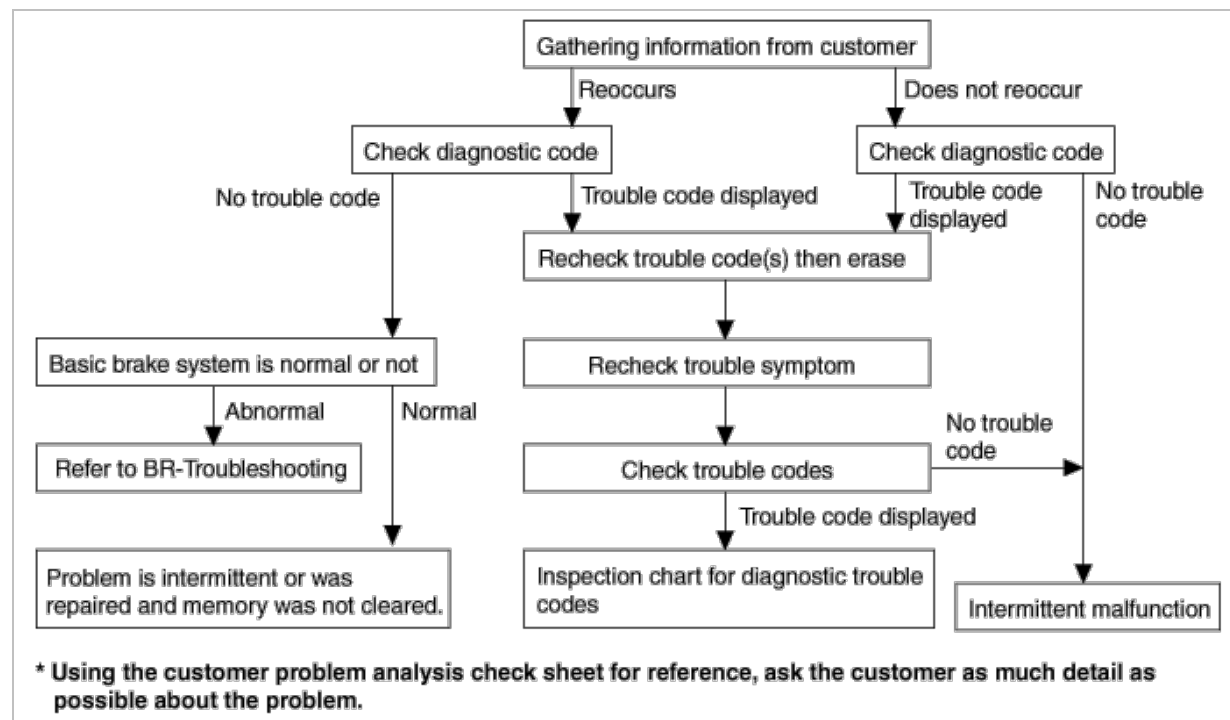


## Standard Flow of Diagnostic Troubleshooting



## Notes With Regard To Diagnosis

The phenomena listed in the following table are not abnormal.

Condition	Explanation
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment. This is because the system operation check is being performed.
ABS operation sound	1. Sound of the motor inside the ABS hydraulic unit operation (whine). 2. Sound is generated along with vibration of the brake pedal (scraping). 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release (Thump : suspension; squeak: tires)
ABS operation (Long braking distance)	For road surfaces such as snow-covered and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed.
Diagnosis detection conditions can vary depending on the diagnosis code. When checking the trouble symptom after the diagnosis code has been erased, ensure that the requirements listed in "Comment" are met.	

## ABS Check Sheet

## ABS Check Sheet

 Inspector's  
Name \_\_\_\_\_

<b>Customer's Name</b>		<b>Registration No.</b>	
		<b>Registration Year</b>	/   /
		<b>VIN.</b>	
<b>Date Vehicle Brought In</b>	/   /	<b>Odometer</b>	Km Miles

<b>Date the Problem First Occurred</b>	/   /
<b>Frequency of Occurrence of Problem</b>	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (   times a day)

<b>Symptoms</b>	<input type="checkbox"/> ABS does not operate.		
	<input type="checkbox"/> ABS does not operate efficiently.		<input type="checkbox"/> Intermittent (   times a day)
	<b>ABS Warning Light Abnormal</b>	<input type="checkbox"/> Remains ON	<input type="checkbox"/> Does not light up

<b>Diagnostic Trouble Code Check</b>	<b>1st Time</b>	<input type="checkbox"/> Normal Code	<input type="checkbox"/> Malfunction Code (Code   )
	<b>2nd Time</b>	<input type="checkbox"/> Normal Code	<input type="checkbox"/> Malfunction Code (Code   )

### Problem Symptoms Table

Symptom	Suspect Area
ABS does not operate.	Only when 1~4 are all normal and the problem is still occurring, replace the HECU. 1. Check the DTC reconfirming that the normal code is output. 2. Power source circuit. 3. Speed sensor circuit. 4. Check the hydraulic circuit for leakage.
ABS does not operate intermittently.	Only when 1~4 are all normal and the problem is still occurring, replace the ABS actuator assembly. 1. Check the DTC reconfirming that the normal code is output. 2. Wheel speed sensor circuit. 3. Stop lamp switch circuit. 4. Check the hydraulic circuit for leakage.
Communication with GDS is not possible. (Communication with any system is not possible)	1. Power source circuit 2. CAN line
Communication with GDS is not possible. (Communication with ABS only is not possible)	1. Power source circuit 2. CAN line 3. HECU

When ignition key is turned ON (engine OFF), the ABS warning lamp does not light up.	1. ABS warning lamp circuit 2. HECU
Even after the engine is started, the ABS warning lamp remains ON.	1. ABS warning lamp circuit 2. HECU

**CAUTION**

During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.

**ABS Does Not Operate.****Detecting condition**

Trouble Symptoms	Possible Cause
Brake operation varies depending on driving conditions and road surface conditions, so diagnosis can be difficult. However if a normal DTC is displayed, check the following probable cause. When the problem is still occurring, replace the ABS control module.	<ul style="list-style-type: none"> <li>- Faulty power source circuit</li> <li>- Faulty wheel speed sensor circuit</li> <li>- Faulty hydraulic circuit for leakage</li> <li>- Faulty HECU</li> </ul>

**Inspection procedures****DTC Inspection**

1. Connect the GDS with the data link connector and turn the ignition switch ON.
2. Verify that the DTC code is output.
3. Is the DTC code output?

<b>NO</b>	► Check the power source circuit.
<b>YES</b>	► Erase the DTC and recheck using GDS.

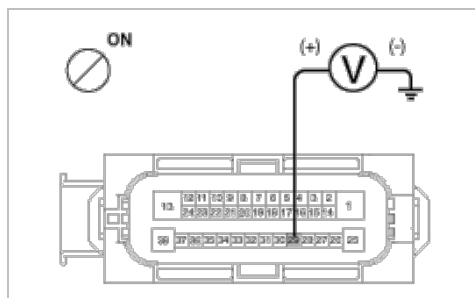
**Check the power source circuit**

1. Disconnect the connector from the ABS control module.
2. Turn the ignition switch ON, measure the voltage between terminal 29 of the ABS control module harness side connector and body ground.

**Specification:** approximately B+

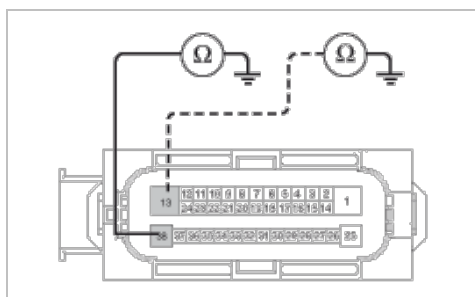
3. Is the voltage within specification?

<b>YES</b>	► Check the ground circuit.
<b>NO</b>	► Check the harness or connector between the fuse (10A) in the engine compartment junction block and the ABS control module. Repair if necessary.

**Check the ground circuit**

1. Disconnect the connector from the ABS control module.
2. Check for continuity between terminals 13, 38 of the ABS control module harness side connector and ground point.
3. Is there continuity?

<b>YES</b>	► Check the wheel speed sensor circuit.
<b>NO</b>	► Repair an open in the wire and ground point.



### Check the wheel speed sensor circuit

1. Refer to the DTC troubleshooting procedures.
2. Is it normal?

<b>YES</b>	► Check the hydraulic circuit for leakage.
<b>NO</b>	► Repair or replace the wheel speed sensor.

### Check the hydraulic circuit for leakage

1. Refer to the hydraulic lines.
2. Inspect leakage of the hydraulic lines.
3. Is it normal?

<b>YES</b>	► The problem is still occurring, replace the ABS control module.
<b>NO</b>	► Repair the hydraulic lines for leakage.

### ABS Does Not Operate (Intermittently).

#### Detecting condition

Trouble Symptoms	Possible Cause
Brake operation varies depending on driving conditions and road surface conditions, so diagnosis can be difficult. However if a normal DTC is displayed, check the following probable cause. When the problem is still occurring, replace the ABS control module.	<ul style="list-style-type: none"> <li>- Faulty power source circuit</li> <li>- Faulty wheel speed sensor circuit</li> <li>- Faulty hydraulic circuit for leakage</li> <li>- Faulty HECU</li> </ul>

### Inspection procedures

#### DTC Inspection

1. Connect the GDS with the data link connector and turn the ignition switch ON.
2. Verify that the DTC code is output.
3. Is the DTC code output?

<b>NO</b>	► Check the wheel speed sensor circuit.
<b>YES</b>	► Erase the DTC and recheck using GDS.

### Check the wheel speed sensor circuit

1. Refer to the DTC troubleshooting procedures.
2. Is it normal?

<b>YES</b>	► Check the stop lamp switch circuit.
<b>NO</b>	► Repair or replace the wheel speed sensor.

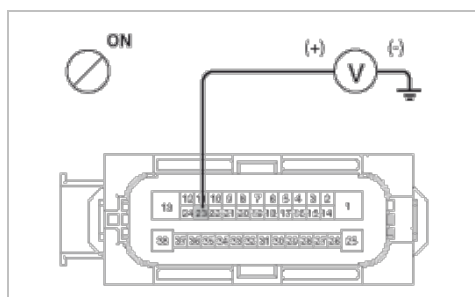
## Check the stop lamp switch circuit

1. Check that stop lamp lights up when brake pedal is depressed and turns off when brake pedal is released.
2. Measure the voltage between terminal 23 of the ABS control module harness side connector and body ground when brake pedal is depressed.

**Specification** : approximately B+

3. Is the voltage within specification?

<b>YES</b>	▶ Check the hydraulic circuit for leakage.
<b>NO</b>	▶ Repair the stop lamp switch. Repair an open in the wire between the ABS control module and the stop lamp switch.



## Check the hydraulic circuit for leakage

1. Refer to the hydraulic lines.
2. Inspection leakage of the hydraulic lines.
3. Is it normal?

<b>YES</b>	▶ The problem is still occurring, replace the ABS control module.
<b>NO</b>	▶ Repair the hydraulic lines for leakage.

**Communication with GDS is not possible.**  
(Communication with any system in not possible.)

## Detecting condition

Trouble Symptoms	Possible Cause
Possible defect in the power supply system (including ground) for the diagnosis line.	<ul style="list-style-type: none"> <li>- An open in the wire</li> <li>- Poor ground</li> <li>- Faulty power source circuit</li> </ul>

## Inspection procedures

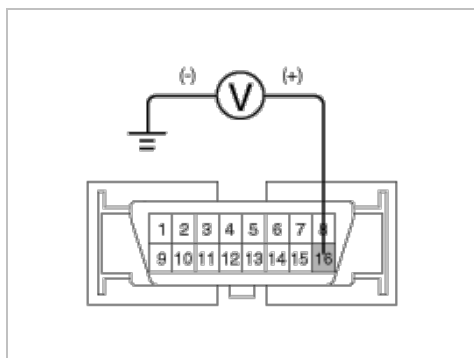
### Check The Power Supply Circuit For The Diagnosis

1. Measure the voltage between terminal 16 of the data link connector and body ground.

**Specification** : approximately B+

2. Is voltage within specification?

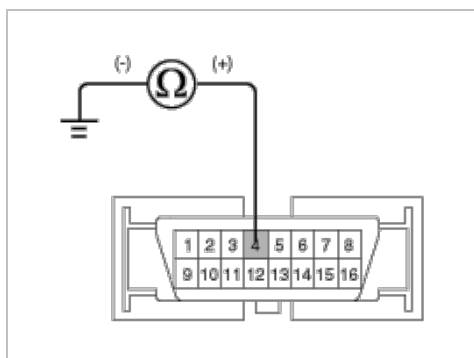
<b>YES</b>	▶ Check the ground circuit for the diagnosis.
<b>NO</b>	▶ Repair an open in the wire. Check and replace fuse from the engine compartment junction block.



### Check the ground circuit for the diagnosis

1. Check for continuity between terminal 4 of the data link connector and body ground.
2. Is there continuity?

<b>NO</b>	► Repair an open in the wire between terminal 4 of the data link connector and ground point.
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**Communication with GDS is not possible.**  
(Communication with ABS only is not possible.)

### Detecting condition

Trouble Symptoms	Possible Cause
When communication with GDS is not possible, the cause may be probably an open in the HECU power circuit or an open in the diagnosis output circuit.	<ul style="list-style-type: none"> <li>- An open in the wire</li> <li>- Faulty HECU</li> <li>- Faulty power source circuit</li> </ul>

### Inspection procedures

#### Check for Continuity in the CAN Line

1. Disconnect the connector from the ABS control module.
2. Check for continuity between terminals 26, 14 of the ABS control module connector and 3, 11 of the data link connector.
3. Is there continuity?

<b>YES</b>	► Check the power source of ABS control module.
<b>NO</b>	► Repair an open in the wire.

### Check the power source of ABS control module

1. Disconnect the connector from the ABS control module.
2. Turn the ignition switch ON, measure the voltage between terminal 29 of the ABS control module harness side connector and body ground.

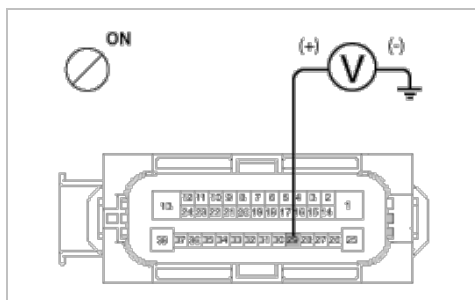
**Specification :** approximately B+

3. Is voltage within specification?

<b>YES</b>	► Check for poor ground.
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**NO**

► Check the harness or connector between the fuse (10A) in the engine compartment junction block and the ABS control module. Repair if necessary.



### Check for poor ground

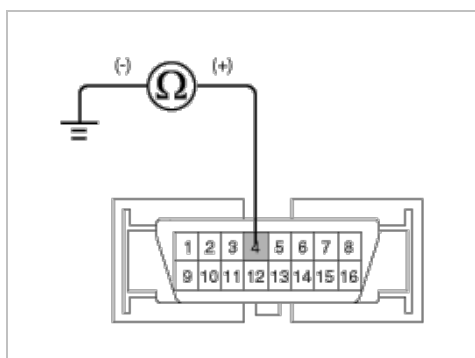
1. Check for continuity between terminal 4 of the data link connector and ground point.

**YES**

► Replace the ABS control module and recheck.

**NO**

► Repair an open in the wire or poor ground



**When Ignition Key Is Turned ON (engine OFF), The ABS Warning Lamp Does Not Light Up.**

### Detecting condition

Trouble Symptoms	Possible Cause
When current flows in the HECU the ABS warning lamp turns from ON to OFF as the initial check. Therefore if the lamp does not light up, the cause may be an open in the lamp power supply circuit, a blown bulb, an open in the both circuits between the ABS warning lamp and the HECU, and the faulty HECU.	<ul style="list-style-type: none"> <li>- Faulty ABS warning lamp bulb</li> <li>- Blown fuse is related to ABS in the engine compartment junction block</li> <li>- Faulty ABS warning lamp module</li> <li>- Faulty HECU</li> </ul>

### Inspection procedures

#### Problem verification

1. Disconnect the connector from the ABS control module and turn the ignition switch ON.
2. Does the ABS warning lamp light up?

**YES**

► Inspect again after replacing the ABS HECU.

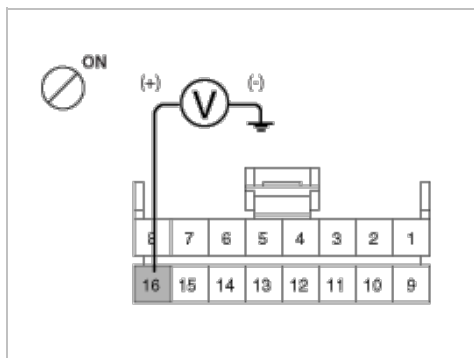
**NO**

► Check the power source for the ABS warning lamp.

### Check the power source for the ABS warning lamp

1. Disconnect the instrument cluster connector (M01-C) and turn the ignition switch ON.
2. Measure the voltage between terminal (M01-C) 16 of the cluster harness side connector and body ground.

**Specification** : approximately B+



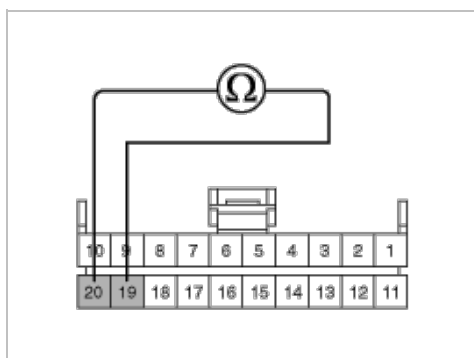
3. Is voltage within specification?

<b>YES</b>	▶ Check the CAN circuit resistance for ABS warning lamp.
<b>NO</b>	▶ Check for blown fuse.

### Check the CAN circuit resistance for ABS warning lamp

1. Disconnect the instrument cluster connector (M01-A) and turn the ignition switch OFF.
2. Measure the resistance between terminal (M01-A) 20 and 19 of the cluster harness side connector.

**Specification : 60Ω**



3. Is resistance within specification?

<b>YES</b>	▶ Repair ABS warning lamp bulb or instrument cluster assembly.
<b>NO</b>	▶ Check the CAN circuit wiring for ABS warning lamp.

### Check the CAN circuit wiring for ABS warning lamp

1. Disconnect the instrument cluster connector (M01-A) and ABS HECU connector, and then turn the ignition switch OFF.
2. Check for continuity between terminal (M01-A) 20 of the cluster harness side connector and terminal 26 of ABS HECU harness side.  
Check for continuity between terminal (M01-A) 19 of the cluster harness side connector and terminal 14 of ABS HECU harness side.

**Specification : Below 1Ω**

3. Is resistance within specification?

<b>YES</b>	▶ Repair short of wiring between terminal 26, 14 of ABS HECU harness connector and ABS warning lamp module.
<b>NO</b>	▶ Repair open of wiring between terminal 26, 14 of ABS HECU harness connector and ABS warning lamp module.

**Even After The Engine Is Started, The ABS Warning Lamp Remains ON.**

#### Detecting condition

Trouble Symptoms	Possible Cause
If the HECU detects trouble, it lights the ABS warning lamp while at the same time prohibiting ABS control. At this time, the HECU records a	- An open in the wire



DTC in memory. Even though the normal code is output, the ABS warning lamp remains ON, then the cause may be probably an open or short in the ABS warning lamp circuit.

- Faulty instrument cluster assembly
- Faulty ABS warning lamp module
- Faulty HECU

## Inspection procedures

### Check DTC Output

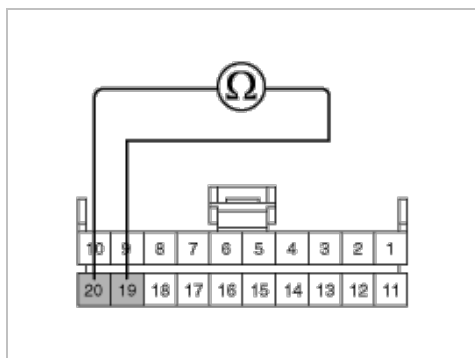
1. Connect the GDS to the 16P data link connector located behind the driver's side kick panel.
2. Check the DTC output using GDS.
3. Is DTC output?

<b>YES</b>	▶ Perform the DTC troubleshooting procedure (Refer to DTC troubleshooting).
<b>NO</b>	▶ Check the CAN circuit resistance for ABS warning lamp.

### Check the CAN circuit resistance for ABS warning lamp

1. Disconnect the instrument cluster connector (M01-A) and turn the ignition switch OFF.
2. Measure the resistance between terminal (M01-A) 20 and 19 of the cluster harness side connector.

**Specification : 60Ω**



3. Is resistance within specification?

<b>YES</b>	▶ Repair ABS warning lamp bulb or instrument cluster assembly.
<b>NO</b>	▶ Check the CAN circuit wiring for ABS warning lamp.

### Check the CAN circuit wiring for ABS warning lamp

1. Disconnect the instrument cluster connector (M01-A) and ABS HECU connector, and then turn the ignition switch OFF.
2. Check for continuity between terminal (M01-A) 20 of the cluster harness side connector and terminal 26 of ABS HECU harness side. Check for continuity between terminal (M01-A) 19 of the cluster harness side connector and terminal 14 of ABS HECU harness side.

**Specification : Below 1Ω**

3. Is resistance within specification?

<b>YES</b>	▶ Repair short of wiring between terminal 26, 14 of ABS HECU harness connector and ABS warning lamp module.
<b>NO</b>	▶ Repair open of wiring between terminal 26, 14 of ABS HECU harness connector and ABS warning lamp module.

## 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. Remove the reservoir cap and fill the brake reservoir with brake fluid.

### CAUTION

If there is any brake fluid on any painted surface, wash it off immediately.

### NOTE

When pressure bleeding, do not depress the brake pedal.  
Recommended fluid..... DOT3 or DOT4

2. 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.
3. Connect the GDS to the data link connector located underneath the dash panel.
4. Select and operate according to the instructions on the GDS screen.

**CAUTION**

You must obey the maximum operating time of the ABS motor with the GDS to prevent the motor pump from burning.

- (1) Select vehicle name.
- (2) Select Anti-Lock Brake system.
- (3) Select HCU air bleeding mode.

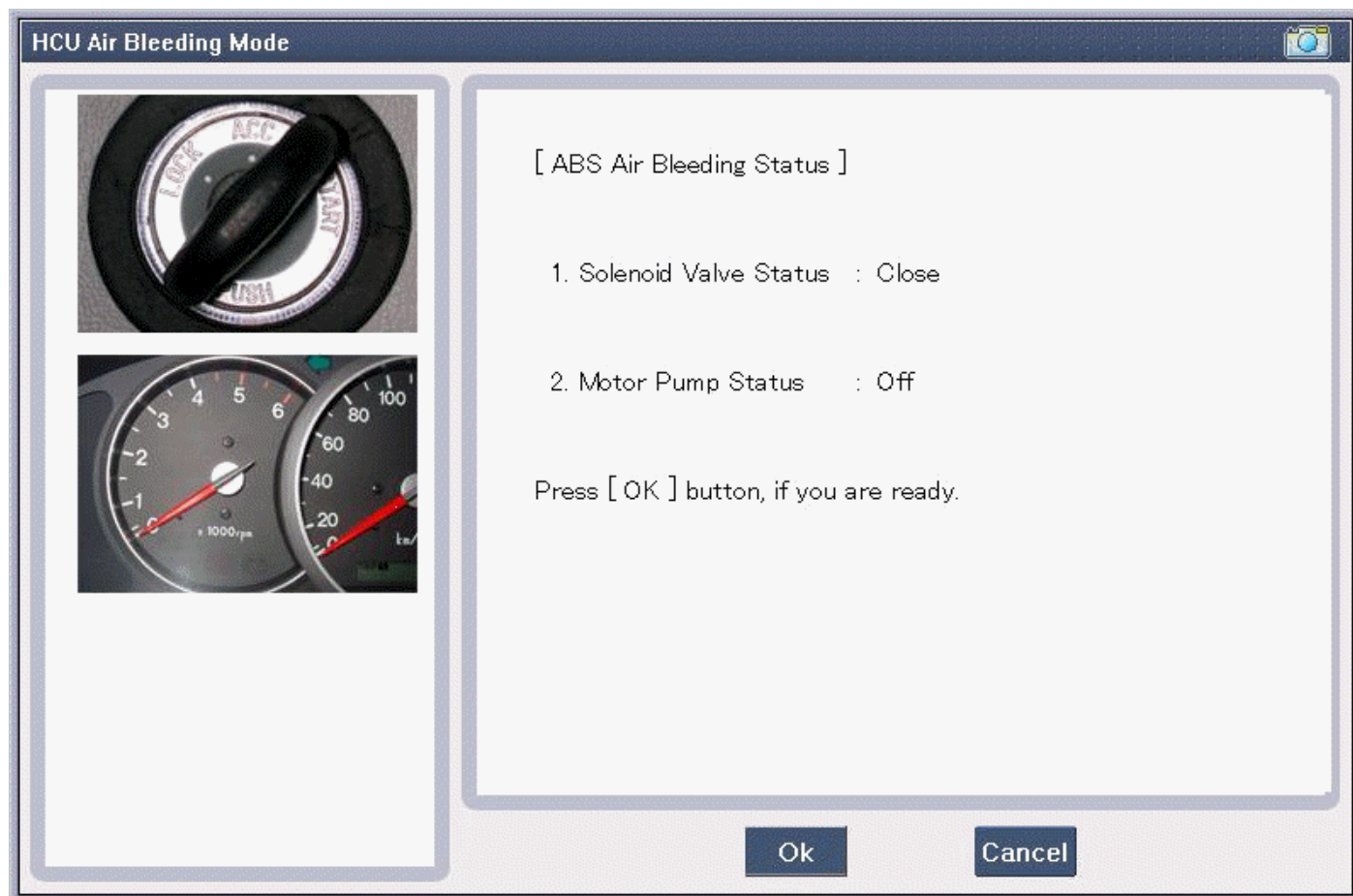
**ID Register**

➔ System Identification

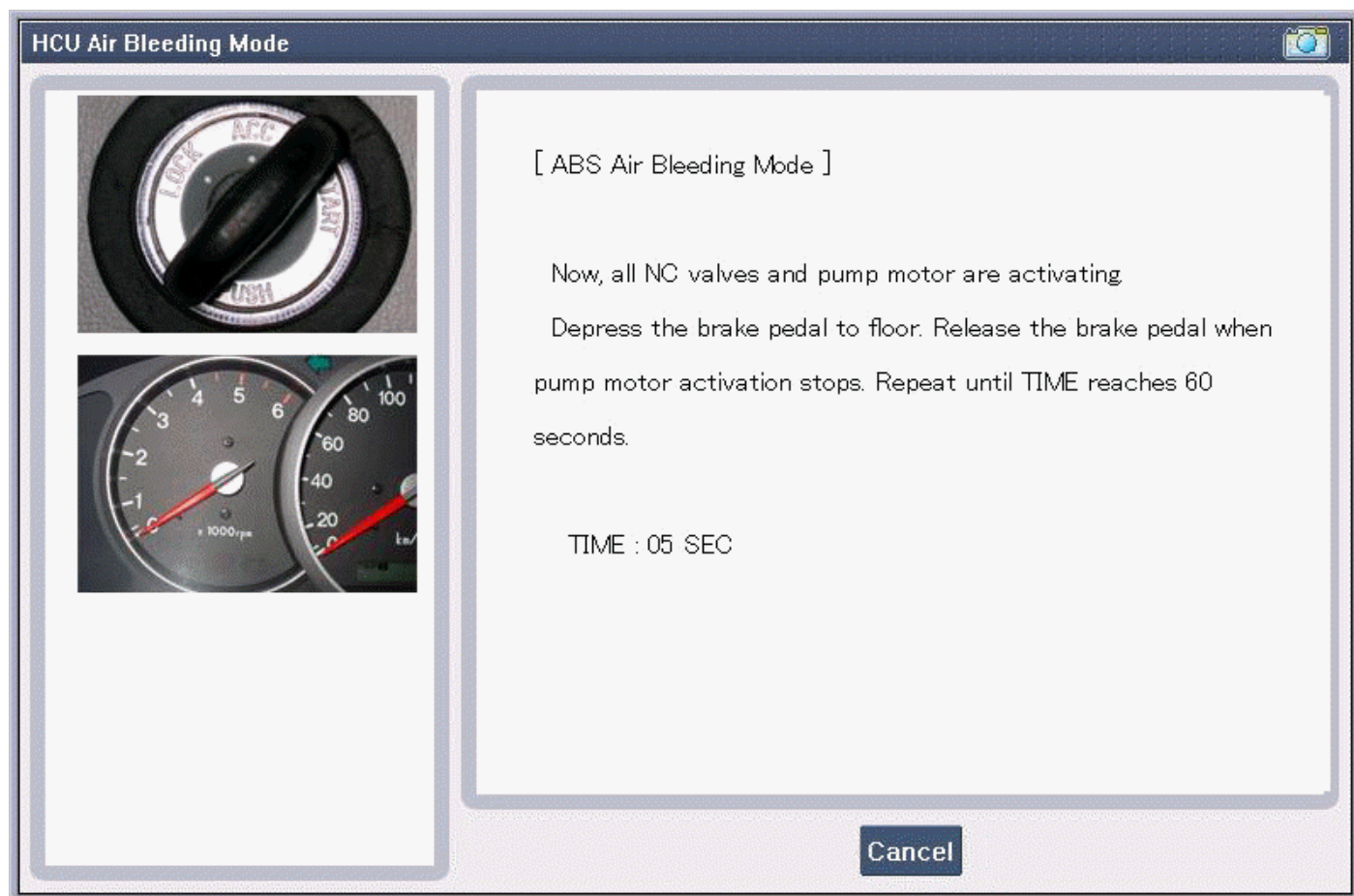
**Inspection / Test**

➔ HCU Air Bleeding Mode

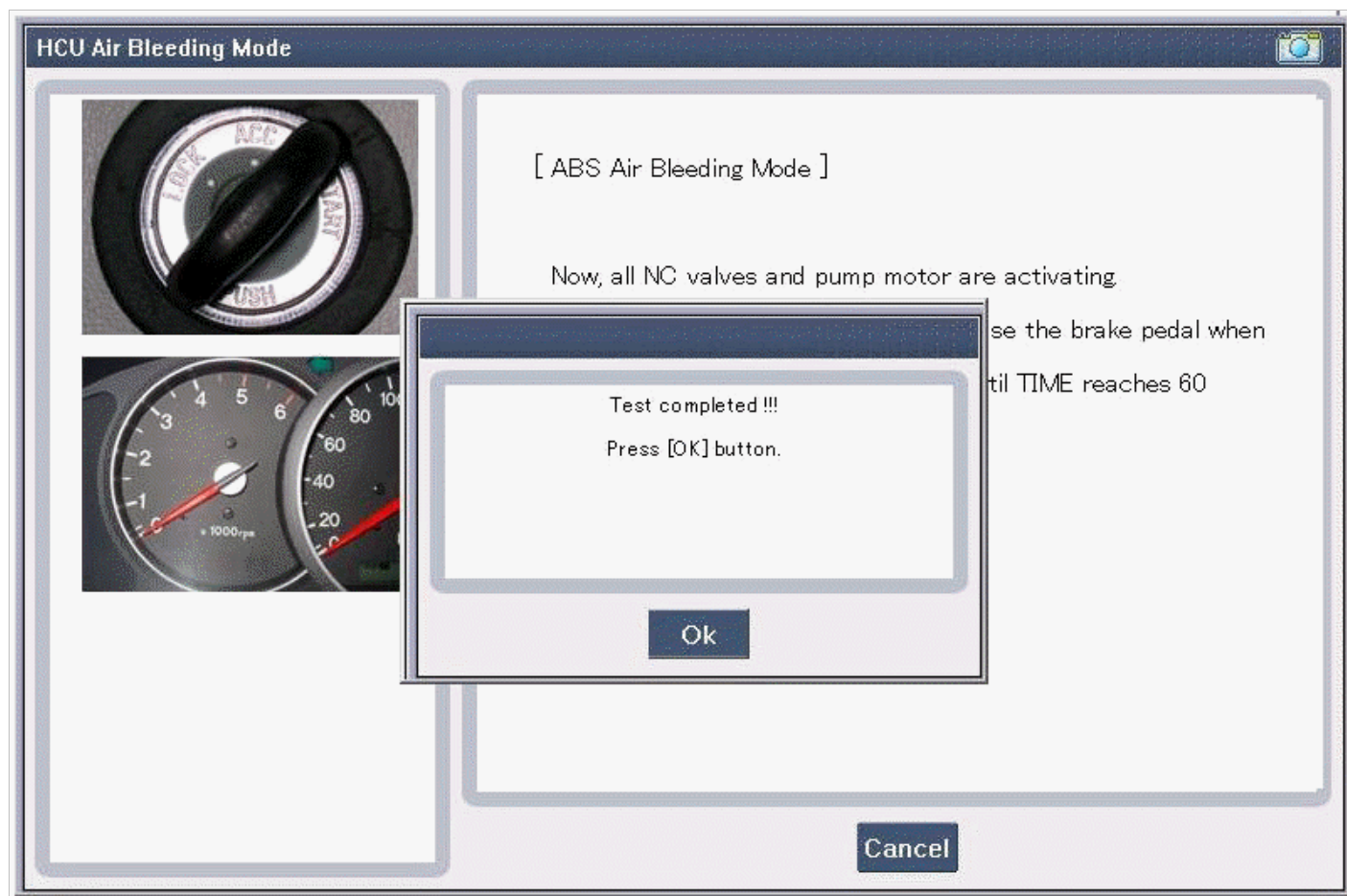
(4) Press "OK" to operate motor pump and solenoid valve.



(5) Wait 60 sec. before operating the air bleeding.  
(If not, you may damage the motor.)

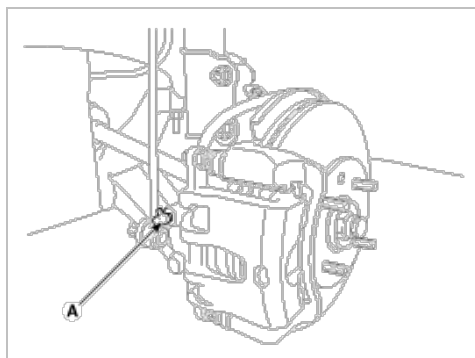


(6) Perform the air bleeding.

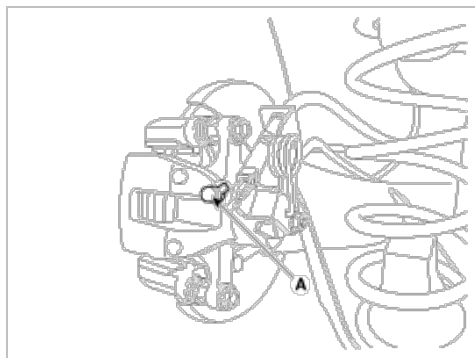


5. Pump the brake pedal several times, and then loosen the bleeder screw until fluid starts to run out without bubbles. Then close the bleeder screw(A).

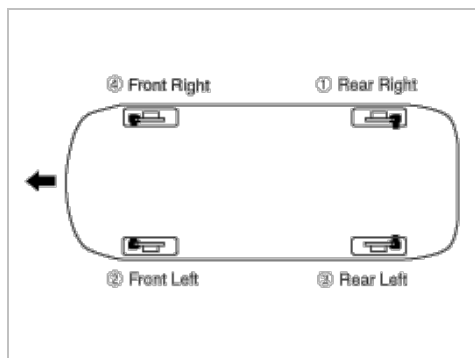
#### Front



#### Rear



6. Repeat step 5 until there are no more bubbles in the fluid for each wheel.



7. Tighten the bleeder screw.

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**Bleed screw tightening torque:**

7 ~ 13 N.m (0.7 ~ 1.3 kgf.m, 5.4 ~ 9.5 lb-ft)

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