



Technical Service Bulletin

GROUP

NUMBER

ENGINE
ELECTRICAL

23-EE-010H

DATE

MODEL(S)

SEPTEMBER 2023

As listed below

SUBJECT:

GDS-M BATTERY DIAGNOSIS FUNCTION

This bulletin supersedes 22-EE-001H to revise procedure, add applicable vehicles, operation codes and LTS time. Op codes and LTS times are added for extended diagnosis and charging time. The battery diagnosis procedure has been updated to attach a jumper/booster box initially when the 12V battery is significantly discharged (dead battery), so the GDS test will be able to be performed at ignition On. The jumper box should then be removed if GDS requests the new 5 minute vehicle run (engine run/Ready On) "battery charge performance" test. The battery charge performance test occurs when GDS confirms battery sensor history with significant discharge and may provide a result of R03 if a charging defect is found with the battery (see step-9). A flowchart summary of GDS Battery Diagnosis procedure is provided on page-3.

Description: This bulletin is issued to provide the extended battery diagnosis procedure using GDS-M. This battery diagnosis function displays the various battery-related faults such as:

- Internal short circuit
- Battery deterioration
- Malfunction of electronic parts
- Insufficient battery charge
- Normal battery
- Charging defect

Battery diagnosis uses the battery sensor history saved for the last 30 days and ICU diagnostic communication to track battery state of charge (SOC) and current parasitic draw history.

IMPORTANT

The below listed models must be tested by the GDS Battery Diagnosis.

Battery claims may be subject to chargeback if submitted with the wrong tester code.

Applicable Vehicles:

- 2021MY~ Elantra (CN7)
- 2021MY~ Elantra (CN7A)
- 2022MY~ Elantra N (CN7 N)
- 2022MY~ Ioniq 5 (NE1 EV)
- 2023MY~ Ioniq 6 (CE1 EV)
- 2024MY~ Kona (SX2)
- 2024MY~ Kona (SX2 EV)
- 2021MY~ Sonata (DN8)
- 2021MY~ Sonata (DN8A)
- 2023MY~ Santa Fe Hybrid (TMa HEV)
- 2022MY~ Tucson (NX4/NX4A)
- 2022MY~ Tucson Plug-in Hybrid (NX4 PHEV)

Circulate To: General Manager, Service Manager, Parts Manager, Warranty Manager, Service Advisors, Technicians, Body Shop Manager, Fleet Repair

Warranty Information:

GDS Battery Diagnostic Code	Op. Code	Operation	Op. Time	Nature Code	Cause Code
R01, R02, R03	37110R00	Battery Replacement	Refer to WebLTS	D91	ZZ3
D01/D03/D04 <u>without</u> a 5 min. vehicle run test	37110A01	Battery Diagnostic Inspection	0.2 M/H		
R03 or D03/D04 <u>after</u> 5 min. vehicle run test	37110A00	Battery Diagnostic Inspection and Charging Operation	0.3 M/H		

NOTE 1: R01/R02/R03 results can claim both 37110R00 "Battery Replacement" and (37110A00 or 37110A01) "Battery Diagnostic Inspection" together.

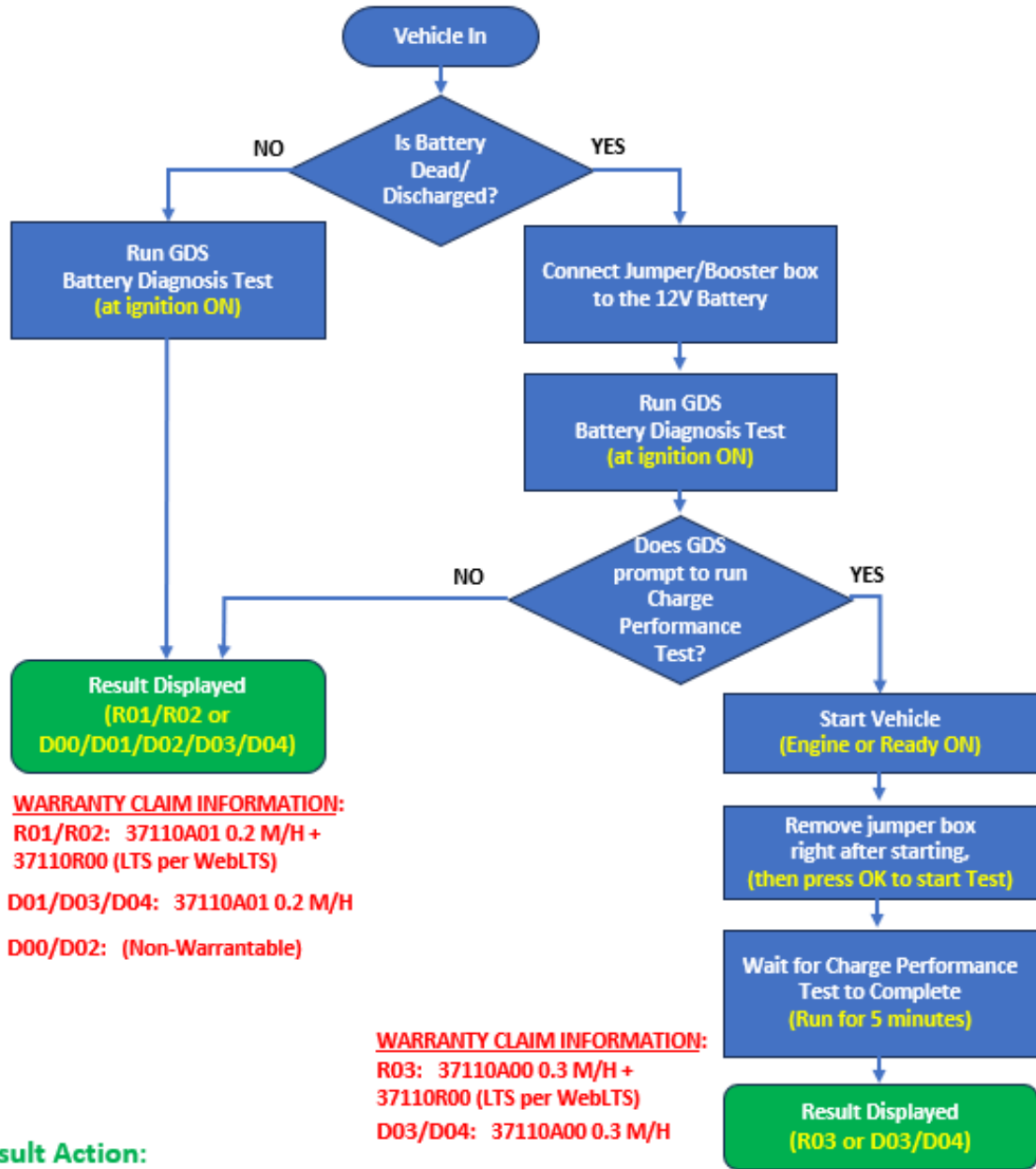
NOTE 2: The GDS test result is automatically electronically uploaded to HMA and HMC, so STUI upload is not required, but it is suggested to maintain a copy for backup record.

Op. Code 37110A00 and 3711A01 (Battery Diagnostic Inspection and Charging Operation):

Item		Code	Display	Op. time
Replace	Internal defect	R01	Battery internal fault condition identified (Warrantable)	0.2 M/H
	Aging	R02	Battery deterioration condition identified(Warrantable)	0.2 M/H
	Charging defect	R03	Abnormal charging current detected, replace battery. (Warrantable)	0.3 M/H
Discharge	Excess dark current	D01	Excessive dark current draw condition identified (Warrantable)	0.2 M/H
	Aftermarket electronic device	D02	Current draw from aftermarket electronic component(s) detected. (Not warrantable)	None
	Excess use	D03	Case 1. Good battery condition identified	0.2 M/H
			Case 2. Over use of electrical components detected while the engine is not running. Charge the battery	0.2 M/H
			Case 3. Over use of electrical components detected while the engine is not running. Charge the battery. Battery sensor requires activation	0.2 M/H
			Case 4. Charge Battery (After vehicle run test found potential for battery to accept charge).	0.3 M/H
	Lack of driving	D04	Case 1. Good battery condition identified	0.2 M/H
			Case 2. Insufficient battery charge condition identified. Charge the battery	0.2 M/H
			Case 3. Insufficient battery charge condition identified. Charge the battery. Battery sensor requires activation	0.2 M/H
			Case 4. Charge Battery (After engine run test found potential for battery to accept charge)	0.3 M/H
Good	Good battery and charge	D00	(Not warrantable)	None

Service Procedure:

Battery Diagnosis Service Procedure Summary:



Result Action:

R01 or R02 REPLACE BATTERY	D01 (Battery OK) Fully Charge the Battery and confirm if vehicle Battery Draw issue	D03 or D04 (Battery OK) Fully Charge the Battery	R03 REPLACE BATTERY
D00 (Battery OK)	D02 (Battery OK) Check for Customer Accessories causing draw		

NOTE: "Battery Sensor Activation" if prompted requires >4 hours at Ignition OFF with doors, hood & trunk closed.

1.

IMPORTANT

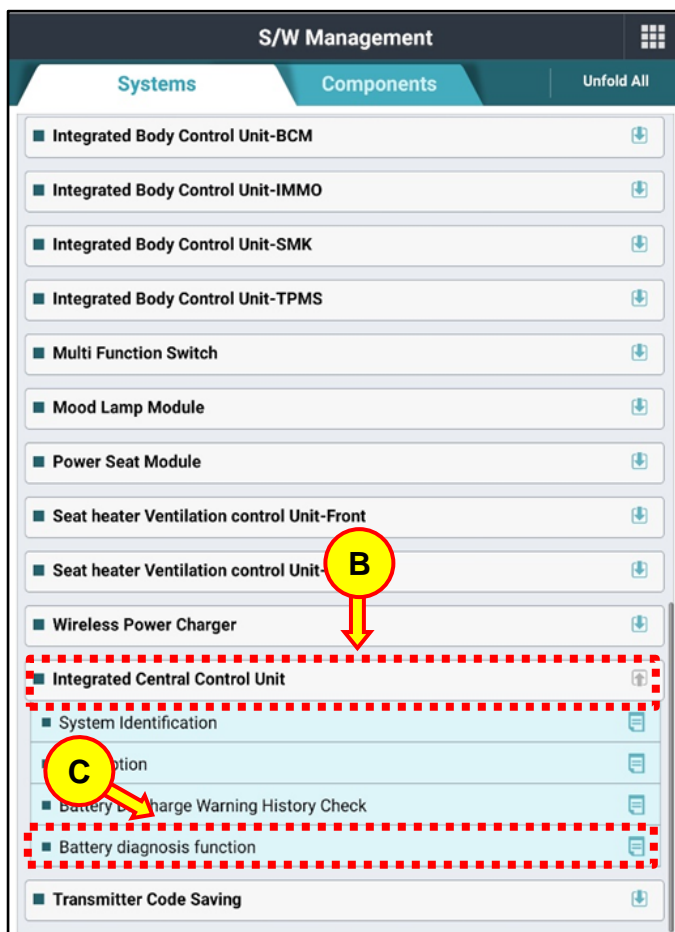
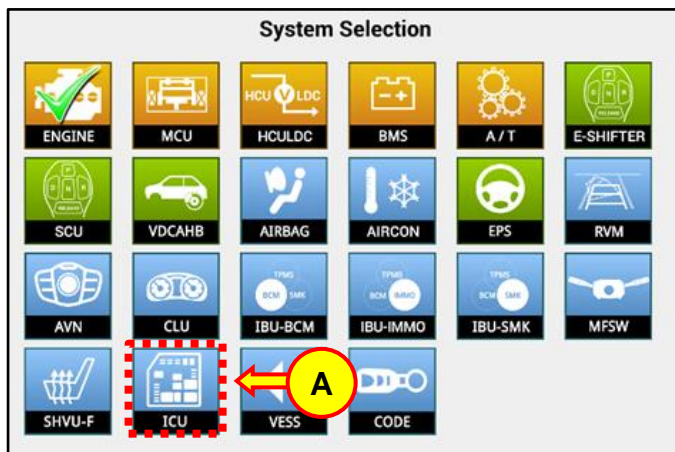
Connect a battery jumper/booster box when the 12V battery is significant discharged to be able to run the GDS test at ignition On.

Connect GDS-M to the Data Link Connector (DLC) and then turn the ignition switch to the **ON** position.

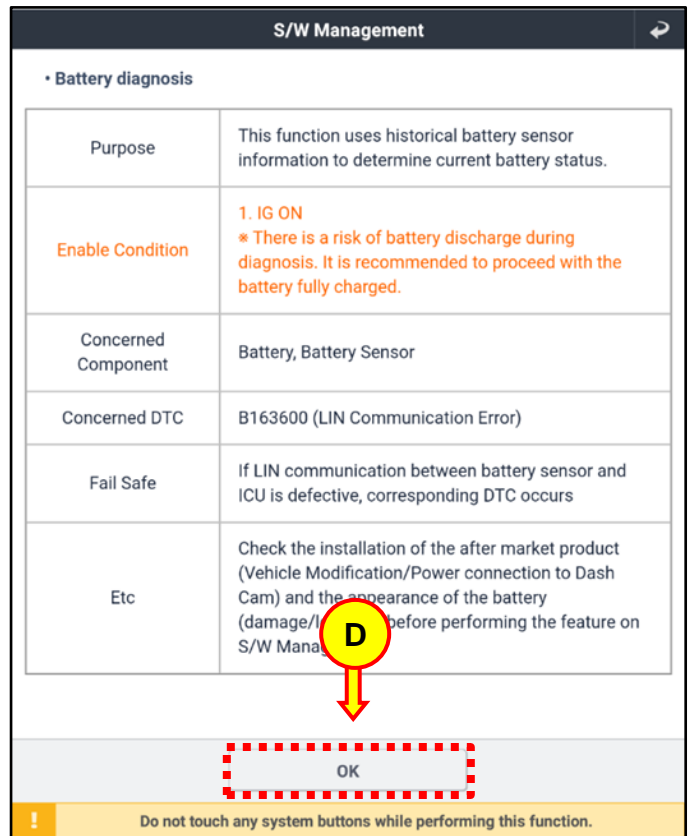
Select the vehicle model, model year, and engine type.

Select the **ICU** (A) as a system and click **OK**.

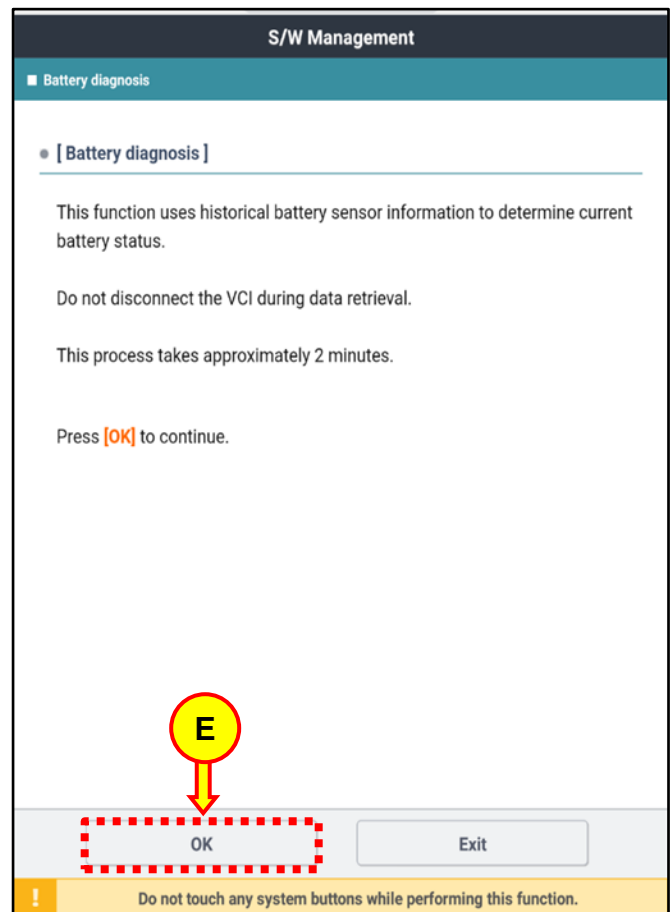
2. Select the **Integrated Central Control Unit** (B) and then **Battery diagnosis function** (C) in the S/W Management menu.



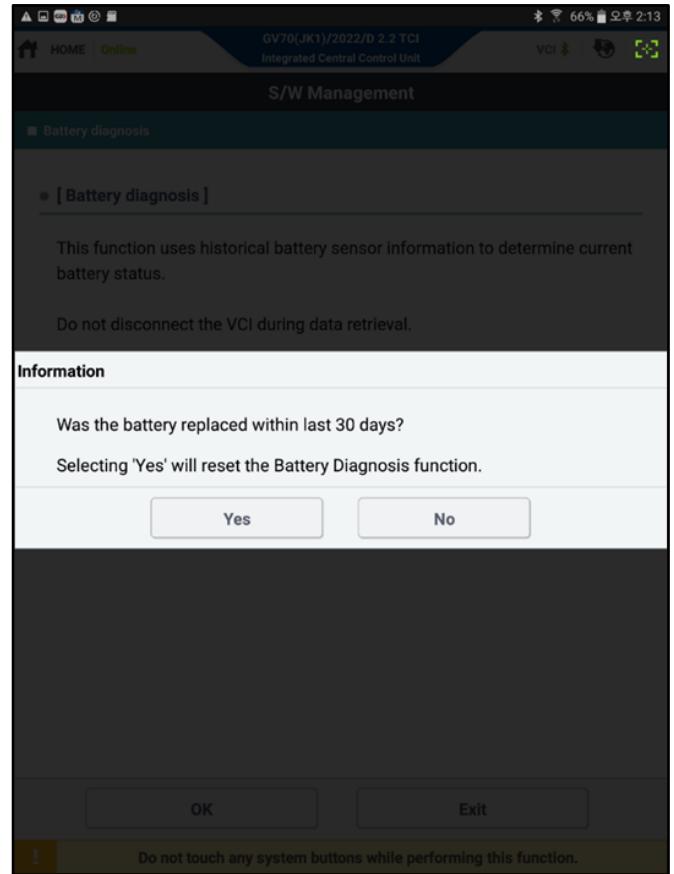
- Follow the instruction on the GDS-M screen and select **OK (D)** to continue.



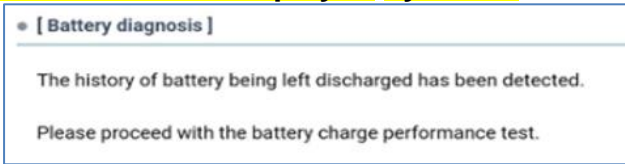
- Select the **OK (E)** button and wait for about 2 minutes for the test results.



5. Should you get this pop-up screen, answer it according to your vehicle's situation.



8. Was the following discharged battery detected screen displayed by GDS?



- **YES:** Go to Step 9.
- **NO:** Perform the action specified by the Result shown on the screen for any of these:
 - R01
 - R02
 - D01
 - D02
 - D03

The bulletin procedure is then complete.

Warranty Information:



Information

The GDS result is sent electronically to HMA and HMC, so a screenshot is not required to be uploaded to STUI. However, it is suggested for warranty record you should print the screen to attach to the repair order or save the screenshot to STUI.

The below claims apply when the GDS provided the result without prompting to run the additional vehicle run time of the battery charge performance test of step-9.

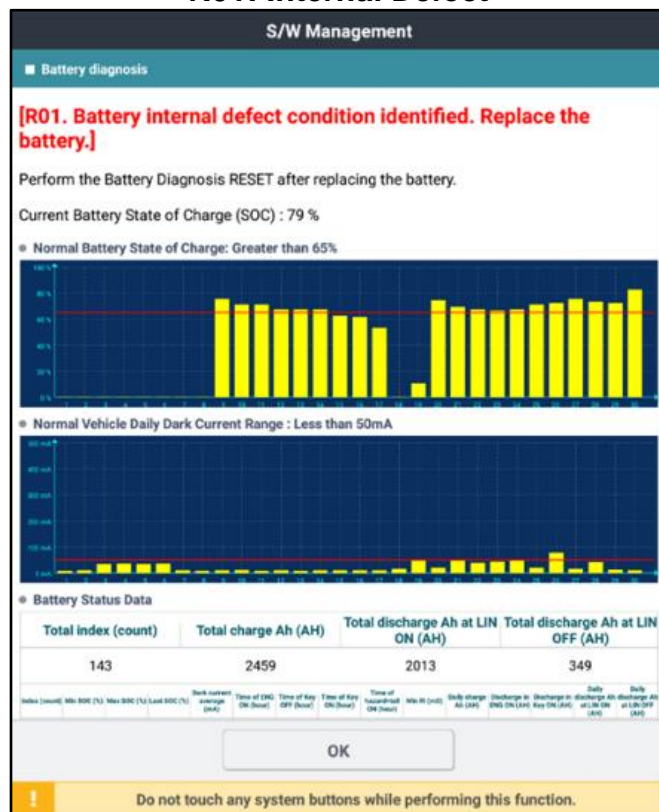
Claim both opcodes for R01/R02:

- 37110R00 Battery Replace (M/H varies by model)
- 37110A01 Battery Diagnostic Inspection (0.2M/H)

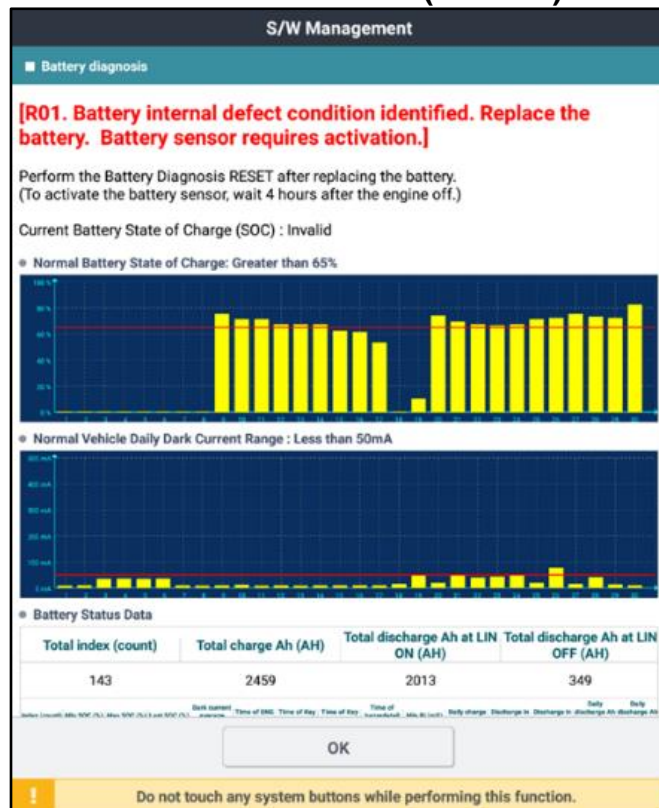
Claim for results of D01/D03/D04:

- 37110A01 Battery Diagnostic Inspection (0.2M/H)

R01: Internal Defect



R01: Internal Defect (Inactive)



R02: Battery Deterioration (Aging)

S/W Management

Battery diagnosis

[R02. Battery deterioration condition identified. Replace the battery.]

Perform the Battery Diagnosis RESET after replacing the battery.

Current Battery State of Charge (SOC) : 79 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
143	2459	2013	349

OK

Do not touch any system buttons while performing this function.

R02: Battery Deterioration (Aging) Inactive

S/W Management

Battery diagnosis

[R02. Battery deterioration condition identified. Replace the battery. Battery sensor requires activation.]

Perform the Battery Diagnosis RESET after replacing the battery.
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
143	2459	2013	349

OK

Do not touch any system buttons while performing this function.

9. For a discharged battery the following **battery charge performance test** may be requested to perform R03 diagnosis:

- a) GDS shows the **battery charge performance test** is required. Select OK to acknowledge.
- b) Start the vehicle either by running engine or Ready On to attempt charging of the battery.

IMPORTANT

Remove the jumper/booster box immediately from the battery after starting the vehicle, and before selecting OK to begin the charging performance test.

- c) Select OK right after starting the vehicle and removing jumper/booster to the battery.

i Information

Make sure vehicle is running and select OK should you get this battery low confirmation message:

Information

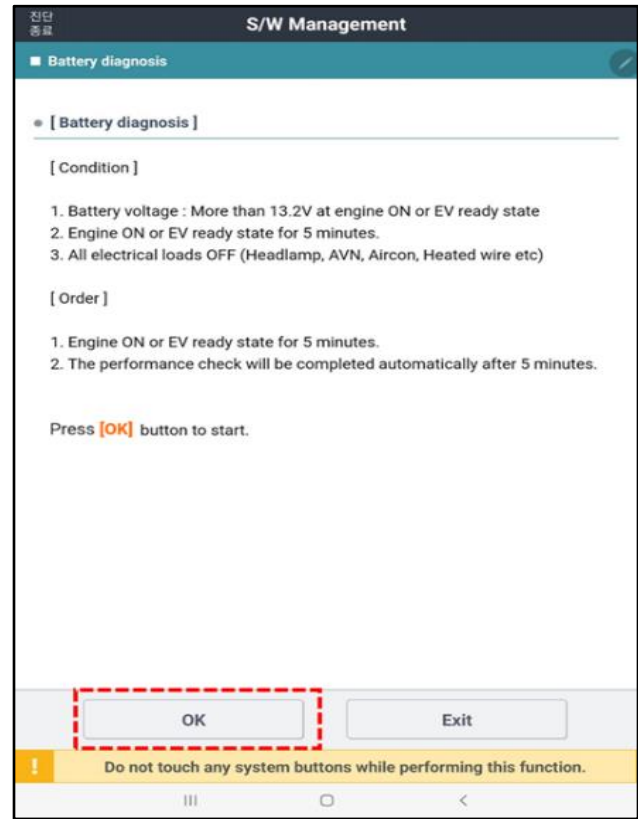
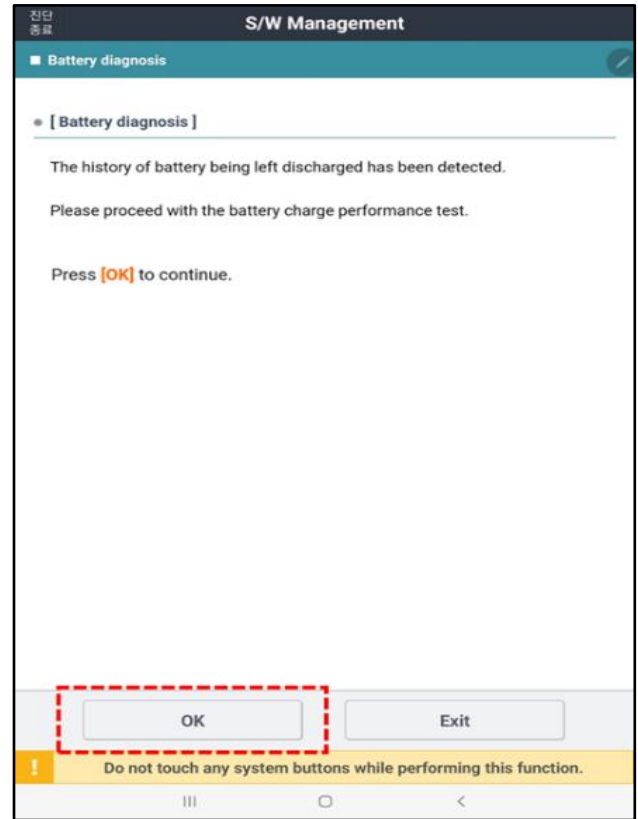
The vehicle battery charge voltage is low.

Please check vehicle status is engine ON or EV ready.

If the vehicle status has been engine ON or EV ready for more than 5 minutes, check the charging system.

Press [OK] button.

- d) The GDS **battery charge performance test** will be run for 5 minutes and the actual progress time will be displayed on the test screen.
- e) Wait until the progress time reaches 5 minutes of vehicle run test, then the GDS will automatically complete the test and display one of the test results shown in the below pages.



- f) After 5 minutes the test result will display. The progress of the battery charge performance is displayed on a 3rd graph showing current (Amps) of charge the battery accepted over the 5 minute vehicle run time. (this example shown is for a good battery that took a charge).



Information

Contact Techline if you get a **D03/D04** result but find the battery is unable to recover after a full charge attempt. Upload the following to STUI before calling:

- GDS screenshot of D03/D04 result.
- Photo of the Midtronics GR8 or DCA8000 diagnostic charge result as proof of charge attempt.

Warranty Information



Information

The GDS result is sent electronically to HMA and HMC, so a screenshot is not required to be uploaded to STUI. However, it is suggested for warranty record you should print the screen to attach to the repair order or save the screenshot to STUI.

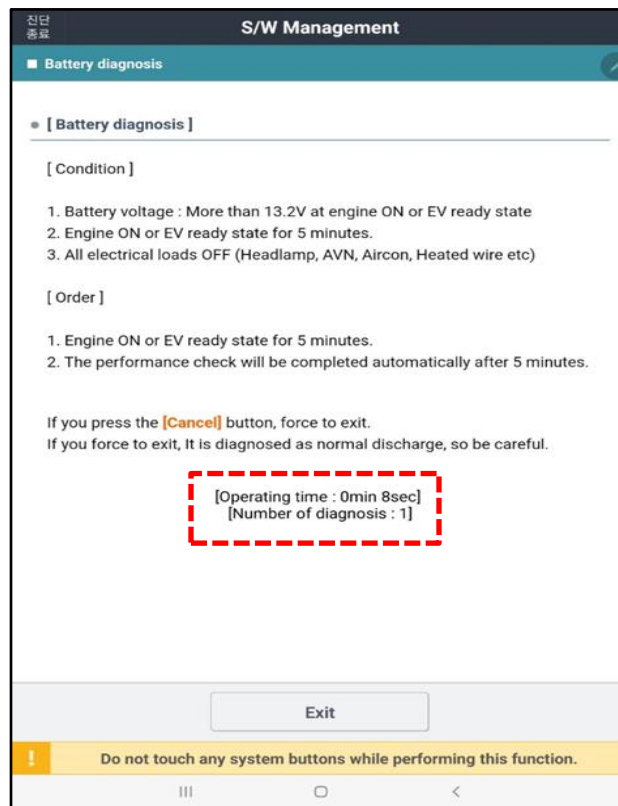
*Applies to the case when **battery charge performance test** was required.*

Claim both for R03 result:

- 37110R00 Battery Replace (M/H varies by model)
- 37110A00 Battery Diagnostic Inspection and Charging (0.3 M/H)

Claim for D01/D03/D04 result:

- 37110A00 Battery Diagnostic Inspection and Charging (0.3 M/H)



GDS KMTGB4SC2PU146119 Diagnosis No : B28AAGN7012307240061
07/24/23 14:22

[D04. Insufficient battery charge condition identified. Charge the battery. (After engine run test found potential for battery to accept charge), Battery sensor requires activation.]

Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC). Charge the battery with a approved charger or idle the engine with the headlights ON. (See the 30 index)
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

- [Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

- Battery Status Data

Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time (Min.)	Number of diagnoses
14.67	1.22	5	1

R03: Battery Charging Fail

R03: Battery Charging Fail Inactive

S/W Management

Battery diagnosis

[R03. Abnormal charging current detected, Replace the battery.]

Perform the Battery Diagnosis RESET after replacing the battery.

Current Battery State of Charge (SOC) : 16 %

Normal Battery State of Charge: Greater than 65%

[Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

Battery Status Data

Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1

Consecutive neglect days : 12days (Number of times left without charging)

	Before diagnosis	After diagnosis
Outside temp.	-8.0°C	-8.0°C
SOC	255%	255%

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	66	58	11

S/W Management

Battery diagnosis

[R03. Abnormal charging current detected, Replace the battery. Battery sensor requires activation.]

Perform the Battery Diagnosis RESET after replacing the battery. (To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

Normal Battery State of Charge: Greater than 65%

[Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

Battery Status Data

Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1

Consecutive neglect days : 12days (Number of times left without charging)

	Before diagnosis	After diagnosis
Outside temp.	-8.0°C	-8.0°C
SOC	255%	255%

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	66	58	11

D01: Excess Dark Current: Current SOC is Normal (Over 65%)

D01: Excess Dark Current: Current SOC is NG (Under 65%)

S/W Management

Battery diagnosis

[D01. Good battery condition identified.]

HISTORY CONDITION: Excessive dark current draw condition identified. (See the 15 index)

Current Battery State of Charge (SOC) : 79 %

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
165	8906	8802	43

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D01. Excessive dark current draw condition identified. Charge the battery and perform diagnosis on dark current draw.]

Refer to the Shop Manual and follow the dark current draw diagnostic procedure. (See the 15 index)

Current Battery State of Charge (SOC) : 63 %

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
165	8906	8802	43

OK

Do not touch any system buttons while performing this function.

**D01: Excess Dark Current:
Current SOC is NG (Inactive)**

**D02: Detect Privately Make Electronic Part:
Current SOC is normal (Over 65%)**

S/W Management

Battery diagnosis

[D01. Excessive dark current draw condition identified. Charge the battery and perform diagnosis on dark current draw. Battery sensor requires activation.]

Refer to the Shop Manual and follow the dark current draw diagnostic procedure. (See the 15 index)
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
151	549	377	69

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D02. Good battery condition identified.]

HISTORY CONDITION: Current draw from aftermarket electronic component(s) detected.

Current Battery State of Charge (SOC) : 79 %

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
151	549	377	69

OK

Do not touch any system buttons while performing this function.

**D02: Detect Privately Make Electronic Part:
Current SOC is NG (Under 65%)**

**D02: Detect Privately Make Electronic Part:
Current SOC is NG (Inactive)**

S/W Management

Battery diagnosis

[D02. Current draw from aftermarket electronic component(s) detected. Inspect and remove any aftermarket electronic component(s).]

Aftermarket electronic components constantly draw power, and rapidly reduce battery State of Charge (SOC).
Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 63 %

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
151	549	377	69

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D02. Current draw from aftermarket electronic component(s) detected. Inspect and remove any aftermarket electronic component(s). Battery sensor requires activation.]

Aftermarket electronic components constantly draw power, and rapidly reduce battery State of Charge (SOC).
Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

Normal Battery State of Charge: Greater than 65%

Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
151	549	377	69

OK

Do not touch any system buttons while performing this function.

**D03: Excess Use of Electronic Part:
Current SOC is normal (Over 65%)**

**D03: Excess Use of Electronic Part:
Current SOC is NG (Under 65%)**

S/W Management

Battery diagnosis

[D03. Good battery condition identified.]

HISTORY CONDITION: Over usage of electrical components detected. (See the 28 index)

Current Battery State of Charge (SOC) : 79 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

- Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
131	169	166	10

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D03. Over usage of electrical components detected while the engine is not running. Charge the battery.]

Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). (See the 28 index)
Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 63 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

- Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
131	160	166	10

OK

Do not touch any system buttons while performing this function.

**D03: Excess Use of Electronic Part:
Current SOC is NG (Inactive)**

**D03: Excess Use of Electronic Part
(After charging current test OK)**

S/W Management

Battery diagnosis

[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. Battery sensor requires activation.]

Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). (See the 28 index)
Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

- Battery Status Data

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. (After engine run test found potential for battery to accept charge)]

Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC).
Charge the battery with a approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 70 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

- [Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

- Battery Status Data

Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1

Consecutive neglect days : 12days (Number of times left without charging)

	Before diagnosis	After diagnosis
Outside temp.	-8.0°C	-8.0°C
SOC	255%	255%

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	66	58	11

OK

Do not touch any system buttons while performing this function.

D03: Excess Use of Electronic Part (After charging current test OK) (Inactive)

D04: Insufficient SOC: Current SOC is normal (Over 65%)

S/W Management

Battery diagnosis

[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. Battery sensor requires activation.]

Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). (See the 28 index)
 Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.
 (To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	66	58	11

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. (After engine run test found potential for battery to accept charge)]

Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC).
 Charge the battery with a approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 70 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

[Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

Battery Status Data

Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1

Consecutive neglect days : 12days (Number of times left without charging)

	Before diagnosis	After diagnosis
Outside temp.	-8.0°C	-8.0°C
SOC	255%	255%

Total index (count) Total charge Ah (AH) Total discharge Ah at LIN ON (AH) Total discharge Ah at LIN OFF (AH)

55 66 58 11

OK

Do not touch any system buttons while performing this function.

D04: Insufficient SOC: Current SOC is NG (Under 65%)

D04: Insufficient SOC: Current SOC is NG (Inactive)

S/W Management

Battery diagnosis

[D04. Insufficient battery charge condition identified. Charge the battery.]

Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC). (See the 10 index)
 Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 63 %

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
142	1120	020	01

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D04. Insufficient battery charge condition identified. Charge the battery. Battery sensor requires activation.]

Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC). (See the 10 index)
 Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.
 (To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%

- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data

Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)

OK

Do not touch any system buttons while performing this function.

**D04 : Insufficient SOC
(After charging current test OK)**

**D04: Insufficient SOC
(After charging current test OK) Inactive**

S/W Management

Battery diagnosis

[D04. Insufficient battery charge condition identified. Charge the battery. (After engine run test found potential for battery to accept charge)]

Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC). (See the 29 index)
Charge the battery with a approved charger or idle the engine with the headlights ON.

Current Battery State of Charge (SOC) : 70 %

- Normal Battery State of Charge: Greater than 65%
- Normal Vehicle Daily Dark Current Range : Less than 50mA
- [Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

Battery Status Data			
Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1
Consecutive neglect days : 12days (Number of times left without charging)			
Outside temp.	Before diagnosis	After diagnosis	
SOC	-8.0°C	-8.0°C	
	255%	255%	
Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	65	58	11

S/W Management

Battery diagnosis

[D04. Insufficient battery charge condition identified. Charge the battery. (After engine run test found potential for battery to accept charge), Battery sensor requires activation.]

Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC).
Charge the battery with a approved charger or idle the engine with the headlights ON. (See the 29 index)
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%
- Normal Vehicle Daily Dark Current Range : Less than 50mA
- [Battery charging current] Normal range : Average charging current 10A or more for 5 minutes

Battery Status Data			
Average charging current for 5 minutes (A)	Total charge Ah (AH)	Total charging time	Number of diagnoses
1.54	0.13	5	1
Consecutive neglect days : 12days (Number of times left without charging)			
Outside temp.	Before diagnosis	After diagnosis	
SOC	-8.0°C	-8.0°C	
	255%	255%	
Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
55	65	58	11

D00: Good

D00: Good (Inactive)

S/W Management

Battery diagnosis

[D00. Good battery condition identified.]

Good battery condition identified.

Current Battery State of Charge (SOC) : 79 %

- Normal Battery State of Charge: Greater than 65%
- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data			
Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
124	5912	5824	62
Index (count)	Min SOC (%)	Max SOC (%)	Last SOC (%)
1	81	95	92
	Dark current average (mA)	Time of ENG ON (hour)	Time of Key OFF (hour)
	6.3	5.0	0
	Time of Key ON (hour)	Time of Assist-Start ON (hour)	Min-R (min)
	0	0	3.30
	Daily charge AB (AH)	Discharge in BMS ON (AH)	Discharge in Key ON (AH)
	46.5	31.0	0.0
	Daily discharge at LIN ON (AH)	Daily discharge at LIN OFF (AH)	Daily discharge AB (AH)
	8.5	0.2	

OK

Do not touch any system buttons while performing this function.

S/W Management

Battery diagnosis

[D00. Good battery condition identified. Battery sensor requires activation.]

Good battery condition identified.
(To activate the battery sensor, wait 4 hours after the engine off.)

Current Battery State of Charge (SOC) : Invalid

- Normal Battery State of Charge: Greater than 65%
- Normal Vehicle Daily Dark Current Range : Less than 50mA

Battery Status Data			
Total index (count)	Total charge Ah (AH)	Total discharge Ah at LIN ON (AH)	Total discharge Ah at LIN OFF (AH)
124	5912	5824	62
Index (count)	Min SOC (%)	Max SOC (%)	Last SOC (%)
1	81	95	92
	Dark current average (mA)	Time of ENG ON (hour)	Time of Key OFF (hour)
	6.3	5.0	0
	Time of Key ON (hour)	Time of Assist-Start ON (hour)	Min-R (min)
	0	0	3.30
	Daily charge AB (AH)	Discharge in BMS ON (AH)	Discharge in Key ON (AH)
	46.5	31.0	0.0
	Daily discharge at LIN ON (AH)	Daily discharge at LIN OFF (AH)	Daily discharge AB (AH)
	8.5	0.2	

OK

Do not touch any system buttons while performing this function.

List of the Possible Battery Diagnosis Results:

	Item	Code	Engine
Replace	Internal defect	R01	<p>[R01. Battery internal defect condition identified. Replace the battery.]</p> <p>Perform the Battery Diagnosis RESET after replacing the battery.</p>
	Aging	R02	<p>[R02. Battery deterioration condition identified. Replace the battery.]</p> <p>Perform the Battery Diagnosis RESET after replacing the battery.</p>
	Charging defect	R03	<p>[R03. Abnormal charging current detected, Replace the battery.]</p> <p>Perform the Battery Diagnosis RESET after replacing the battery.</p>
Discharge	Excess dark current	D01	<p>[D01. Excessive dark current draw condition identified. Charge the battery and perform diagnosis on dark current draw.]</p> <p>Refer to the Shop Manual and follow the dark current draw diagnostic procedure. (See the 15 index)</p>
	Aftermarket electronic device	D02	<p>[D02. Current draw from aftermarket electronic component(s) detected. Inspect and remove any aftermarket electronic component(s).]</p> <p>Aftermarket electronic components constantly draw power, and rapidly reduce battery State of Charge (SOC). Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.</p>
	Excess use	D03	<p>[D03. Over usage of electrical components detected while the engine is not running. Charge the battery.]</p> <p>Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). (See the 28 index) Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.</p>
			<p>[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. (After engine run test found potential for battery to accept charge)]</p> <p>Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). Charge the battery with a approved charger or idle the engine with the headlights ON.</p>
Lack of driving	D04	<p>[D04. Insufficient battery charge condition identified. Charge the battery.]</p> <p>Dark current draw amount is normal. ISG system may not activate due to insufficient battery State of Charge (SOC). (See the 10 index) Charge the battery with a Hyundai/Kia approved charger or idle the engine with the headlights ON.</p>	
		<p>[D03. Over usage of electrical components detected while the engine is not running. Charge the battery. (After engine run test found potential for battery to accept charge), Battery sensor requires activation.]</p> <p>Electrical components usage while the engine is not running draw battery current, and rapidly reduce battery State of Charge (SOC). Charge the battery with a approved charger or idle the engine with the headlights ON. (To activate the battery sensor, wait 4 hours after the engine off.) Current Battery State of Charge (SOC) : Invalid</p>	
Normal		D00	<p>[D00. Good battery condition identified.]</p> <p>Good battery condition identified.</p>