

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

**Service Category** Engine/Hybrid System

**Market** USA and Mexico

**Section** Hybrid/Battery Control System

Toyota Supports ASE Certification 

## Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2013 - 2018	Avalon HV	
2007 - 2017	Camry HV	
2006 - 2019	Highlander HV	
2012 - 2021	Prius C	
2012 - 2018	Prius V	
2001 - 2015	Prius	
2016 - 2018	RAV4 HV	

### **SUPERSESSION NOTICE**

The information contained in this bulletin supersedes Service Bulletin No. T-SB-0119-15

- The Market has been updated to include Mexico.
  - The Required Tools & Equipment and Rescue Charge HV Battery sections have been updated.
- Service Bulletin No. T-SB-0119-15 is obsolete and any printed versions should be discarded.

## Introduction

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

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

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### Required Tools & Equipment

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
High Voltage Battery Service Unit*	01413-00002	1
Interface ECU* – 64	01413-00017	
High Voltage Cable* (A)	01413-00013	
High Voltage Cable* (B)	01413-00014	
High Voltage Cable* (C)	01413-00015	
High Voltage Cable* (D)	01413-00016	
High Voltage Cable* (E)	01413-00009	
High Voltage Cable* (G)	01413-00018	
Universal High Voltage Cable* (V)	01413-00007	
Interlock Connector*	01413-00003	
Stack Balance Cable* (I)	01413-00024	
Low Voltage Cable* (P)	01413-00022	
Low Voltage Cable* (Q)	01413-00023	
Low Voltage Cable* (R)	01413-00004	
Cell Voltage Cable* (J)	01413-00019	
Cell Voltage Cable* (L)	01413-00021	
Temperature Sensor Cable* (K)	01413-00020	
Universal Fuse Box*	01413-00010	
AC Power Cord* (S)	01413-00005	
D/C Adapter Kit* (T&U)	01413-00006	
Banana Jack Extension Cable* (X)	01413-00031	
AC Circuit Checker*	01413-00012	
Battery Diagnostic Tool*	<a href="#">DCA-8000P I</a>	

















\*Essential SST for TMNA, GST, SET (US) Market Dealers. For non-TMNA (TdPR, TdMEX, Servco) dealers, contact your Distributor Representative for tool sourcing options or purchase the necessary SSTs.

## High Voltage (HV) Battery Rescue Charge (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.

**Table 1.**

TMC PART NUMBERS*			TMNA PART NUMBERS**			
SUB-COMPONENTS	IMAGE	DESCRIPTION	MAIN	SUB-COMPONENTS	IMAGE	DESCRIPTION
09881-10041		THS Charger	01413-00002	GRX-5100T		GRX-5100 High Voltage Battery Service Unit (HV/EV Charge/Discharge Tool)
09881-10081		THS Charger AC Cable	01413-00005	A573		AC Power Cord (S)
09882-10070		Low Voltage Cable	01413-00004	A533		Low Voltage Cable (R)
09882-10040		High Voltage Cable	01413-00016	A504		High Voltage Cable (D)
			01413-00010	A296		Universal Fuse Box
			01413-00007	A571		Universal High Voltage Cable (V)
09882-10030		High Voltage Cable	01413-00015	A503		High Voltage Cable (C)
			01413-00010	A296		Universal Fuse Box
			01413-00007	A571		Universal High Voltage Cable (V)
09883-00010		Interlock Cover	01413-00003	A580		Interlock Cover















\*TMC Part Numbers listed in this matrix are NOT available in North America.

\*\*TMNA Part Numbers listed in this matrix are available in North America and should be included in the HEV Workstation (large orange toolbox).

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

### Required Tools & Equipment (continued)

**Table 1. (continued)**

TMC PART NUMBERS*			TMNA PART NUMBERS**			
SUB-COMPONENTS	IMAGE	DESCRIPTION	MAIN	SUB-COMPONENTS	IMAGE	DESCRIPTION
09882-10080		High Voltage Cable	01413-00009	A505		High Voltage Cable (E)
			01413-00010	A296		Universal Fuse Box
			01413-00007	A571		Universal High Voltage Cable (V)
09982-10010	N/A	High Voltage Cable	01413-00013	A501		High Voltage Cable (A)
			01413-00010	A296		Universal Fuse Box
			01413-00007	A571		Universal High Voltage Cable (V)
09982-10050		Low Voltage Cable	01413-00022	A531		Low Voltage Cable (P)
09882-10020		High Voltage Cable	01413-00014	A502		High Voltage Cable (B)
			01413-00010	A296		Universal Fuse Box
			01413-00007	A571		Universal High Voltage Cable (V)
09882-10060		Low Voltage Cable	01413-00023	A532		Low Voltage Cable (Q)

\*TMC Part Numbers listed in this matrix are NOT available in North America.

\*\*TMNA Part Numbers listed in this matrix are available in North America and should be included in the HEV Workstation (large orange toolbox).

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

### Required Tools & Equipment (continued)

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream ADVI*	ADE	TSADVUNITECP	1
Techstream Lite		TSLP3DLR01	
Techstream Lite (Green Cable)		TSLP2DLR01	

\*Essential SST.

**NOTE**

- Only ONE of the Techstream units listed above is required.
- GTS+ software version 2025.04.002.02 or later is required.
- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787 (USA) or +(525) 5550 10 3000 (Mexico) or by visiting *TIS – Diagnostics – Tools & Equipment – Techstream Order Portal*.

### Rescue Charge HV 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 (HEV Workstation/GRX-5100)

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### Rescue Charge HV 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 w/ 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 Toyota THS charger connection instruction in the Repair Manual. Follow the proceeding step in this bulletin to correctly use the GRX-5100.

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

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### Rescue Charge HV Battery (continued)

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

- [2013](#) / [2014](#) / [2015 – 2018](#) Avalon HV:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2007](#) / [2008](#) / [2009](#) / [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) / [2015](#) / [2016](#) / [2017](#) Camry HV:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2006](#) / [2007](#) / [2008](#) / [2009](#) / [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014 – 2016](#) / [2017 – 2019](#)  
Highlander HV:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2012](#) / [2013](#) / [2014](#) / [2015](#) / [2016 – 2017](#) / [2018 – 2021](#) Prius C:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2012](#) / [2013](#) / [2014](#) / [2015](#) / [2016 – 2018](#) Prius V:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2001](#) / [2002](#) / [2003](#) / [2004](#) / [2005](#) / [2006](#) / [2007](#) / [2008](#) / [2009](#) / [2010](#) / [2011](#) / [2012](#) / [2013](#)  
/ [2014](#) / [2015](#) Prius:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*
- [2016 – 2017](#) / [2018](#) RAV4 HV:  
*Engine / Hybrid System – Hybrid / Battery Control – HV Battery – Charging*

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

### Rescue Charge HV Battery (continued)

4. Connect the GRX-5100 for a rescue charge
  - A. Use the table below to select the high voltage and low voltage cables for the specific model that is being rescue charged. Some vehicles may also require a high voltage accessory. Remove the necessary SST cables located in the HEV workstation toolbox drawers.

**Table 2.**

Model Name	Year	High Voltage Cables					HV Accessory	Low Voltage Cable / HV Bonding Cable		
		01413-00013	01413-00014	01413-00015	01413-00016	01413-00009	01413-00003	01413-00022	01413-00023	01413-00004
		A501	A502	A503	A504	A505	A580	A531	A532	A533
Description	Cable A	Cable B	Cable C	Cable D	Cable E	Interlock Connector	Cable P	Cable Q	Cable R	
Avalon HV	2013 – 2018	–	–	–	<b>X</b>	–	–	–	–	<b>X</b>
Camry HV	2007 – 2011	–	–	–	<b>X</b>	–	–	–	–	<b>X</b>
	2012 – 2017	–	–	–	<b>X</b>	–	–	–	–	<b>X</b>
Highlander HV	2006 – 2007	–	–	<b>X</b>	–	–	–	–	–	<b>X</b>
		–	–	<b>X</b>	–	–	–	–	–	<b>X</b>
	2008 – 2010	–	–	–	<b>X</b>	–	–	–	–	<b>X</b>
	2011 – 2013	–	–	–	–	<b>X</b>	<b>X</b>	–	–	<b>X</b>
	2014 – 2019	–	–	–	–	<b>X</b>	<b>X</b>	–	–	<b>X</b>
Prius	2001 – 2003	<b>X</b>	–	–	–	–	–	<b>X</b>	–	–
	2004 – 2009	–	<b>X</b>	–	–	–	–	–	<b>X</b>	–
	2010 – 2015	–	–	–	–	<b>X</b>	<b>X</b>	–	–	<b>X</b>
Prius C	2012 – 2021	–	–	–	–	<b>X</b>	<b>X</b>	–	–	<b>X</b>
Prius V	2012 – 2018	–	–	–	–	<b>X</b>	<b>X</b>	–	–	<b>X</b>
RAV4 HV	2016 – 2018	–	–	–	<b>X</b>	–	–	–	–	<b>X</b>

**NOTE**

All models require Cable V (01413-00007 A571) and Universal Fuse Box (01413-00010 A296).

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

### Rescue Charge HV Battery (continued)

**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.

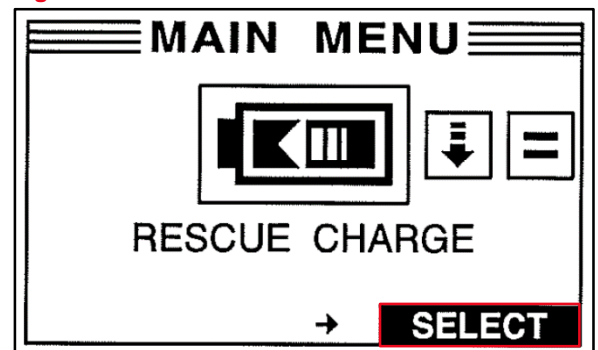
- B. Connect the power input (Cable S) to the GRX-5100 and connect the cable into a grounded AC 100 to 240V receptacle.

**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.

- 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.

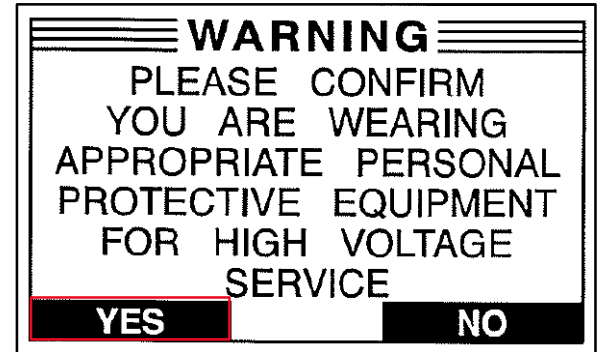
## High Voltage (HV) Battery Rescue Charge (HEV Workstation/GRX-5100)

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### Rescue Charge HV Battery (continued)

F. Press YES.

Figure 2.

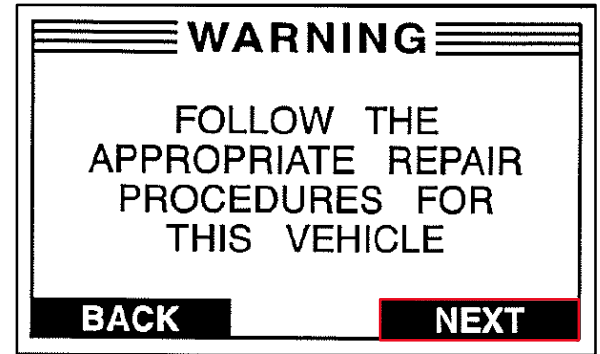


G. Press NEXT.

**NOTE**

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

Figure 3.

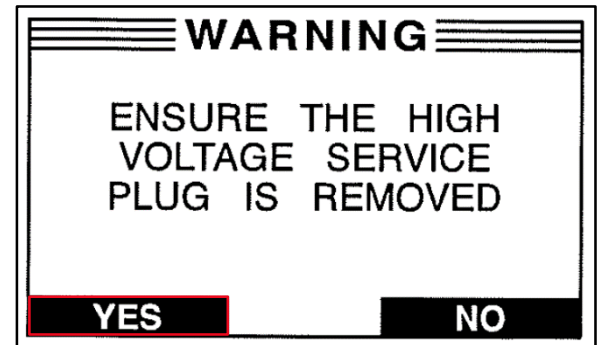


H. Ensure the service plug grip is removed, then press Yes.

**NOTE**

Refer to the applicable model and model year Repair Manual in step 3 for the appropriate wait time AFTER the high voltage service plug grip is pulled.

Figure 4.



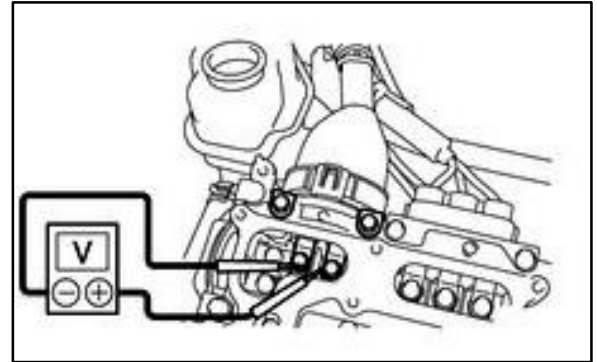
## High Voltage (HV) Battery Rescue Charge (HEV Workstation/GRX-5100)

### Rescue Charge HV Battery (continued)

- I. Remove the inverter terminal cover.
- J. Check the terminal voltage.

**HINT**  
Standard voltage is 0V.

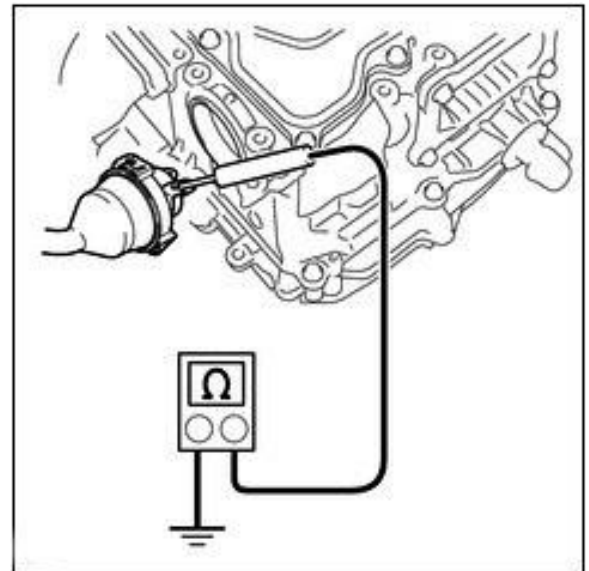
**Figure 5.**



- K. Disconnect the frame wire.
- L. Measure the resistance according to the value(s) in the table below.

**NOTE**  
If the shielding of the frame wire is NOT securely connected to body ground, the GRX-5100 will NOT operate.

**Figure 6.**



**Table 3**

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Frame Wire Connector Housing – Body Ground	Always	Below 1 Ω

- M. If the results are NOT as specified, inspect the connection according to the applicable model and model year Repair Manual in step 3 for proper installation.
- N. Connect the vehicle specific high voltage cable to the Universal Fuse Box.

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

### Rescue Charge HV Battery (continued)

- O. Connect High Voltage Cable V to the fuse box.
- P. Connect High Voltage Cable V to the GRX-5100.
- Q. Connect the vehicle specific low voltage cable to the GRX-5100.
- R. Install the inverter terminal cover to the inverter assembly.

**NOTICE**

- Do NOT allow any foreign material or water to enter the inverter assembly.
- Make sure ALL connectors are securely connected.

**CAUTION**

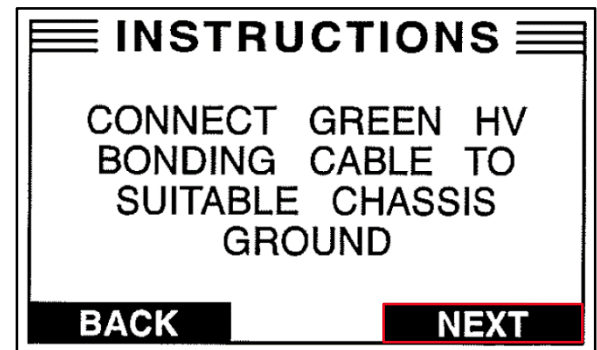
- ALWAYS wear insulated gloves and the appropriate PPE provided in the HEV Workstation when working with high voltage.
- ALWAYS use insulated tools provided in the HEV Workstation when working with high voltage.

- S. Connect the green high voltage bonding cable to a suitable chassis ground.
- T. Press NEXT.

**NOTE**

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

Figure 7.



- U. Connect the low voltage cable to inverter terminal cover as shown in the Repair Manual.

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

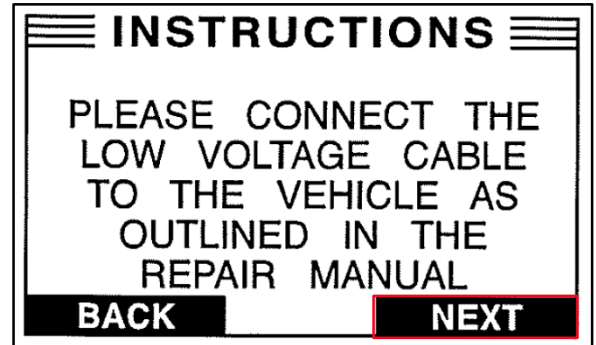
### Rescue Charge HV Battery (continued)

V. Press NEXT.

**NOTE**

NOT ALL vehicles require a separate low voltage cable circuit.

Figure 8.



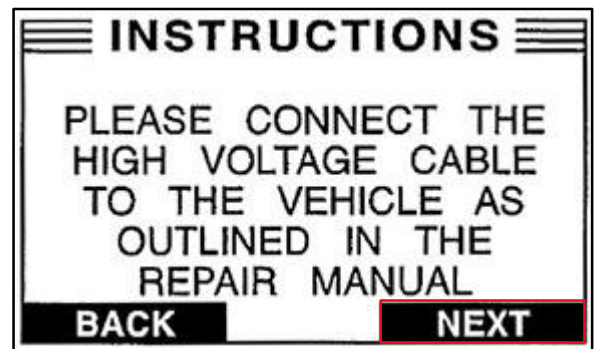
W. Connect the high voltage cable to the vehicle's frame wire.

X. Press NEXT.

**NOTE**

- Certain high voltage cables require a grounding bolt to complete the high voltage bonding test.
- High voltage cables requiring a grounding bolt have been labeled using a black sticker indicating bolt location, size, and torque.

Figure 9.

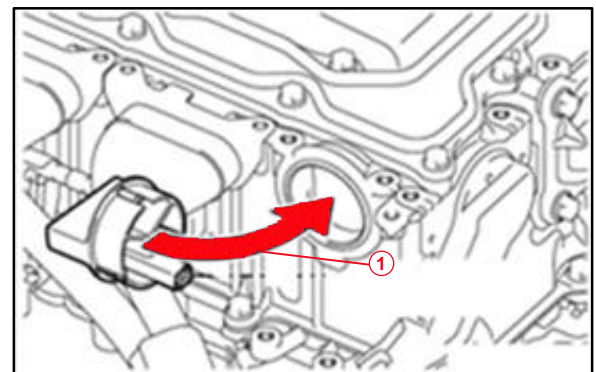


Y. Install the interlock connector in the inverter (not required on all models).

**NOTE**

The battery charge active test will fail and a DTC will set if the interlock connector is NOT installed.

Figure 10.



<b>1</b>	<b>Interlock</b>
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## High Voltage (HV) Battery Rescue Charge (HEV Workstation/GRX-5100)

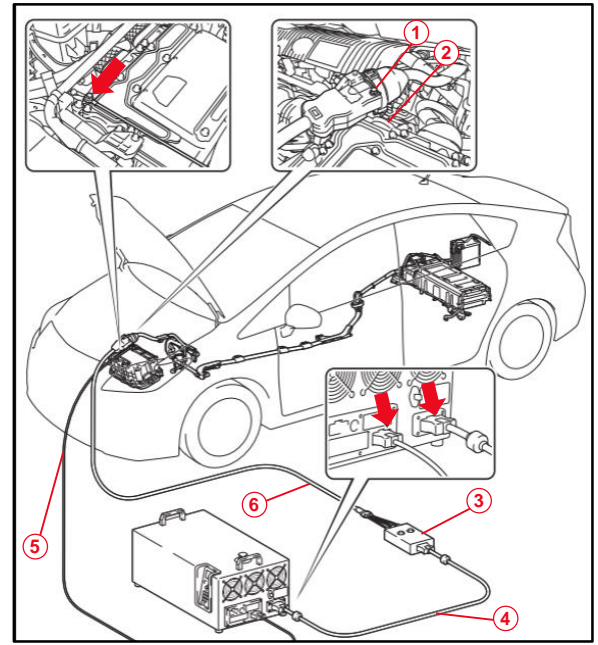
### Rescue Charge HV Battery (continued)

- Z. Inspect the connection according to the applicable model and model year Repair Manual using the links found in step 3.

**NOTE**

An overall view of connectors and their connections for the GRX-5100 during a high voltage battery rescue charge is shown in Figure 11.

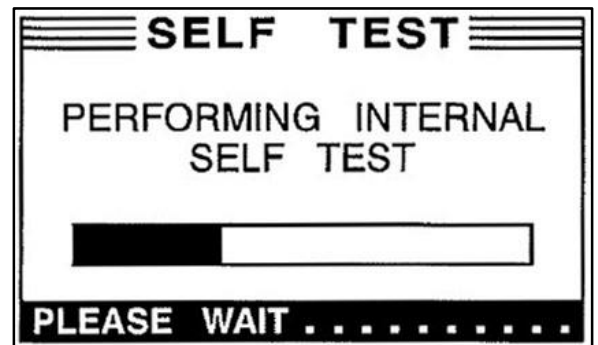
**Figure 11.**



1	Grounding Bolt
2	Interlock Connector
3	Fuse Box
4	Cable V
5	Cable R
6	Cable E

- AA. Wait for the internal test to complete.

**Figure 12.**



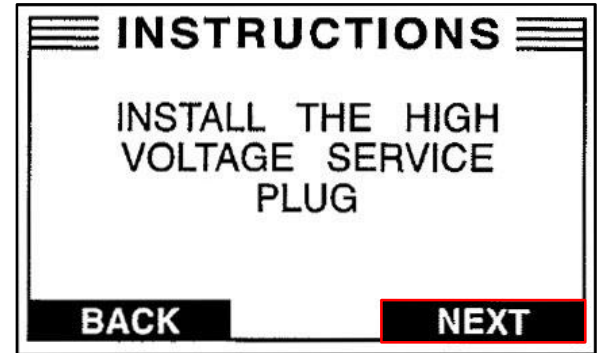
## High Voltage (HV) Battery Rescue Charge (HEV Workstation/GRX-5100)

### Rescue Charge HV Battery (continued)

- BB. Install the service plug grip.
- CC. Press NEXT.

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

Figure 13.

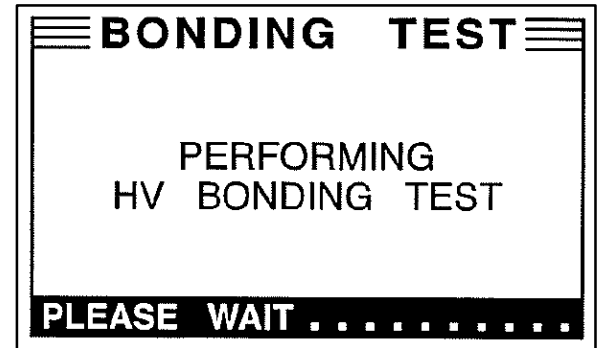


- DD. Connect the negative (-) terminal of the auxiliary battery.

**NOTE**  
 Using the ECU Reflash mode, connect the DCA-8000 to the auxiliary battery.

- EE. 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 GTS+ 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 (HEV Workstation/GRX-5100)

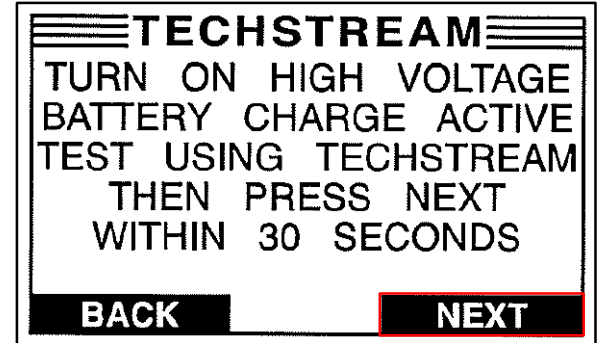
### Rescue Charge HV Battery (continued)

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

**HINT**

After starting the active test, the SMRs should make an audible “click” when they close.

**Figure 15.**



**NOTE**

- AFTER the battery charge active test has been turned ON, press the NEXT button on the GRX-5100 within 30 seconds. If the NEXT button is NOT pressed within the 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 GTS+ and cycle the vehicle’s power switch to the IG-ON/OFF positions and then perform the HV battery rescue charging procedure again.

**Table 4.**

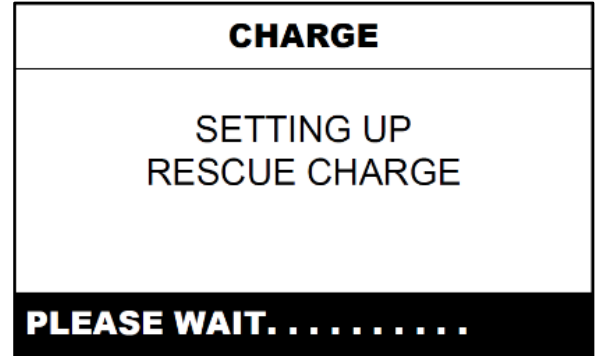
STEP	ACTIVE TEST BATTERY CHARGE	GRX-5100 START SWITCH	DATA LIST SYSTEM MAIN RELAY STATUS - SMRB	DATA LIST SYSTEM MAIN RELAY STATUS - SMRG
1	OFF	OFF	OFF	OFF
2	OFF → ON	OFF	OFF → ON	OFF → ON
3	ON	OFF → ON	ON	ON

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

## Rescue Charge HV Battery (continued)

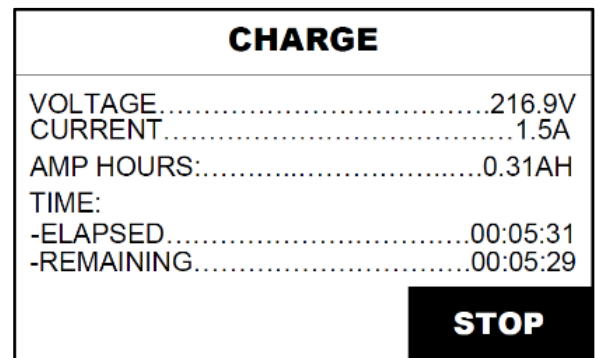
- E. Wait for the HV battery rescue charge to start.

Figure 16.



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

Figure 17.



**HINT**  
 Observe the current (amp) readings on the GRX charge screen. If the current is zero, then the GRX isn't charging the battery. There might be an open in the GRX Cable charging circuit and/or the SMRs didn't close or didn't stay in the closed position after starting the active test on the scan tool.

**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 (HEV Workstation/GRX-5100)

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### Rescue Charge HV 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 12V auxiliary battery.
  - D. Remove the service plug grip.
  - E. Remove the GRX-5100 cables and interlock connector.
  - F. Reassemble the vehicle following the applicable model and model year Repair Manual found in step 3.
  - 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 sub step K.
    - **NO** — Repeat steps 3 – 6.
  - K. Confirm whether the engine starts.  
Does the engine start?
    - **YES** — Continue to step 7.
    - **NO** — This bulletin does NOT apply. 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.