Specifications

Item		Specifications
Transmission type		A8LR1
Engine model		Gasoline 3.8
Torque converter type		3-element, 1-stage, 2-phase type
Oil pump system		Internal gear type
Friction elements		Clutch: 4EA
		Brake: 2EA
		OWC : 1EA
Planetary gear		3EA
Gear ration	1st	3.665
	2nd	2.396
	3rd	1.610
	4th	1.190
	5th	1.000
	6th	0.826
	7th	0.643
	8th	0.556
	Reverse	2.273
Final gear ratio		3.909
Accumulator		6EA
Solenoid valve		9EA (*VFS: 2EA, Direct control SOL: 6EA., ON/OFF: 1EA)
Shift lever position		4 Range (P,R,N,D)
Oil filter		1EA

* VFS: Variable Force Solenoid

Sensors

Input Speed Sensor
▹ Type: Hall effect sensor
▹ Specifications

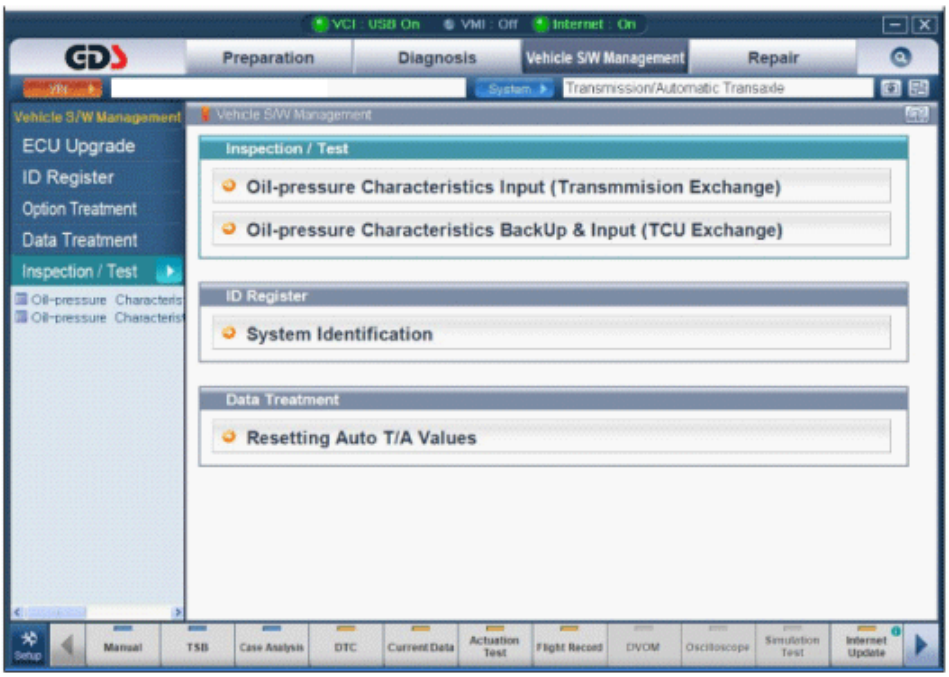
Operation condition (°C)°F		((-)40 ~ 150)) -40 ~ 302
Air gap(mm)in.		1.3(0.0512)
Output voltage (V)	High	1.4
	Low	0.7

Middle Speed Sensor
▹ Type: Hall effect sensor
▹ Specifications

Operation condition (°C)°F		((-)40 ~ 150)) -40 ~ 302
Air gap(mm)in.		1.3(0.0512)
Output voltage (V)	High	1.4
	Low	0.7

Output Speed Sensor
▹ Type: Hall effect sensor
▹ Specifications

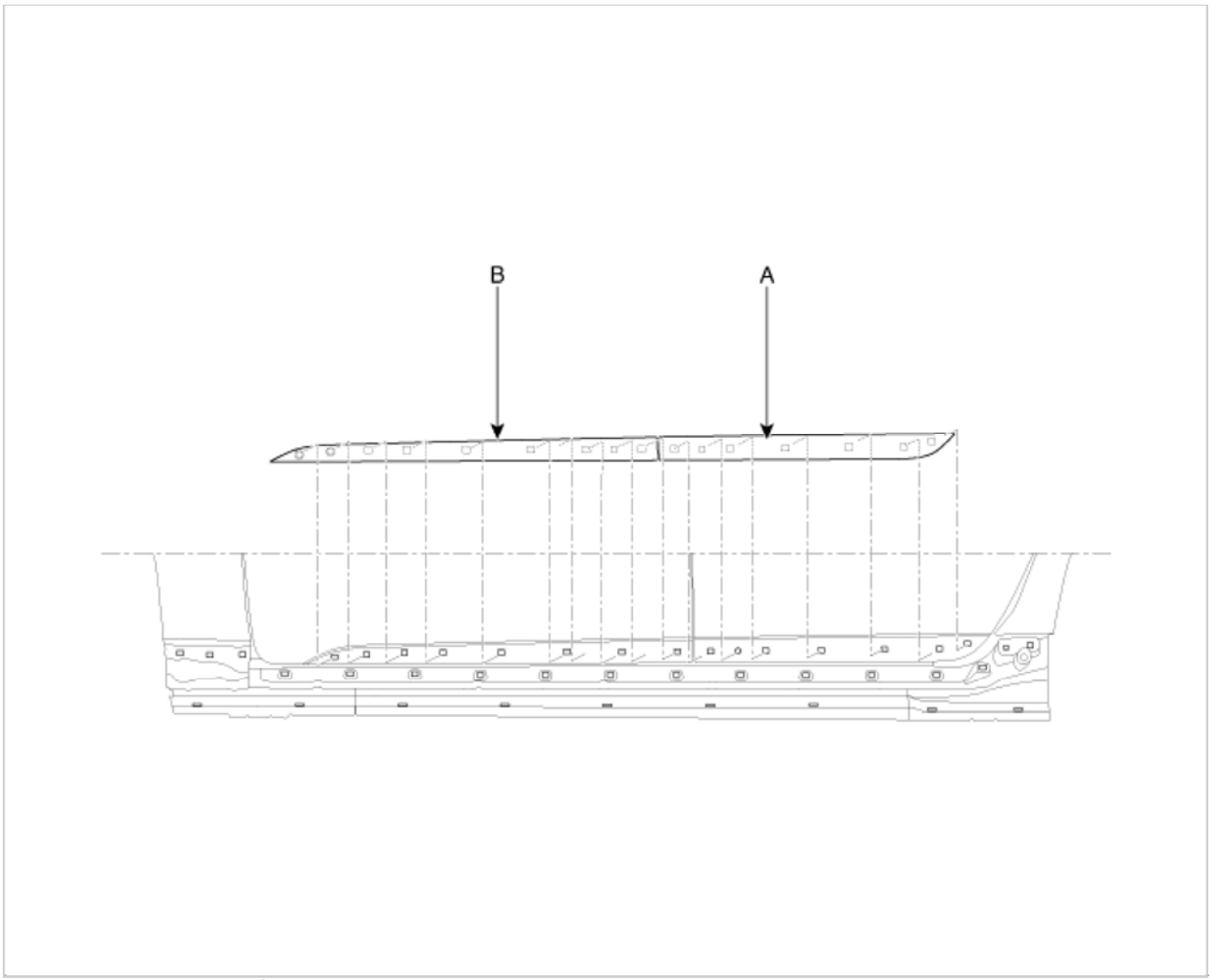
Operation condition (°C)°F		((-)40 ~ 150)) -40 ~ 302
Air gap(mm)in.		1.3(0.0512)
Output voltage (V)	High	1.4
	Low	0.7



Information

If you can not access the internet, record the bar code data (oil pressure characteristics) on the automatic transmission case and then input it manually onto the GDS.

(2) Perform the TCM adaptive values learning procedure using the GDS.
(Refer to Automatic Transmission Control System - "Repair procedures")



3. Install in the reverse order of removal.

Information

- Replace any damaged clips.

Replacement

CAUTION

- Put on gloves to protect your hands.

NOTICE

- When prying with a flat-tip screwdriver, wrap it with protective tape, and apply protective tape around the related parts, to prevent damage.
- Take care not to scratch the body surface.

1. Loosen the side sill moulding mounting screws.
2. Using a screwdriver or ornament remover, remove the side sill moulding (A).

1. Front seat cushion track	

Body (Interior and Exterior)

Replacement

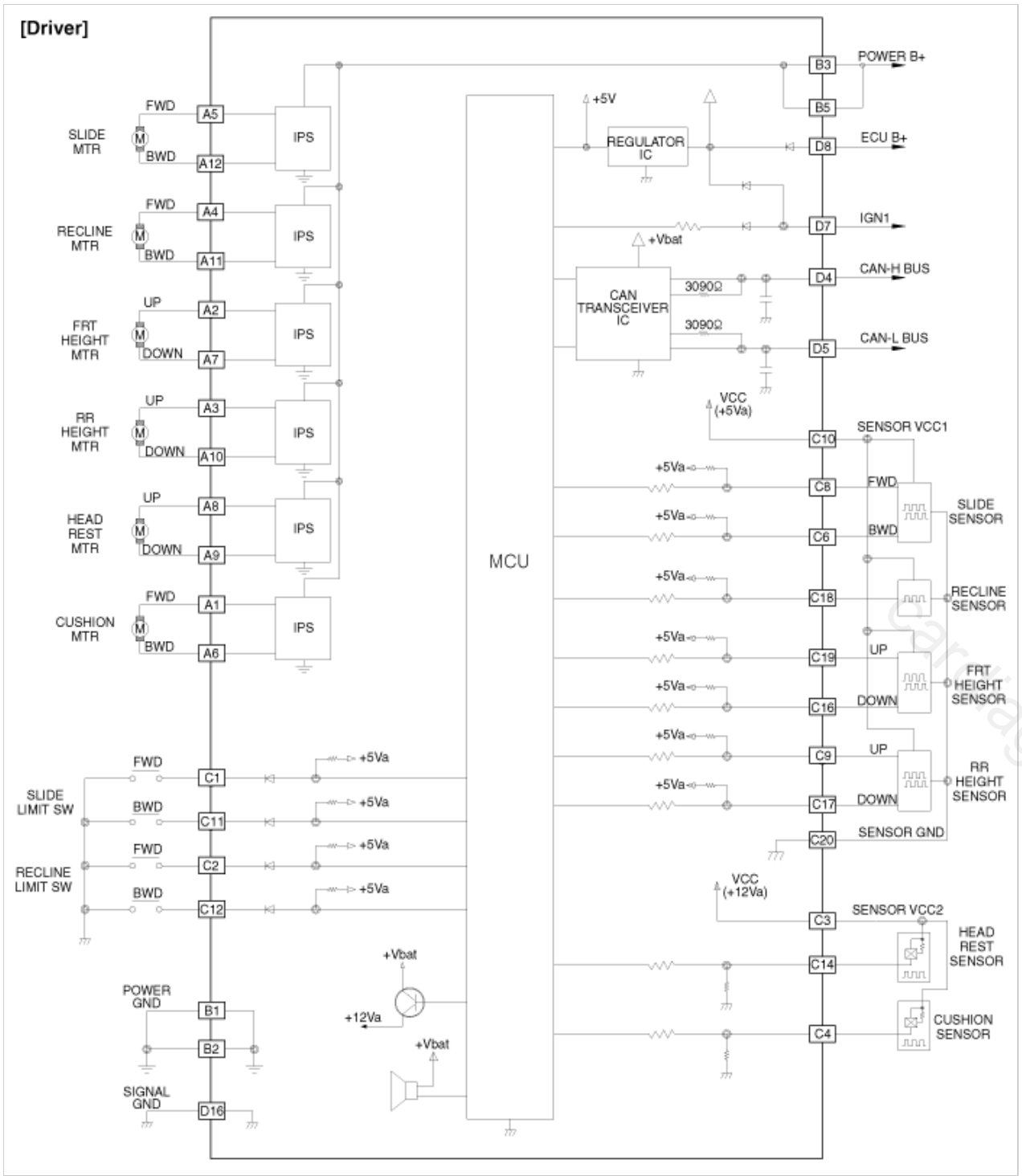
CAUTION

- Put on gloves to protect your hands.

NOTICE

- When prying with a flat-tip screwdriver, wrap it with protective tape, and apply protective tape around the related parts, to prevent damage.
- Use a plastic panel removal tool to remove interior trim pieces to protect from damaging the surface.
- Take care not to bend or scratch the trim and panels.

1. Remove the front seat assembly.
   (Refer to Front Seat - "Front Seat Assembly")


[Driver]
SLIDE MTR
RECLINE MTR
FRT HEIGHT MTR
RR HEIGHT MTR
HEAD REST MTR
CUSHION MTR
FWD
BWD
UP
DOWN
A5
A12
A4
A11
A2
A7
A3
A10
A8
A9
A1
A6
IPS
MCU
SLIDE LIMIT SW
RECLINE LIMIT SW
C1
C11
C2
C12
+5Va
POWER GND
SIGNAL GND
B1
B2
D16
+Vbat
+12Va
+5V
REGULATOR IC
CAN TRANSCEIVER IC
3090Ω
VCC (+5Va)
VCC (+12Va)
B3
B5
D8
D7
D4
D5
C10
C8
C6
C18
C19
C16
C9
C17
C20
C3
C14
C4
POWER B+
ECU B+
IGN1
CAN-H BUS
CAN-L BUS
SENSOR VCC1
SENSOR VCC2
SENSOR GND
SLIDE SENSOR
RECLINE SENSOR
FRT HEIGHT SENSOR
RR HEIGHT SENSOR
HEAD REST SENSOR
CUSHION SENSOR

(5) When using the outside hand switch to open the trunk, the initialization is completed with a buzzer sound.

NOTICE

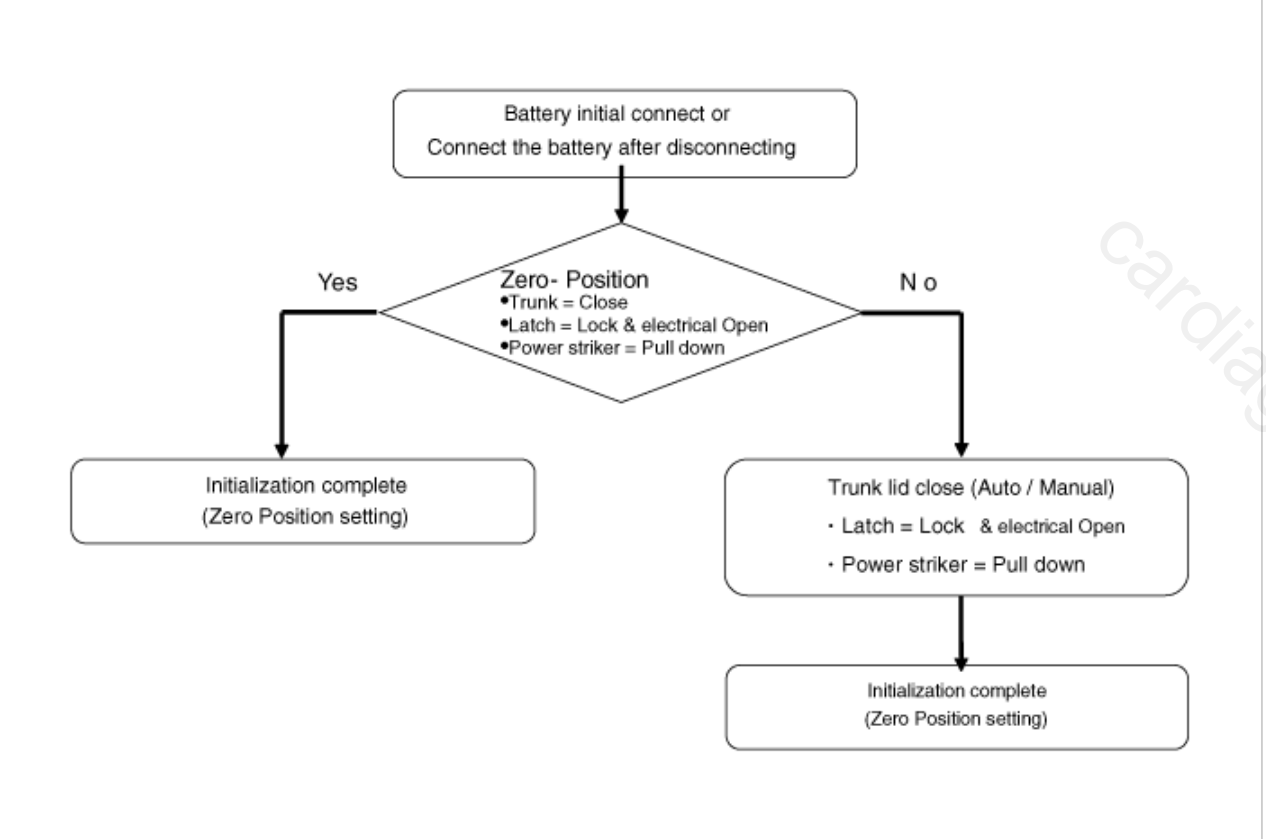
1. You should not stop the trunk when saving the parameter values. Ensure that the parameter values can be saved by power opening and closing based on PTM (Power Trunk Module) control.
2. The safety function is on while the parameter value is being saved.
3. Once the parameter value is saved, the value will not be deleted even though the battery is discharged and you will not have to do the saving process again after charging the battery.
4. If you do the saving process again after saving a parameter value, a new parameter value is saved in the power trunk module.

Power Trunk module Initialization

If the battery is removed and then installed again, the current trunk location information is deleted. You have to carry out the initialization process.

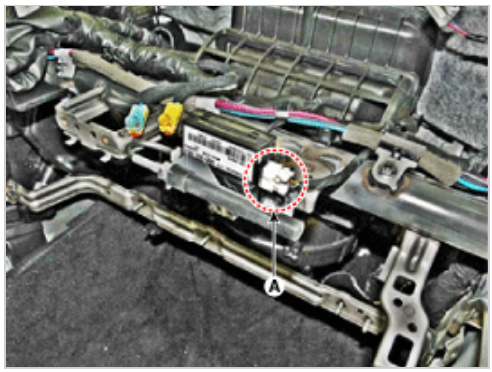
The power trunk module recognizes the trunk closing location and latch locking as the zero position. So carry out the initialization process as in the following.

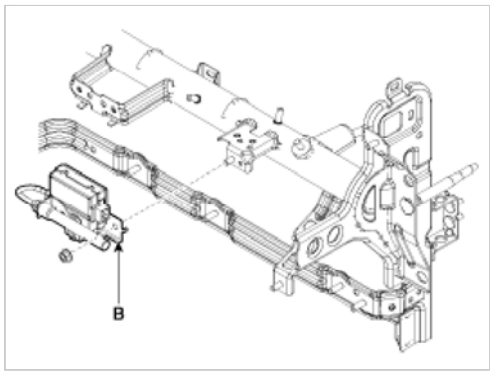
Initialization Procedure



Component Location

3. Remove the RF receiver (B) after disconnecting the connector (A) and loosening the mounting nut.





Installation

1. Install the RF receiver after connecting the connector.
2. Install the glove box housning.
3. Connect the negative (-) battery terminal.

Body Electrical System

Inspection

Self Diagnosis With GDS

Smart key system defects can be quickly diagnosed with the GDS. GDS operates actuator quickly to monitor, input/output value and self diagnosis.

The following three features will be major problem in SMART KEY system.

1. Problem in SMART KEY unit input.
2. Problem in SMART KEY unit.
3. Problem in SMART KEY unit output.

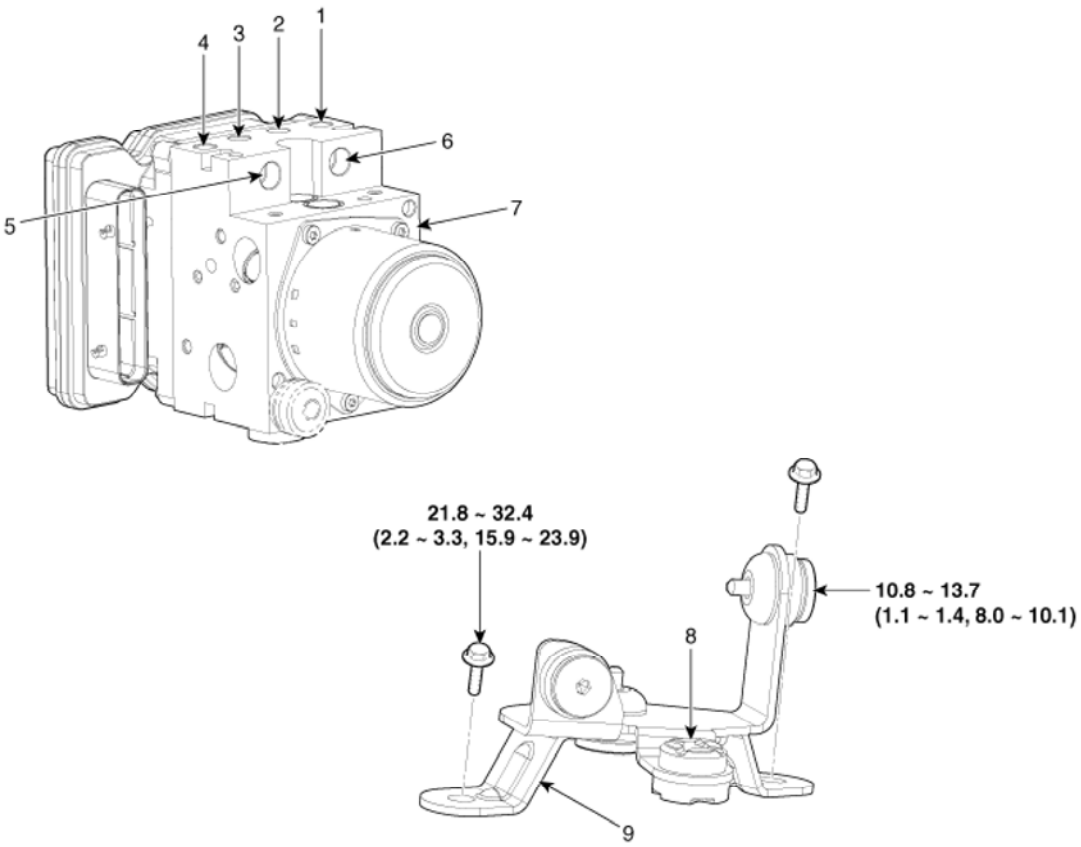
The following three diagnostic solutions will be the main solution process to a majority of concerns.

1. SMART KEY unit Input problem : switch diagnosis
2. SMART KEY unit problem : communication diagnosis
3. SMART KEY unit Output problem : antenna and switch output diagnosis

Switch Diagnosis

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.
2. Select the vehicle model and then SMART KEY system.

[Premium]



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

1. Front - left tube	6. MC1
2. Rear - right tube	7. ESP control module (HECU)
3. Rear - left tube	8. Damper
4. Front - right tube	9. Bracket
5. MC2	

Brake System

Removal

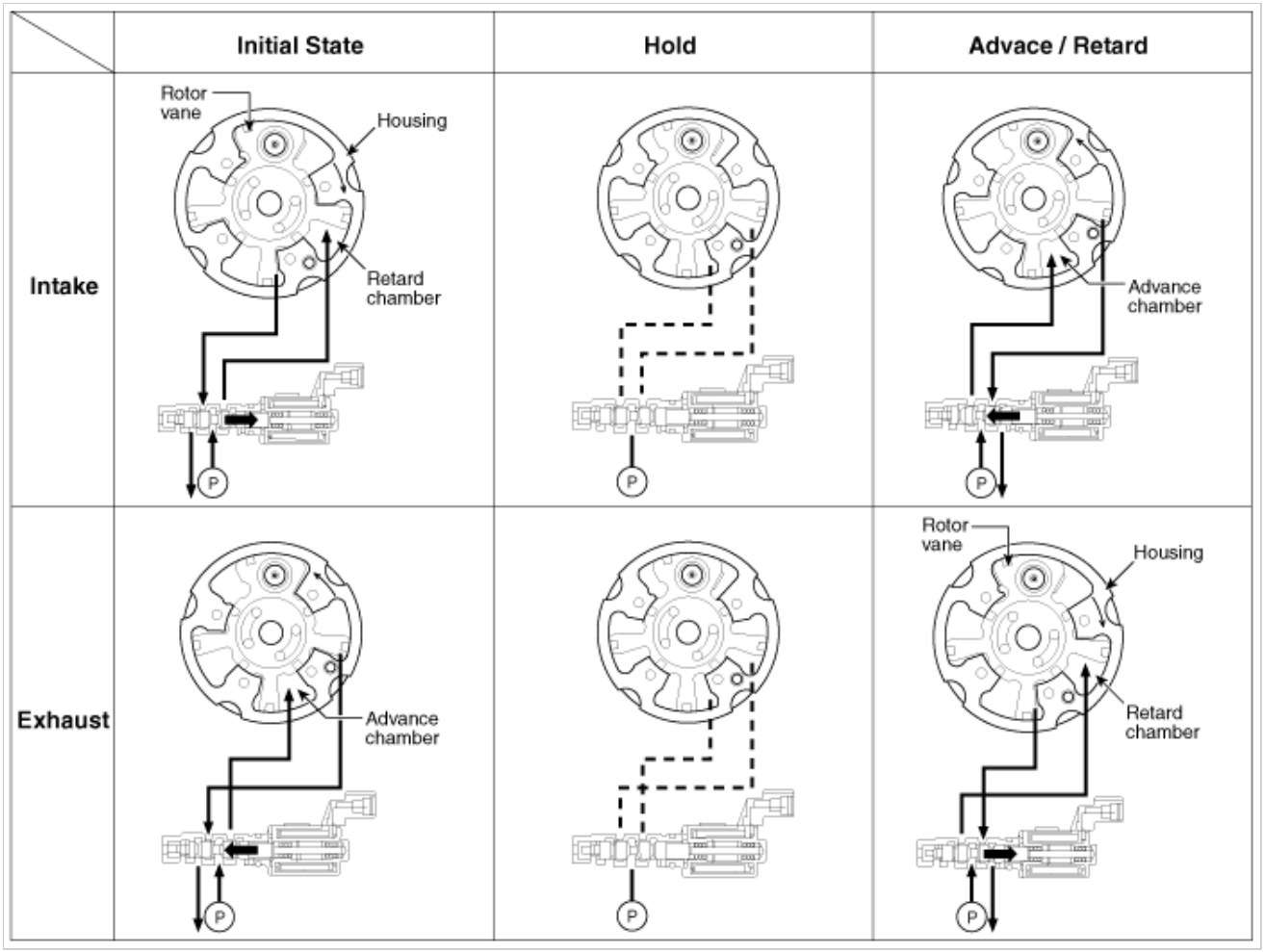
1. Turn ignition switch OFF and disconnect the negative (-) battery cable
2. Remove the Engine room fuse & relay box (B) after removing the cover (A).

3. Disconnect the brake tubes from the HECU by unlocking the nuts counterclockwise with a wrench.

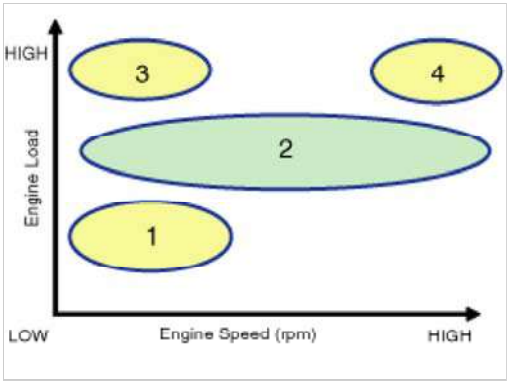
Tightening torque:

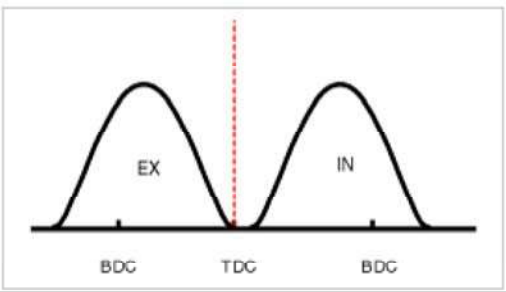
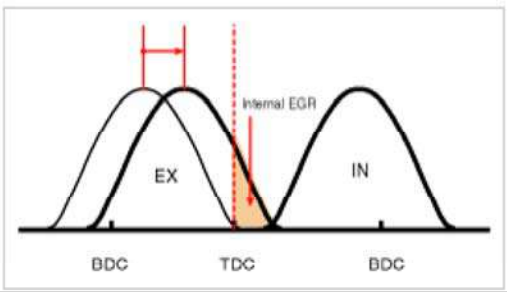
A : 11.8 ~ 15.7 N.m (1.2 ~ 1.6 kgf.m, 8.7 ~ 11.6 lb-ft)

B : 18.6 ~ 22.6 N.m (1.9 ~ 2.3 kgf.m, 13.7 ~ 16.6 lb-ft)



[CVVT System Mode]



(1) Low Speed / Low Load	(2) Part Load
	
(3) Low Speed / High Load	(4) High Speed / High Load

Installation

1. Install in the reverse order of removal.

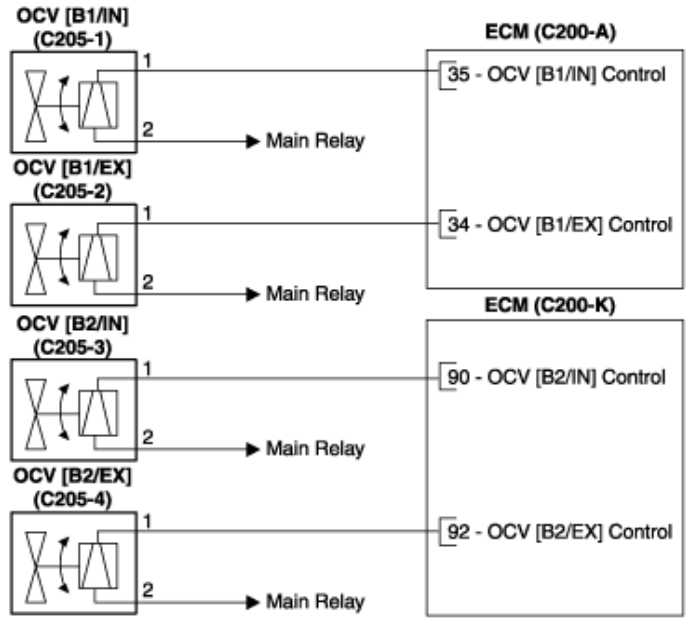
Engine Control/Fuel System

Description

The fuel pump control module (FPCM) is installed on the right side of the trunk compartment. It controls the BLDC (Brushless DC) motor mounted inside the variable low pressure fuel pump. This module compares the target fuel pressure data received from the ECM to the current fuel pressure measured by the fuel pressure sensor (FPS) and, based on the data from the FPS, controls the 3-phase duty function of the low pressure fuel pump to generate the target pressure.

Operation

[Circuit Diagram]



[Connection Information]

OCV [Bank 1/Intake] (C205-1)

Terminal	Connected to	Function
1	ECM C200-A (35)	OCV [B1/IN] Control
2	Main Relay	Battery Power (B+)

OCV [Bank 1/Exhaust] (C205-2)

Terminal	Connected to	Function
1	ECM C200-A (34)	OCV [B1/EX] Control
2	Main Relay	Battery Power (B+)

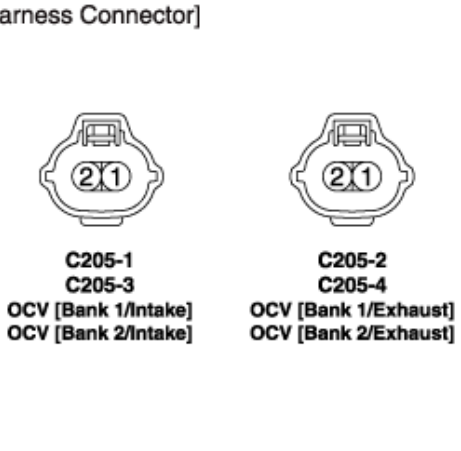
OCV [Bank 2/Intake] (C205-3)

Terminal	Connected to	Function
1	ECM C200-K (90)	OCV [B2/IN] Control
2	Main Relay	Battery Power (B+)

OCV [Bank 2/Exhaust] (C205-4)

Terminal	Connected to	Function
1	ECM C200-K (92)	OCV [B2/EX] Control
2	Main Relay	Battery Power (B+)

[Harness Connector]



Engine Control/Fuel System

Inspection

1. Turn the ignition switch OFF.
2. Disconnect the OCV connector.
3. Measure resistance between the OCV terminals 1 and 2.
4. Check that the resistance is within the specification.

Specification: Refer to “Specification”

Removal

[CVVT Oil Control Valve (Bank 1)]

1. Turn ignition switch OFF and disconnect the negative (-) battery terminal.
2. Disconnect the CVVT oil control valve connector (A-Intake) and (B-Exhaust).
3. Remove the mounting bolt, and then remove the valve from the engine.

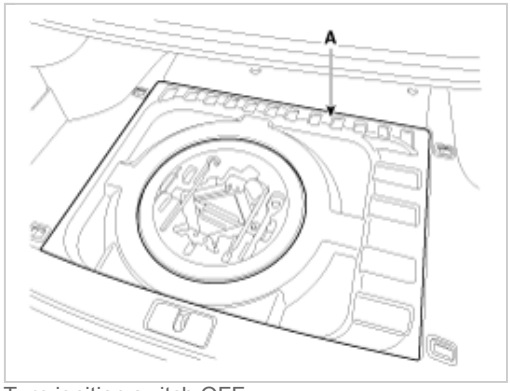
- For the vehicle equipped with a battery sensor, be careful not to damage the battery sensor when the battery is replaced or recharged.

1. When replacing the battery, it should be same one (type, capacity and brand) that is originally installed on your vehicle. If a battery of a different type is replaced, the battery sensor may recognize the battery to be abnormal.
2. When installing the ground cable on the negative post of battery, tighten the clamp with specified torque. An excessive tightening torque can damage the PCB internal circuit and the battery terminal .
3. When recharging the battery, ground the negative terminal of the booster battery to the vehicle body.

Engine Electrical System

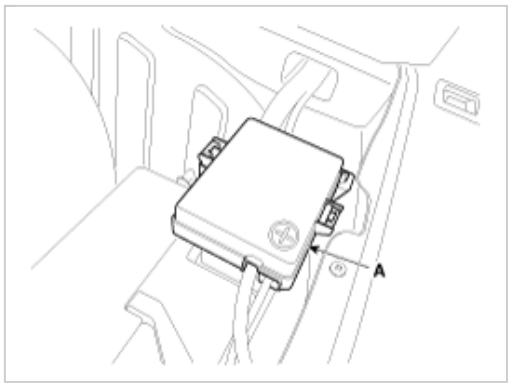
Removal

1. Open the trunk.
2. Remove the luggage under cover (A).



3. Turn ignition switch OFF.
4. Disconnect the battery sensor connector (A) and disconnect the negative (-) battery terminal.

5. Open the battery positive (+) terminal cover (A).



6. Remove the mounting nut (A) and disconnect the starting signal connector (B).
7. Dissconnect the battery positive (+) cable (C).

(6) Install the water vent hose to the timing chain cover.
(7) The firing and/or blow out test should not be performed within 30 minutes after the timing chain cover was assembled.

2. Install the water pump.
   (Refer to Cooling System - "Water Pump")
3. Install the crankshaft damper pulley.
   (Refer to Timing System - "Crankshaft Damper Pulley")
4. Install the oil filter body.
   (Refer to Lubrication System - "Oil Filter Body")
5. Install the drive belt auto tensioner.
   (Refer to Timing System - "Drive Belt Tensioner")
6. Install the idler.
   (Refer to Timing System - "Idler")
7. Install the drive belt.
   (Refer to Timing System - "Drive Belt")
8. Install the LH/RH cylinder head cover.
   (Refer to Cylinder Head Assembly - "Cylinder Head Cover")
9. Install the intake manifold.
   (Refer to Intake And Exhaust System - "Intake Manifold")
10. Install the surge tank.
    (Refer to Intake And Exhaust System - "Surge Tank")
11. Install the air cleaner assembly.
    (Refer to Intake And Exhaust System - "Air Cleaner")
12. Refill the coolant.
    (Refer to Cooling System - "Coolant")
13. Install the lower oil pan.
    (Refer to Lubrication System - "Oil Pan")

NOTICE

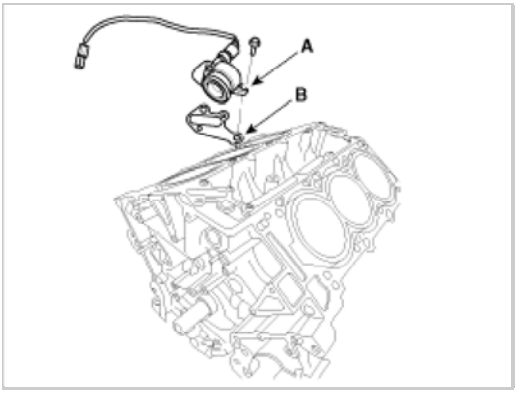
- Refill engine oil.
- Refill radiator and reservoir tank with engine coolant.
- Bleed air from the cooling system.
  - Start engine and let it run until it warms up. (Until the radiator fan operates 3 or 4 times.)
  - Turn Off the engine and let it cool down. Check the level in the radiator, add coolant if needed. This will allow trapped air to be removed from the cooling system.
  - Put radiator cap on tightly, then run the engine again and check for leaks.
- Clean the battery posts and cable terminals with sandpaper. Assemble and then apply grease to prevent corrosion.
- Inspect for fuel leakage.
  - After assembling the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.
  - Repeat this operation two or three times, then check for fuel leakage at any point in the fuel lines.

Components

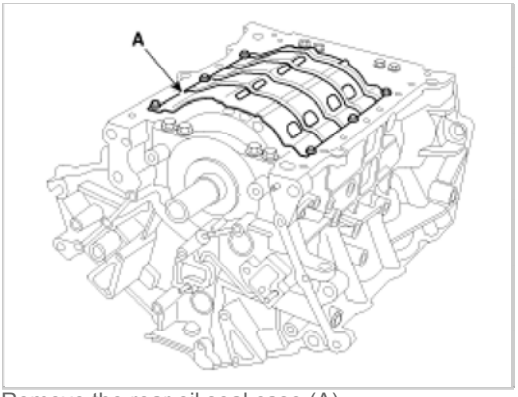
Information

- Mark all wiring and hoses to avoid misconnection.
- Inspect the timing chain before removing the cylinder head.
- Turn the crankshaft pulley so that the No.1 piston is at top dead center.

1. Remove the engine assembly from the vehicle.
   (Refer to Engine And Transaxle Assembly - "Engine And Transaxle Assembly")
2. Remove the drive plate and adapter plate.
   (Refer to Cylinder Block - "Drive Plate")
3. Attach the engine to engine stand for disassembly.
4. Remove the exhaust manifold.
   (Refer to Intake And Exhaust System - "Exhaust Manifold")
5. Remove the intake manifold.
   (Refer to Intake And Exhaust System - "Intake Manifold")
6. Remove the timing chain.
   (Refer to Timing System - "Timing Chain")
7. Remove the water temperature control assembly.
   (Refer to Cooling System - "Water Temperature Control Aassembly")
8. Remove the cylinder head.
   (Refer to Cylinder Head Assembly - "Cylinder Head")
9. Remove the oil pump.
   (Refer to Lubrication System - "Oil Pump")
10. Remove the oil cover (A) and gasket (B).

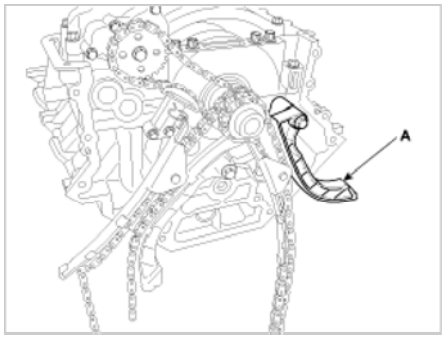


11. Remove the water jacket separator.
    (Refer to Cylinder Block - "Water Jacket Separator")
12. Remove the knock sensor #1 and #2.
    (Refer to Engine Control / Fuel System - "Knock Sensor")
13. Remove the upper oil pan.
    (Refer to Lubrication System - "Oil Pan")
14. Remove the baffle plate (A).

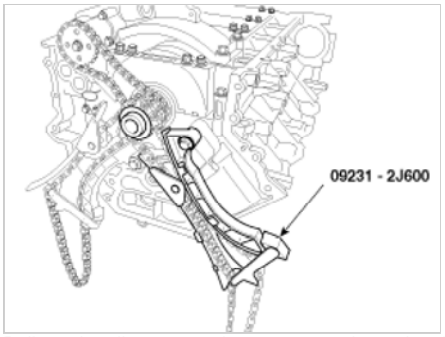


15. Remove the rear oil seal case (A).

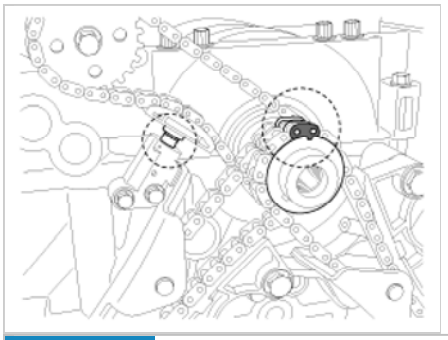
21.6 ~ 25.5 N.m (2.2 ~ 2.6 kgf.m, 15.9 ~ 18.8 lb-ft)



10. Hold the RH timing chain, guide and the arm using the timing chain locking tool (SST : 09231-2J600).



11. Pull out the oil pump tensioner stopper pin, and make sure tension is set. And confirm the timing chain align mark again.



NOTICE

- Confirm that the "shoe" area of oil pump tensioner is protruding.
- Friction plate mark, timing chain color link (yellow or pink color) and crankshaft sprocket mark (yellow or pink color) should be matched.
- The color of chain link should be matched with color of crank sprocket.

  Yellow (Chain) - Yellow (Crank sprocket) : OK
  Pink (Chain) - Pink (Crank sprocket) : OK
  Yellow - Pink : N.G

12. Install the timing chain lower cover.
    (Refer to Timing System - "Timing Chain Cover")
13. Install the LH/RH cylinder head.
    (Refer to Cylinder Head Assembly - "Cylinder Head")
14. Remove the SST from the timing chain guide and the timing chain tensioner arm.
15. Install the LH/RH CVVT & camshaft.
    (Refer to Cylinder Head Assembly - "CVVT&Camshaft")
16. Install the timing chain to the CVVT sprocket.

[RH]