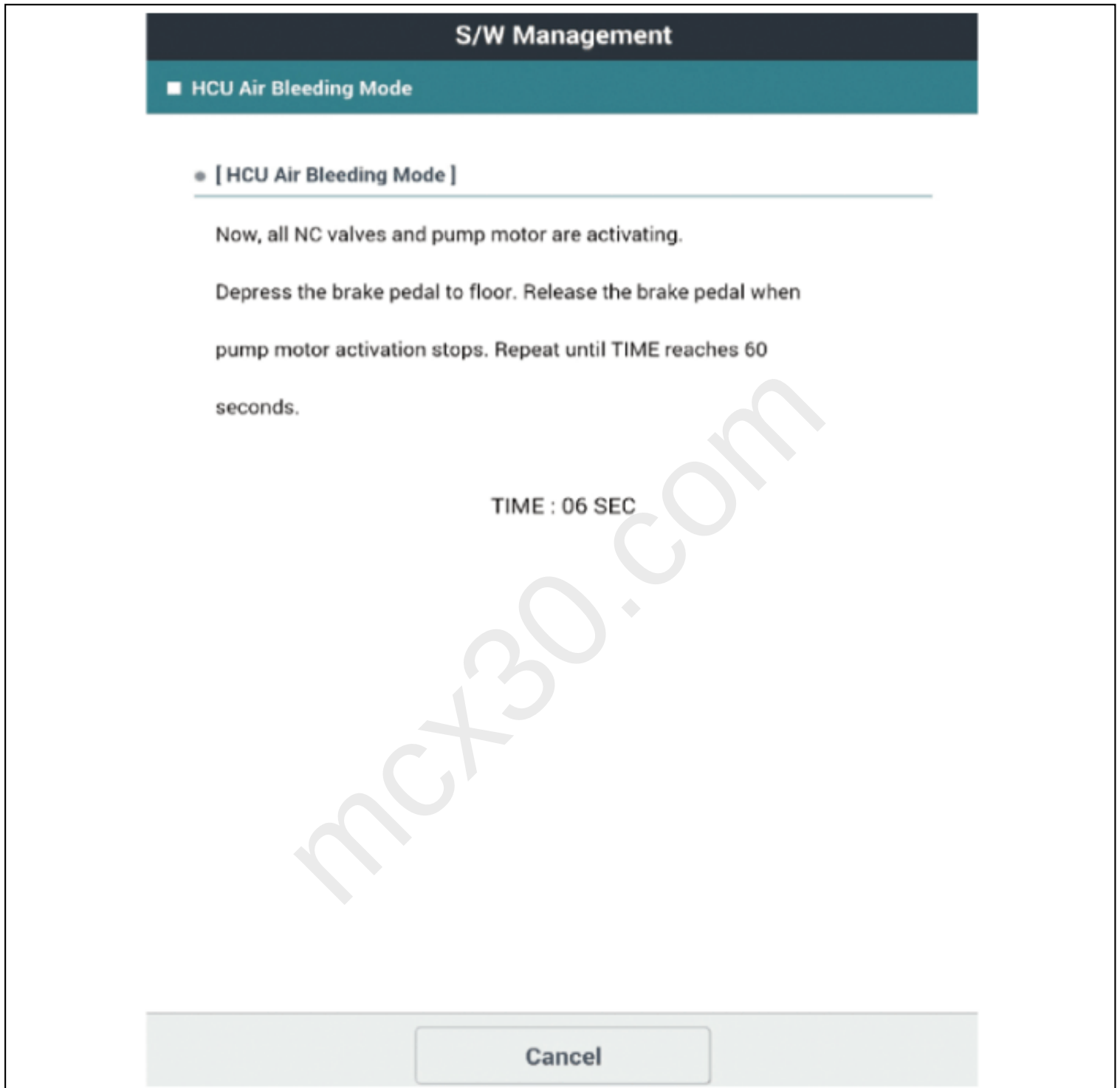
6.8 - 12.7 N.m (0.7 - 1.3 kgf.m, 5.0 - 9.4 lb-ft)





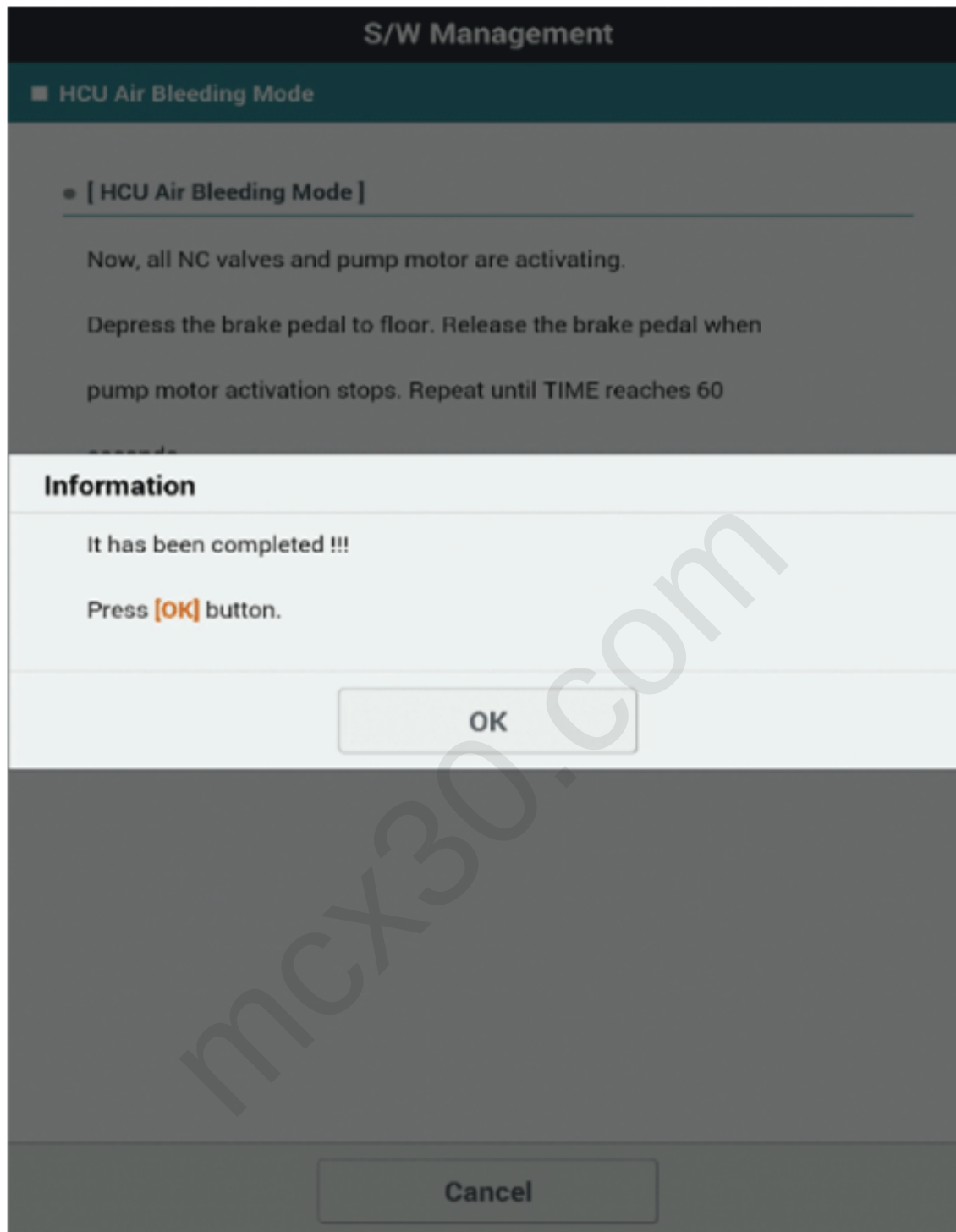
- The bleed screw opens and closes only a quarter of a turn.

7. Depress the brake pedal with strong force at regular intervals while HCU is operated forcibly.



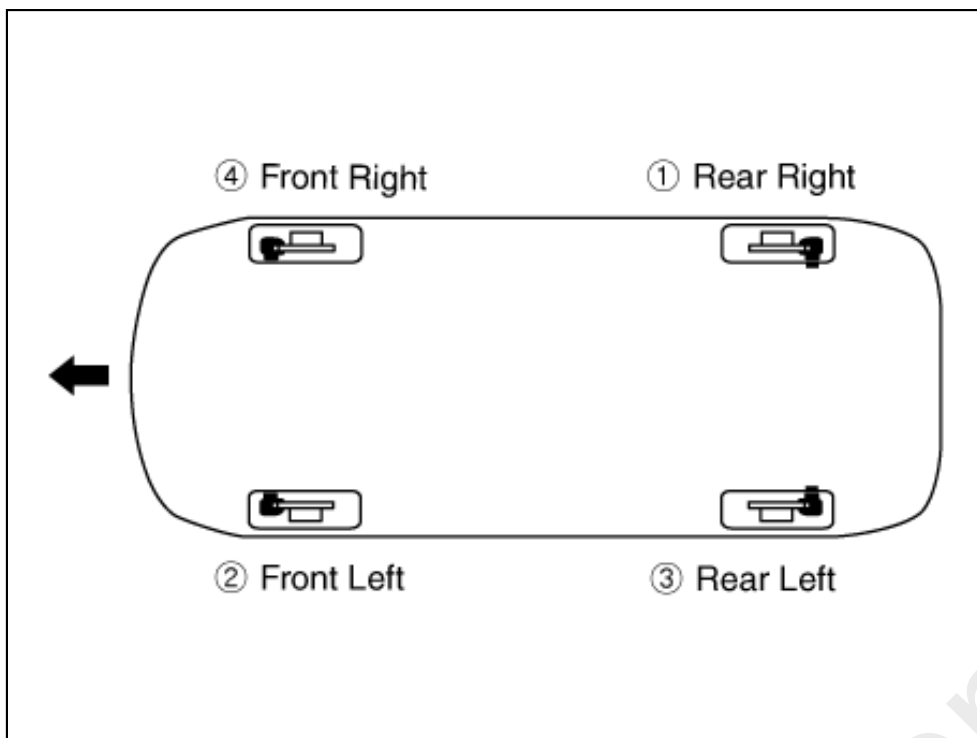
8. Repeat the above procedure until the air bubbles are completely removed.

9. When HCU forced operation is completed, send the "work end" signal.



10. Close the wheel bleeder screw.

11. Work in the order shown in the figure below.



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