Technical Service Information Bulletin

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Service Category Engine/Hybrid System

Section Hybrid/Battery Control System **Market** USA

Toyota Supports ASE Certification

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2019 - 2022	ES300H, UX250H	
2018 - 2022	LC500H, LS500H	
2022	NX350H	

REVISION NOTICE

May 31, 2022 Rev1:

- **Applicability has been updated to include 2022 model year ES 300h, LC 500h, LS 500h, NX 350h, and UX 250h vehicles.**
- **The Required Tools & Equipment and Rescue Charge at Battery sections have been updated.**

Any previous printed versions of this bulletin should be discarded.

Introduction

This bulletin includes basic procedures for performing a rescue charge at battery on high voltage (HV) Ni-MH and Li-ion batteries. This bulletin should be used in conjunction with the applicable model and model year Repair Manual while performing the battery rescue charge. The GRX-5100 should be used wherever the Repair Manual references the Toyota Hybrid System (THS) charger.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Required Tools & Equipment

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
High Voltage Battery Service Unit*	01413-00002	1
High Voltage Cable* A619 A and B	01416-00119	1
Universal High Voltage Cable* (V)	01413-00007	1
Low Voltage Cable* (R)	01413-00004	1
Universal Fuse Box*	01413-00010	1
AC Power Cord* (S)	01413-00005	1
Banana Jack Extension Cable* (X)	01413-00031	1
AC Circuit Checker*	01413-00012	1
Battery Diagnostic Tool*	DCA-8000P T	1

*Essential SST.

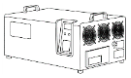
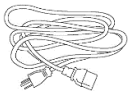
NOTE

Additional SSTs may be ordered by calling 1-800-933-8335.

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Required Tools & Equipment (continued)

The table below is a cross reference matrix showing the TMC THS charger part numbers and the equivalent TMNA GRX-5100 charger part numbers. This matrix can be used as a guide to ensure the correct cables are selected when following the applicable model and model year Repair Manual and this Service Bulletin to complete a rescue charge.

TMC PART NUMBERS*				TMNA PART NUMBERS**			
MAIN	SUB-COMPONENTS	IMAGE	DESCRIPTION	MAIN	SUB-COMPONENTS	IMAGE	DESCRIPTION
09880-10021	09881-10041		THS Charger	01413-00002	GRX-5100T		GRX-5100 High Voltage Battery Service Unit
	09881-10081		THC Charger AC Cable	01413-00005	A573		AC Power Cord (S)
	09882-10070		Low Voltage Cable	01413-00004	A533		Low Voltage Cable (R)
	09882-10090		High Voltage Cable	01416-00119	A619		High Voltage Cable A619 A and B
				01413-00031	A564		Banana Jack Extension Cable (X)
				01413-00010	A296		Universal Fuse Box
				01413-00007	A571		Universal High Voltage Cable (V)

* The TMC part numbers listed in the table are NOT available in North America.

**The TMNA part numbers listed in the table are available in North America and should be included in the HEV Workstation (large orange toolbox).

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Required Tools & Equipment (continued)

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream ADVI*	ADE	TSADVUNIT	1
Techstream 2.0		TS2UNIT	
Techstream Lite		TSLITEPDLR01	
Techstream Lite (Green Cable)		TSLP2DLR01	

*Essential SST.

NOTE
- Only ONE of the Techstream units listed above is required.
- Software version 17.00.020 or later is required.
- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

Rescue Charge at Battery

1. Inspect the vehicle.
   A. Inspect the auxiliary battery voltage.

   B. Test the auxiliary battery using the DCA-8000 Battery Diagnostic Tool to ensure the battery is fully charged.

2. Inspect the HV battery.
   A. Check the charge level of the HV battery.

   B. Check whether the HV battery warning message is shown in the vehicle's multi-information display.

   C. Confirm whether the engine starts.

   Does the engine start?
   - **YES —** Go to step 7.
   - **NO —** Continue to step 3.

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

3. Prepare the vehicle for a rescue charge.

CAUTION

- **ALWAYS wear the appropriate Personal Protective Equipment (PPE) provided in the HEV Workstation when working with high voltage. (Insulated gloves, insulated apron, and arc protective helmet with face shield.)**
- **ALWAYS use insulated tools when working with high voltage.**
- **ALWAYS use the cones, barriers, and high voltage car toppers provided in the HEV Workstation to create a perimeter around the vehicle and work area.**

HINT

- Removing the service plug grip interrupts the high voltage circuit.
- High voltage wiring connectors are orange.

NOTE

Do NOT proceed with the Lexus THS charger connection instructions in the Repair Manual. Follow the proceeding steps in this bulletin to correctly use the GRX-5100 instead.

Refer to TIS, applicable model and model year Repair Manual:

- 2019 – 2021 ES 300h:
  Engine/Hybrid System – Hybrid/Battery Control System – “Hybrid / Battery Control: HV Battery (for Nickel Metal Hydride Battery): Charging”
- 2022 ES 300h:
  Engine/Hybrid System – Hybrid/Battery Control System – “Hybrid / Battery Control: HV Battery (for Nickel Metal Hydride Battery): Charging”
- 2022 ES 300h:
  Engine/Hybrid System – Hybrid/Battery Control System – “Hybrid / Battery Control: HV Battery (for Lithium-Ion Battery): Charging”
- 2018 – 2021 LC 500h:
  Engine/Hybrid System – Hybrid/Battery Control System – “8GR-FXS (Hybrid / Battery Control): HV Battery: Charging”
- 2018 LS 500h:
  Engine/Hybrid System – Hybrid/Battery Control System – “8GR-FXS (Hybrid / Battery Control): HV Battery: Charging”
- 2019 – 2020 LS 500h:
  Engine/Hybrid System – Hybrid/Battery Control System – “8GR-FXS (Hybrid / Battery Control): HV Battery: Charging”

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

- 2021 LS 500h:
  Engine/Hybrid System – Hybrid/Battery Control System – "8GR-FXS (Hybrid / Battery Control): HV Battery: Charging"
- 2022 LS 500h:
  Engine/Hybrid System – Hybrid/Battery Control System – "8GR-FXS (Hybrid / Battery Control): HV Battery: Charging"
- 2022 NX 350h:
  Engine/Hybrid System – Hybrid/Battery Control System – "Hybrid / Battery Control: HV Battery: Charging"
- 2019 – 2022 UX 250h:
  Engine/Hybrid System – Hybrid/Battery Control System – "Hybrid / Battery Control: HV Battery: Charging"

4. Connect the GRX-5100 for a rescue charge.

NOTE

- ALWAYS use Techstream to troubleshoot the hybrid system before attempting an HV battery charge.
- Charging time while using the GRX-5100 is 10 minutes per charge cycle when the battery temperature is above 77°F (25°C).
- If the battery temperature is below 32°F (0°C), then three 10-minute charge cycles may be required for putting the engine in a condition where it can be started (the system can enter the READY ON state).
- The GRX-5100 will automatically stop 10 minutes AFTER charging starts.

A. Remove necessary SST cables located in the HEV tool box drawers.

NOTE

The required cables are listed in the Required Tools & Equipment table shown on page 2.

B. Connect the power input (Cable S) to the GRX-5100 and connect the cable into a grounded AC 100 to 240V receptacle.

NOTICE

ALWAYS confirm the AC 100 to 240V receptacle has a properly functioning ground by using the AC Circuit Checker provided in the HEV Workstation. The ground is designed to reduce the chance of electric shock if a malfunction occurs. Do NOT use the charger if ANY of the pins on the plug (Cable S) have been damaged or removed.

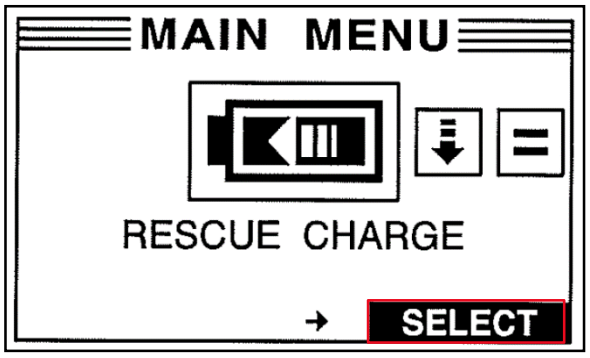
High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

C. Turn the GRX-5100 ON.

D. Select Rescue Charge by using the arrow key, then press Select.

Figure 1.



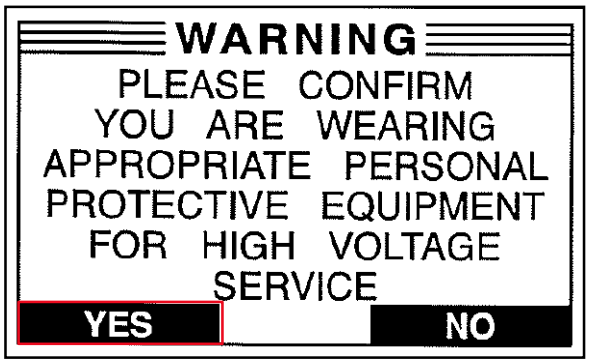
E. Confirm you are wearing the appropriate PPE for high voltage service.

CAUTION

ALWAYS wear the appropriate PPE when working with high voltage: Insulated gloves, insulated apron, and arc protective helmet with face shield.

F. Press Yes.

Figure 2.



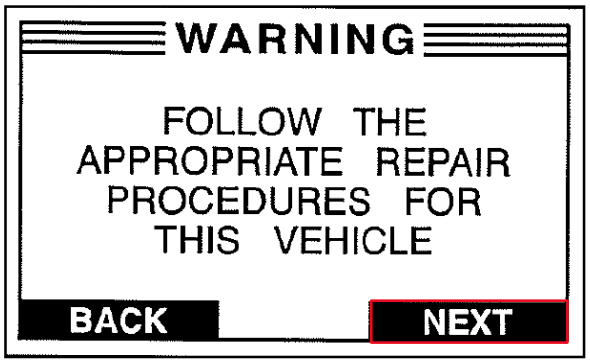
High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

G. Press Next.

> NOTE
>
> Refer to the applicable model and model year Repair Manual for vehicle specific instructions for disassembly and connector locations.

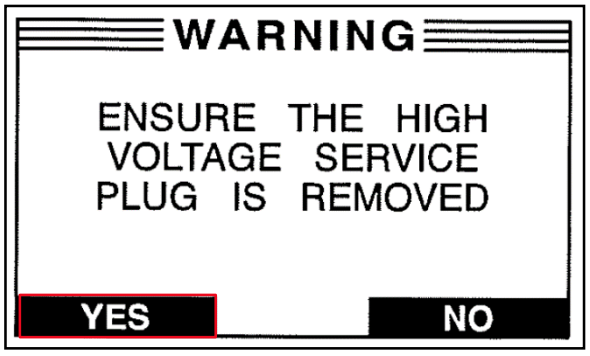
Figure 3.



H. Ensure the service plug grip is removed, then press Yes.

> NOTE
>
> Refer to the applicable model and model year Repair Manual at *TIS – Engine Hybrid System – Hybrid/Battery Control System – HV Battery Charging* for the appropriate wait time AFTER the high voltage service plug grip is pulled.

Figure 4.



I. Connect the High Voltage Cable V to the fuse box.

J. Connect the Banana Jack Extension Cable X to the fuse box.

K. Connect High Voltage Cable V to the GRX-5100.

L. Connect the Low Voltage Cable R to the GRX-5100.

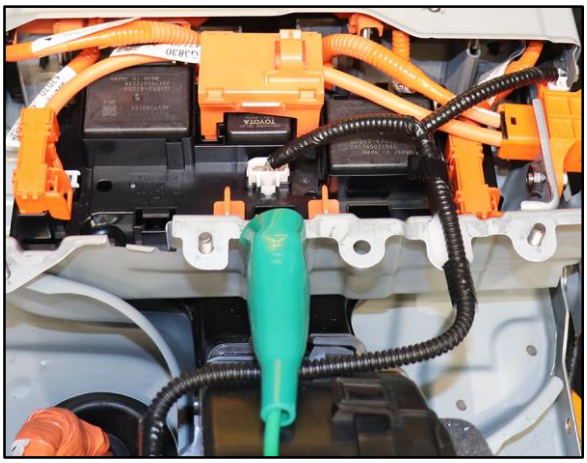
> **CAUTION**
>
> - **ALWAYS wear insulated gloves and the appropriate PPE provided in the HEV Workstation when working with high voltage.**
> - **ALWAYS use insulated tools provided in the HEV Workstation when working with high voltage.**

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

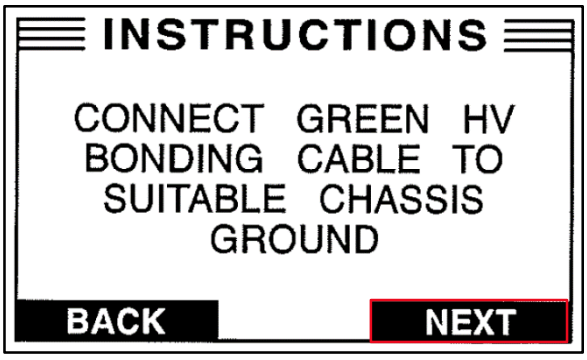
M. Connect the green high voltage bonding cable to a suitable chassis ground.

Figure 5.



N. Press Next.

Figure 6.



High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

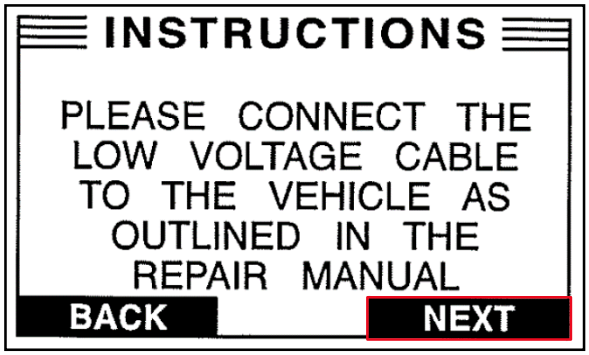
O. Connect the low voltage cable as shown in Repair Manual.

> NOTE
>
> The Repair Manual may call this cable “EV bonding cable (green cable).”

Figure 7.

P. Press Next.

Figure 8.



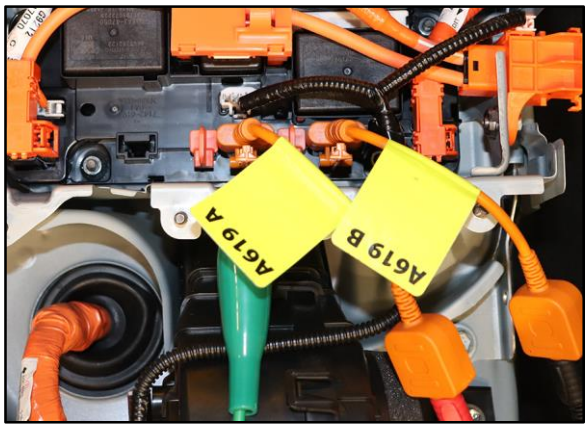
High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

Q. Plug Cable A619A and Cable A619B into the HV battery location shown in the Repair Manual.

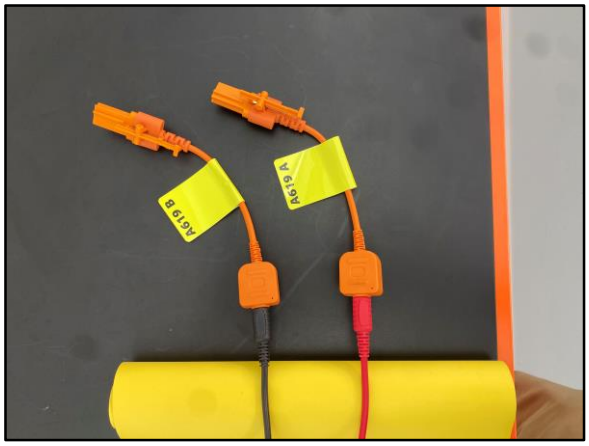
> NOTE
>
> Install the HV cables above in the same location on the junction block as the “High voltage cable” listed in the Repair Manual.

Figure 9.



R. Connect the red (+) Banana Jack Extension cable into A619A, and the black (-) banana jack extension cable into A619B.

Figure 10.



S. Inspect the connection according to the applicable model and model year Repair Manual at *TIS – Engine/Hybrid System – Hybrid/Battery Control System – HV Battery Charging* for proper installation.

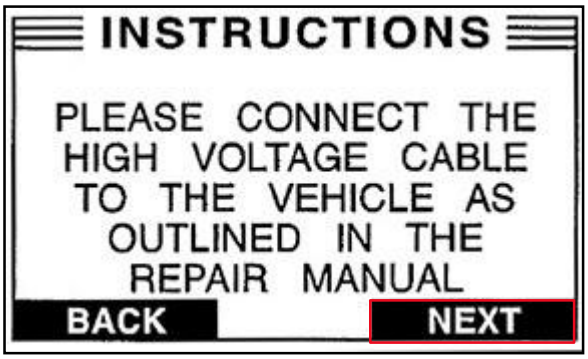
> NOTE
>
> The Repair Manual will show Lexus THS charger usage; please use the GRX-5100 instead.

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

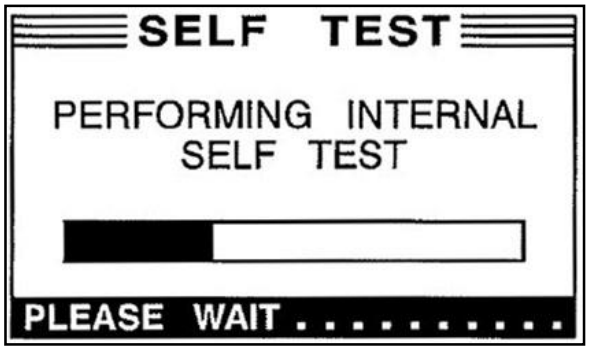
T. Press Next.

Figure 11.



U. Wait for the internal test to complete.

Figure 12.

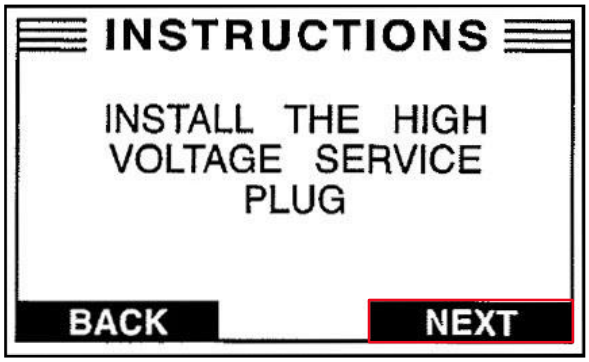


V. Install the service plug grip.

W. Press Next.

NOTICE
Make sure the service plug grip's interlock is fully engaged.

Figure 13.



High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

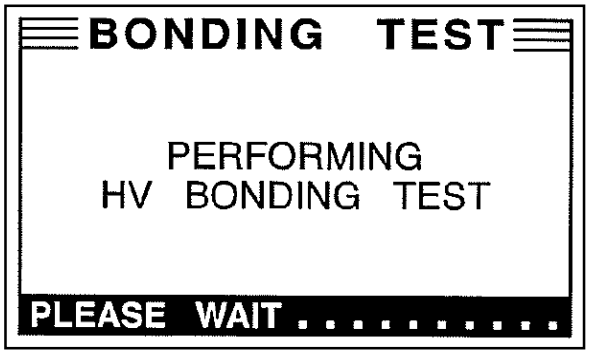
Rescue Charge at Battery (continued)

X. Connect the negative (–) terminal of the auxiliary battery.

> NOTE
> Using the power supply mode, connect the DCA-8000 to the auxiliary battery.

Y. Wait for the high voltage bonding test to complete.

Figure 14.



5. HV battery rescue charging.
   A. Turn the vehicle power switch to the IG-ON position.
   B. Connect Techstream to DLC3.
   C. Refer to the following menus: *Powertrain – Hybrid Control – Active Test – Battery Charge*.

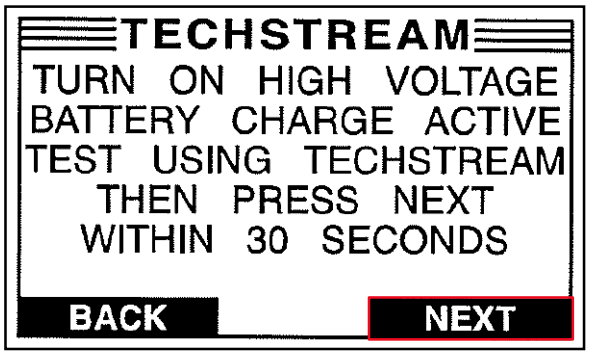
> HINT
> During the battery charge active test, check the *System Main Relay Status – SMRB* and the *System Main Relay Status – SMRG* on the data list.

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

D. Open the battery charge active test and click the ON button on Techstream. Then press Next on the GRX-5100 to start HV battery charging within 30 seconds.

Figure 15.



NOTE

- AFTER the battery charge active test has been turned ON, press Next on the GRX-5100 within 30 seconds. If Next is NOT pressed within 30 seconds, the SMR will open, and the GRX-5100 will NOT be able to charge the HV battery.
- If the shielding of the frame wire is NOT securely connected to body ground, the GRX-5100 will NOT operate.
- The GRX-5100 charging condition status will be displayed on the screen of the GRX-5100 while charging the HV battery.
- During the HV battery charge cycle, the voltage and charge current will be recorded on the flash drive.
- The GRX-5100 will automatically stop 10 minutes AFTER charging starts. SMRs will automatically open as soon as the GRX-5100 stops charging.
- If the data list values are NOT as specified in the table below, restart Techstream and cycle the vehicle's power switch to the IG-ON/OFF positions, and then perform the HV battery rescue charging procedure again.

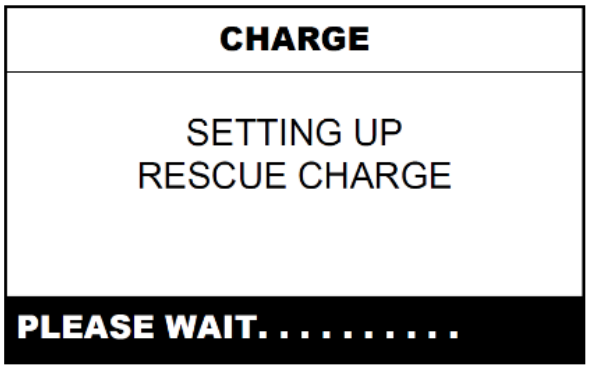
STEP	ACTIVE TEST BATTERY CHARGE	GRX-5100 START SWITCH	DATA LIST SYSTEM MAIN RELAY STATUS – SMRB	DATA LIST SYSTEM MAIN RELAY STATUS – SMRG
1	OFF	OFF	OFF	OFF
2	OFF → ON	OFF	OFF → ON	OFF → ON
3	ON	OFF → ON	ON	ON

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

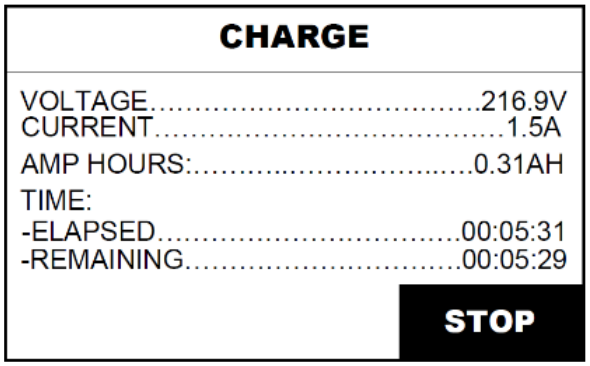
E. Wait for the HV battery rescue charge to start.

Figure 16.



F. Repeat the charge cycle up to three times if required.

Figure 17.



NOTE

- Charging time while using the GRX-5100 is 10 minutes per charge cycle when the battery temperature is above 77°F (25°C).
- If the battery temperature is below 32°F (0°C), then three 10-minute charge cycles may be required for putting the engine in a condition where it can be started (the system can enter the READY ON state).
- The GRX-5100 will automatically stop 10 minutes AFTER charging starts.
- There is VERY LITTLE chance of overcharging the HV battery during the second or third charging cycle. The SOC will not likely increase beyond the upper limit because it was low enough to prevent the engine from starting. Even if the SOC were to increase enough to exceed the limit, the hybrid vehicle control ECU will stop the active test to prevent overcharging.
- Cranking the engine once causes the SOC to drop approximately 1%.
- Charging the HV battery once (10 minutes) using the GRX-5100 restores the SOC approximately 2%.

High Voltage (HV) Battery Rescue Charge at Battery (HEV Workstation/GRX-5100)

Rescue Charge at Battery (continued)

6. Reassemble the vehicle.

CAUTION

- **ALWAYS wear insulated gloves and the appropriate PPE provided in the HEV Workstation when working with high voltage.**
- **ALWAYS use insulated tools provided in the HEV Workstation when working with high voltage.**

A. Turn the GRX-5100 power switch OFF.

B. Turn the vehicle power switch OFF.

C. Disconnect the 12V auxiliary battery.

D. Remove the service plug grip.

E. Remove the GRX-5100 cables.

F. Reassemble the vehicle following the applicable model and model year Repair Manual at *TIS – Engine Hybrid System – Hybrid/Battery Control System – HV Battery Charging*.

G. Install the service plug grip.

H. Connect the 12V auxiliary battery.

I. Check for ANY DTCs.

J. Confirm whether the engine cranks.
Does the engine crank?
- **YES —** Continue to substep K.
- **NO —** Repeat steps 3 – 6.

K. Confirm whether the engine starts.
Does the engine start?
- **YES —** Continue to step 7.
- **NO —** Continue diagnosis using the applicable Repair Manual.

7. Allow the vehicle to idle in park “P” until the engine stops. Once the engine stops, self-charge has been completed.