

Technical Service Bulletin

GROUP	NUMBER
FUEL SYSTEM	20-FL-004H
DATE	MODEL(S)
MAY, 2020	ELANTRA (AD/ADA) PALISADE (LX2) SANTA FE (TM) SONATA (DN8)

SUBJECT: IDLE STOP & GO SYSTEM OPERATION, DIAGNOSTIC AND BATTERY SENSOR RECALIBRATION PROCEDURE

This bulletin supersedes TSB 19-FL-002H to include additional models, and ISG system diagnostics and requirements.

Description: This bulletin describes the Idle Stop and Go (ISG) system operation, diagnostic and battery sensor recalibration procedure. Refer to applicable Shop Manual and Owner's Manual for additional information.

Applicable Vehicles: Elantra (AD/ADA), Palisade (LX2), Santa Fe (TM) and Sonata (DN8) vehicles equipped with Idle Stop and Go (ISG) System

Note: Normal Warranty Applies

System Operation:

When the vehicle comes to a stop after brake pedal is depressed, the ISG system automatically and temporarily shuts down the engine to improve fuel efficiency and reduce exhaust gas emissions. The ISG system then restarts the engine when the brake pedal is released or the accelerator pedal is depressed (if Auto Hold feature is equipped and activated).

The ISG system is active by default whenever the ignition is cycled to start the vehicle. To deactivate the system, press the **ISG OFF** button.

Some Notable Prerequisites for ISG System Activation:

•	Battery has a 70% or above State of Charge (SOC)	•	Outside temperature is between 14 ~ 95°F Engine coolant temperature is over 86°F
•	Shift lever is in DRIVE or NEUTRAL	•	Air Conditioning system is not in high load or
•	Driver's seatbelt is fastened		demand
•	Driver's door and the hood are closed	•	Steering wheel is turned less than 180 degrees
•	Brake vacuum pressure is adequate	•	System is not in the diagnostic mode
•	Vehicle is not on a steep slope	•	No related diagnostic trouble codes
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NOTICE

- The ISG system will not be activated until all prerequisites are satisfied. If not satisfied, the orange color Auto Stop symbol is illuminated in the instrument cluster when the vehicle is stopped, and the "ISG OFF" button indicator illuminates or flashes depending on ISG system version.
- Vehicle speed must reach 5 MPH again for the ISG to activate after the previous stop.

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

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ISG System Operation Illustrations

1. Vehicle is moving.	2. Shift lever is in DRIVE . Brake pedal is released.	3. Engine is running.

4.	Driver brakes until vehicle is stationary.	5.	Shift lever is in DRIVE . Brake pedal is pressed.	6.	Engine stops running. Green color Auto Stop symbol illuminates in the instrument cluster.
	Red		Lon Marine		
		2		- 4	

7.	Driver wants to continue moving.	8.	Shift lever is in DRIVE . Brake pedal is released.	9.	Engine restarts and running. Auto Stop symbol goes out.
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Idle Stop and Go System Illuminations and Conditions

 Auto Stop symbol illuminated in green color ISG activated Engine stopped 	 Auto Stop symbol illuminated in yellow color ISG prerequisites unsatisfied Engine running 	 ISG OFF button illuminated ISG prerequisites unsatisfied Idle Stop deactivated Battery sensor is recalibrating Engine running
A	A	(A) OFF
Auto Stop symbol flashing in	Auto Stop symbol flashing in	ISG OFF button flashing
green color	yellow color	Battery cable or sensor was
 ISG automatically restarted Engine running 	 ISG system malfunction Engine running 	 Battery sensor is recalibrating
		Engine stopped
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Situations ISG May Abort and Engine Automatically Restart:

- The vehicle is shifted to **PARK** or **REVERSE** when the brake pedal is depressed or Auto Hold is activated
- The battery State of Charge (SOC) is below 70% threshold limit or the battery is weak
- The brake vacuum pressure is low
- The climate control system blower fan speed is set above the 6th position with air condition **ON**
- A certain period of time has elapsed with air condition ON
- The defroster is activated
- The driver door is opened or the driver seat belt is unfastened when the brake pedal is depressed or Auto Hold is activated
- The Electronic Parking Brake (EPB) is pressed when Auto Hold is activated (if EPB is equipped)

WARNING

- When the engine is in Auto Stop mode, the engine may restart on its own.
- Never work the engine when the ignition is in "ON" or "ACC" position as the engine may restart without warning.
- Before leaving the vehicle or checking the engine compartment, stop the engine by pushing/turning the ignition switch to the OFF position, and remove the key(s) from the vehicle.

ISG System Diagnostics:

1. Turn the ignition key to the **ON** position or press the **Start-Stop Button** two times without depressing the brake pedal.

Connect a **GDS Mobile VCI-II** to the vehicle data link connector.

2. Select "Data Analysis" within the GDS app.



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Data Analysis

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Multi Data Analysis

Measurement

DTC

Analysis

S/W Management

Actuation

Test

Flight

Record

Recorded

Data

OBD-II

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3. Select "Engine".



4. Scroll down the data analysis page and look for Battery Voltage, SOC & SOH and ISG parameters.

Quick Tips:

Click on the forward arrow (>) next to **"Actuation Test"**. Then click **"Group"** and select the desired data group to view corresponding data.

- Select Alternator Management System (AMS) group for battery related data
- Select Idle Stop and Go (ISG) group for ISG related data

	Data P	alaiyala	C	
< Stop	Graph	Selective Display	Actuation Test) >
Sensor I	Name(220)	Value	Unit	Link Up
Battery Voltage		13.4	v	
Battery Voltage after IG Ke	y	13.3	v	
Actual Engine Speed		723	RPM	
Target Idle RPM		730	RPM	
Pressure Sensor(MAP) Sig	nal Voltage	1.9	v	
Intake Manifold Pressure		480.7	hPa	
Water Temperature Voltage	e	0.7	v	
Water Temperature		165.6	'F	
Ambient Air Temperature		32.3	'C	
Intake Air Temperature Vol	tage	1.6	v	
Intake Air Temperature		38.3	'C	
Engine Oil Temperature		57.8	'C	
Fuel Level(Option)		99	%	
Fuel Tank Pressure Value(Option)	1.0	hPa	

Celective Dia Selective Di	splay	Group	>		
Alternator Management System (AMS)			Sensor Name(49)		
Auto-Cruise Control (ACC)		ISG System	Built-in(ISG)		
		ISG Status(I	SG)		
E Dattery Voltage		ISG Inhibitio	n Switch(ISG)		
G Brake System		ISG Inhibitio	n Lamp(ISG)		
Camshaft Position (CMP)		Start Reques	t from ISG (ISG)		
Catalyst Aging		Stop Reques	t from ISG (ISG)		
Continuous Variable Valve Timing (CVVT)		Start Request from Key			
Cooling Fan		Starter Relay ON Signal			
Crankshaft Position (CKP)	Hood Switch(ISC)				
Engine Coolant Temperature Sensor (ECTS)	Deer Switch/(EC)				
Engine Oil Temperature Sensor (EOTS)		Door Switch	156)		
Engine Status		Driver's Sea	Belt(ISG)		
Evaporation System		No Idle Stop	by Engine Temperature(ISG)		
E Fuel Pressure		No Idle Stop by Catalyst Temperature Lo			
E Fuel Pump		No Idle Stop	by Ambient Pressure Low(IS		
Fuel System		No Idle Stop	by Lambda Adaptation Activ		
E Fuel Trim		No Idle Stop by Torque System(ISG)			
Idle Speed		No Idle Stop	by Catalyst Heating Active(I		
Idle Stop and Go (ISG)		No Idle Stop	by Brake Pressure too Low(I		
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5. Review all ISG parameters and compare the parameters with a properly operating vehicle (if in doubt).

Inspect any ISG data parameter that is different from the properly operating vehicle and make appropriate correction(s).

Follow the Shop Manual for additional information.

6. Review all battery parameters, and compare the parameters with a properly operating vehicle (if in doubt).

Ensure State of Charge of Battery (SOC) and State of Health of Battery (SOH) fields display a percentage value.

 If SOC or SOH displays "Checking" instead of a percentage value, perform the battery sensor recalibration procedure outlined on Page #7 of this TSB.

Recorded Data Selective Display	Group	>
Sensor Name(49)	Value	Unit Link Up
ISG System Built-in(ISG)	ON	· [
ISG Status(ISG)	ON	
ISG Inhibition Switch(ISG)	OFF	
ISG Inhibition Lamp(ISG)	OFF	
Start Request from ISG (ISG)	OFF	
Stop Request from ISG (ISG)	OFF	-
Start Request from Key	OFF	
Starter Relay ON Signal	OFF	-
Hood Switch(ISG)	CLOSE	-
Door Switch(ISG)	OPEN	
Driver's Seat Belt(ISG)	UNBUCKLED	-
No Idle Stop by Engine Temperature(ISG)	OFF	
No Idle Stop by Catalyst Temperature Low(ISG)	OFF	-
No Idle Stop by Ambient Pressure Low(ISG)	OFF	-

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$\mathcal{P}_{\mathbb{A}}$	£0	Data An	alysis		0	
< [Recorded Data	Data Capture	Group			>
	Sensor N	ame(12)	Value	Unit	1	Link Up
AMS	Stop Reason - Blower M	Max Switch(AMS)	OFF	8		
AMS	Stop Reason - Head La	mp(AMS)	ON	-		
AMS	Stop Reason - Wiper(A	MS)	OFF			
Batte	ry Current(AMS)		5.5	А		
Batte	ry Voltage(AMS)		14.4	v		
Batte	ry Temperature(AMS)		37.5	'C		
State	of Charge of Battery(A	MS)	77	%		
State	of Health of Battery(Al	MS)	81	%		
State	of Function of Battery(AMS)	9.4	v		
Desir	ed Alternator Voltage D	uty Cycle(AMS)	72.5	%		
Duty	Cycle from Alternator P	WM Signal(AMS)	72.0	%		
Nomi	nal Capacity(AMS)		80	Ah		

HOME OffLine	SANTAFE(TMA)/ Eng	2019/G 2.0 T-G pine	VCI 🙃	Ð	58
P, =	Data A	nalysis		0	
< Recorded Data	Data Capture	Group			>
Sensor N	lame(12)	Value	Unit		Link Up
AMS Stop Reason - Blower	Max Switch(AMS)	OFF	2		
AMS Stop Reason - Head La	imp(AMS)	ON	-		
AMS Stop Reason - Wiper(A	.MS)	OFF	-		
Battery Current(AMS)		5.1	А		
Battery Voltage(AMS)		14.4	v		
Battery Temperature(AMS)		39.0	'C		
State of Charge of Battery(A	MS)	Checking	%		
State of Health of Battery(Al	MS)	Checking	%		
State of Function of Battery	(AMS)	12.8	v		
Desired Alternator Voltage	Juty Cycle(AMS)	72.5	%		
Duty Cycle from Alternator F	WM Signal(AMS)	72.4	%		
Nominal Capacity(AMS)		80	Ah		

8. Evaluate the ISG system operation when SOC, SOH and all ISG operation prerequisites are satisfied.

NOTICE

- ISG does not activate if the Battery SOC is below 70%.
- Charge the battery above 70% SOC level before conducting further ISG system diagnosis.
 - Idle charging Idle the engine with headlights ON and monitor SOC value with GDS (recommended procedure)
 - Charge with a Battery Charger (if a battery cable was disconnected from the terminal, battery sensor may need recalibration)
- If the ISG system is working properly when the battery SOC is above 70% level, inform the customer of the ISG system prerequisites and Battery SOC requirements for ISG Operation. Refer to the Owner's Manual for additional information.
- Battery may not get adequate charging when driving short distances and frequent stop & go situations.

NOTICE

- The battery should only be replaced if testing with either GR8 or Cadex battery tester resulted in "Replace Battery".
- Battery replacement warranty submission without a "Replace Battery" printed ticket along with associated warranty code will likely result in warranty charge back.

Battery Sensor

- The battery sensor which is mounted on battery negative (-) terminal transmits battery voltage, current, and temperature information to the Engine Control Module (ECM).
- The ISG system utilizes Battery State of Charge (SOC), Battery State of Health (SOH) and other battery data generated by battery sensor.
- The battery sensor requires approximately 4 hours of continuous connection with a battery to generate stabilized data.
- If any battery cable or battery sensor was disconnected from the battery or the battery was
 recharged, perform the battery sensor recalibration procedure located below after finishing any
 repair work.

Battery Sensor Recalibration Procedure:

- Switch the ignition **"ON"** and **"OFF"** one time.
- Park the vehicle for a minimum of 4 hours with the hood and all doors closed.
- Verify that battery SOC and SOH data are displayed.