7ISSUE DATE:	7/7/2020
SERVICE BULLETIN SUBJECT:	800 Volt Software Update
VINs or MODELS AFFECTED:	Service Specified Buses
COMPLETE BY:	Next Service Opportunity
SERVICE BULLETIN #:	SB-20-91

NOTICE! It is expected that this process may require up to 1 hour per bus. Please schedule appropriately to minimize vehicle downtime.

VEHICLE SOFTWARE UPDATE

Description

The reason for this software update is to update various controllers to the latest state of the art software. This will improve vehicle up-time, reduce driver interactions with the doors, and improve diagnostic fault handling. All the included Proterra Catalyst 800V vehicles require a change to the software/configuration for the following items:

- Body Controller
- Vehicle Controller
- HVAC Inverter

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Summary of Software Changes

There are three controllers that will be updated. Below are the high-level updates. More detailed information is available in the individual controllers release notes.

- Body Controller
  - Updated the HVAC state conditions to not request for fan control during auxiliary heat cycles.
  - Updated the HVAC heat cycle state conditions to request to lockout the A/C functionality.
  - Added a PA System Active Icon.
  - Added a Video Event Active Icon.
  - Added functionality to always request to close the fresh air flaps and prevent opening.
  - Fixed an issue where the HVAC state machine was not exiting the electric heat state to other new HVAC states.
  - Fixed an issue where the curbside rear door was not able to be requested to close while opening.
  - Fixed an issue with the vehicle range and efficiency displayed on the dash.
  - Fixed an issue with false ceiling light configuration diagnostics being always active.
- Vehicle Controller
  - Change hard coded power electronics coolant pump max temperature limit to a calibratable parameter.
  - Added HVIL 10hz low pass filter on the analog signal to remove the high frequency noise that is tripping HVIL. Added a learned DC offset to use based on a 2.5 second moving average window, to base protections on.
  - Graham White cutout pressure set to 130 psi
  - When requested from the Body or Manual Charging, set interlocks only when parking brake is not set.
  - Added cableCheck response contains CableCheckFailed as condition to set SPN 520879 FMI 31 'Pantograph Failed to Connect' fault.
  - Added auto-detect for Heron based on additional coolant sensor availability.
  - SPN 8234 FMI 0 will not be set when Battery Coolant Temperature is Invalid.
  - Battery Heater FMI 0 will not trip when FMI 3 is active.
  - Update flow status determination to be based off the pump speed Cals.

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- HVAC Inverter
    - HVAC Lenze VFD AC switching frequency is changed from 8 kHZ to 2KHZ, this dramatically increases the max allowable current and thus power the compressor can pull.
    - The Vehicle controller is updated for 15KW inverters to reduce compressor speed when power exceeds the set limit where an over current can occur (even with 2KHZ switching frequency), Speed is reduced temporarily and is increased incrementally continually to test if the exceedingly high current draw is lower.
    - The HVAC Inverter CAN ID is changed from 246 to 245 for buses with 15KW VFDs getting this software change. This allows the Vehicle controller to properly set vehicle speed contols for 15 and 30 KW VFDs (which would have no limitation).

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Tools/Programs Required

Tools Required:

- Laptop Computer
- Nexiq USB-Link 2
- USB-Serial Adapter
- K-Line Communications Adapter
- Proterra Diagnostic Port DB9 Breakout Cable (Octopus)

Programs Required:

- Proterra Diagnostics Tool
- Parametereditor3

Software Files Required / Preparation

IMPORTANT! NEVER access the software from the USB memory device, ALWAYS copy the software files to your computer hard drive and access the software from this location. Secure the bus with the Vehicle Master Disconnect in the rear ON.

Component	Part Number	Version
Body Controller	054704	6.3.0
Vehicle Controller	054750	4.2.0
HVAC Inverter	054619	Rev_C

It is recommended that you copy the entire “service bulletin files” folder to your local machine in order to more effectively keep track of the software versions you are deploying:
\\bus.local\files\Engineering\Service Bulletins\Service Bulletin Files for SC-20-91\

Service Bulletin Execution

1. Update the Body Controller using the process in Appendix A
2. Update the Vehicle Controller Software using the process in Appendix B
3. Update the HVAC Inverter Software using the process in Appendix C
4. Verify software versions using the Proterra Service Tool
5. Update each work order in Service Max when complete

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Appendix A

BODY SOFTWARE UPDATE PROCEDURE

Description

This document contains the necessary information to update the Body Controller on a Proterra Vehicle. This controller provides the control algorithms for body functionality on 800V models. This covers the control logic relating to driver inputs and display, stop requests, doors, interior and exterior lighting, and ramp control.

Tools/Programs Required

Tools Required:

- Laptop Computer
- Nexiq USB-Link 2

Programs Required:

- Proterra Diagnostics Tool

Software Files Required / Preparation

To program the body controller, you will need a *.ZR32A_A data file. This file contains the necessary firmware files and a baseline configuration to provide an operational bus body. The bus may need to be configured to match customer specific functionality after programming.

If the vehicle has already been configured, the Proterra Diagnostics Tool will attempt to automatically carry the configuration information forward into the new software version.

If needed, configuration information is contained in the released customer configuration documentation. Ensure that you also have the configuration definition for the customer's vehicle.

IMPORTANT! NEVER access the software from the USB memory device or network drive, ALWAYS copy the software files to your computer hard drive and access the software from this location.

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Preparing the Vehicle to be Programmed

When programming a vehicle, it is critical that the low voltage batteries remain connected throughout the process. Ensure that the LV batteries are fully charged before starting the process. If they are low you can use the vehicle to recharge them buy turning on high voltage, or you can place the bus on a low voltage charger for the duration of the process.

Connecting to the Vehicle

This process will guide the user to connect to the vehicle with the Proterra Diagnostics Tool.

1. Power up and login to the Proterra-Supplied laptop or a comparable PC that has the Proterra Diagnostics Tool software installed with a valid license.

2. Turn **ON** the 12/24V rear Vehicle Master Disconnect located at the curbside rear charge port access panel.

Vehicle Master Disconnect

3. Connect the Nexiq USB Link2 device to the laptop and to the OBDII Diagnostic Port located in the Street-Side wheel well box.

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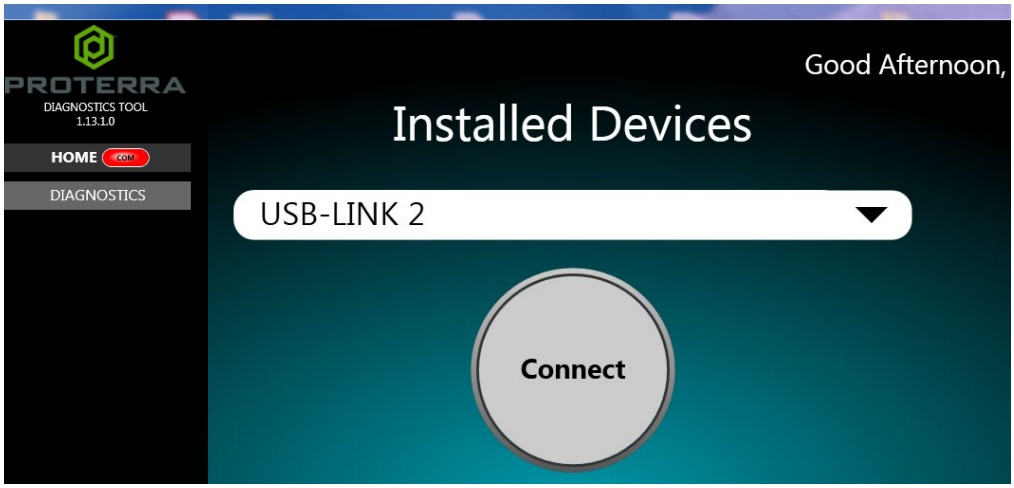
4. Turn the Driver's Master Switch to the **ACC** position.

5. On the laptop, double-click on the Proterra Diagnostics Tool software icon to start the software.

6. When the program opens, read and click OK for the high voltage safety prompt.

7. On the Home tab, select the appropriate device from the drop down and click "Connect".



8. Once the Proterra Diagnostics Tool has connected to the vehicle, you will have a VIN number and connection status displayed on the home screen, and tabs available to navigate. If you don't, double check that the low voltage batteries are connected and that the Nexiq tool is plugged in.

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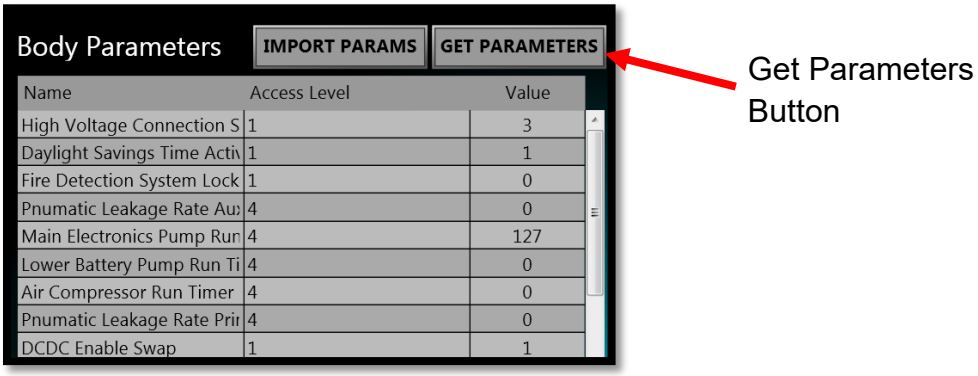
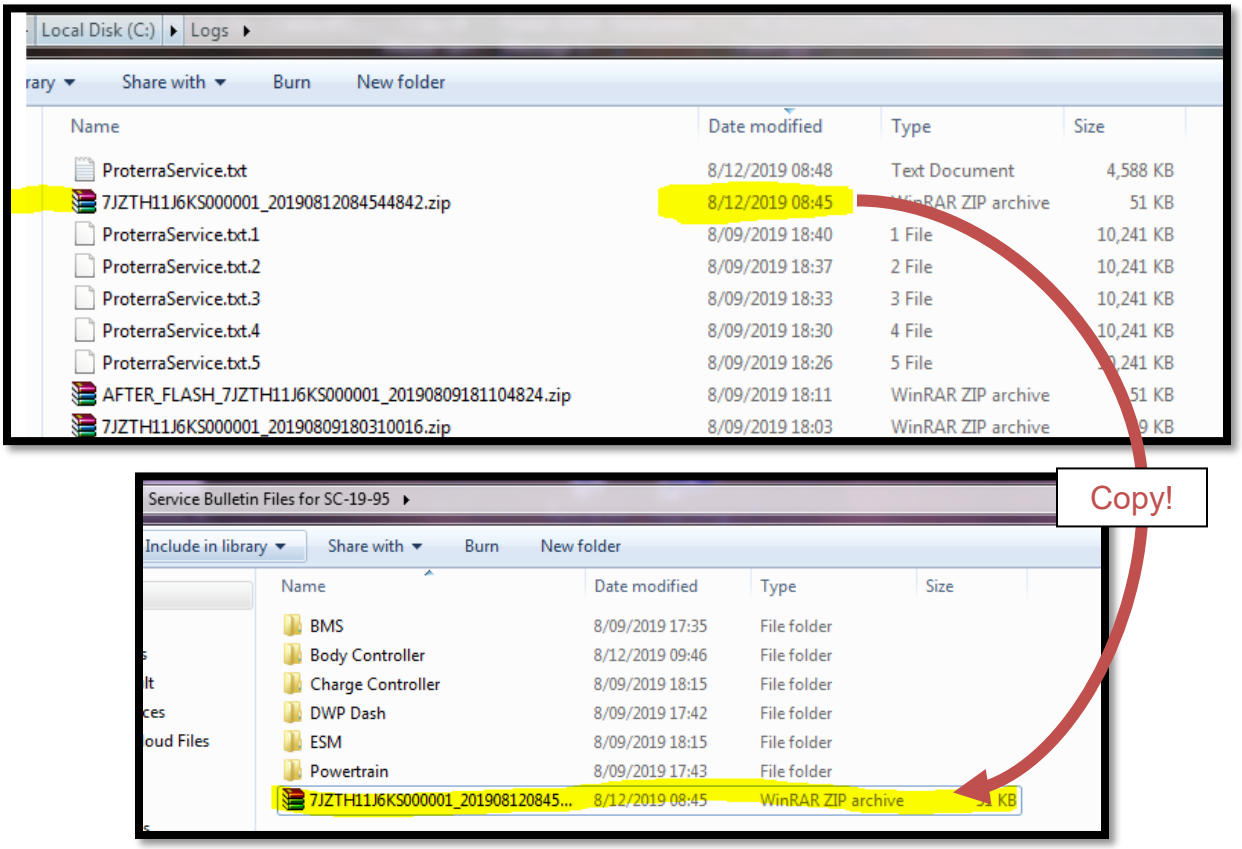
Download and Store Existing Parameters

Sometimes you might want to download and store the customer specific parameters from the vehicle. This can be useful when comparing two vehicles that are behaving differently, or if you are replacing the ZR32A controller on a vehicle.

1. After the first vehicle has been completed and verified, disconnect the Proterra Diagnostics Tool and then re-connect.
2. Navigate to the Configuration tab and click the “Get Parameters” button. This will download the latest parameter set to the “C:\Logs” folder on your machine.



3. In windows file explorer, navigate to the C:\Logs folder. Copy the latest downloaded *.zip file to a folder for the specific customer and vehicle.



4. Do not rename the file as the tool will follow the naming convention when reloading the file.

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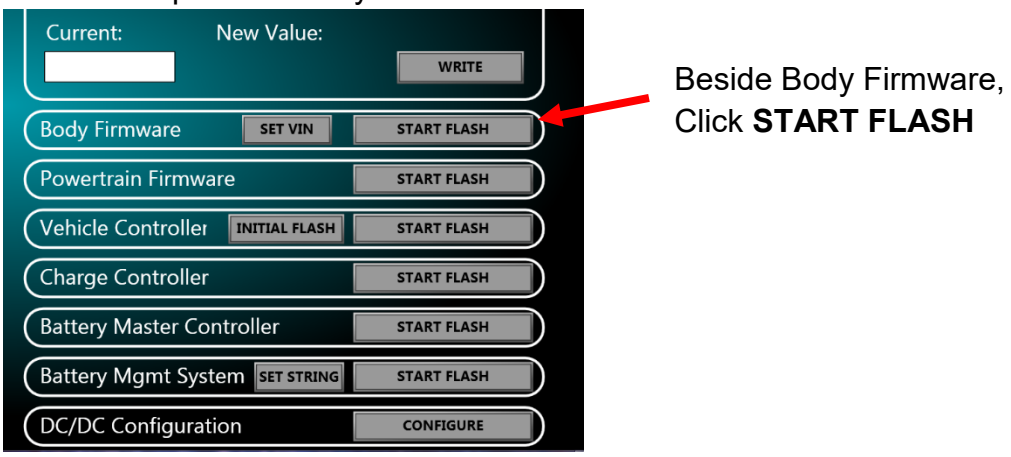
Update Using the Proterra Diagnostic Tool

1. Navigate to the CONFIGURATION tab in the left menu.

2. If this is a replacement controller, select the “SET VIN” and program the controller to match the vehicle VIN, then proceed to step 3. If not proceed to step 3.

3. Select the option for Body Firmware “START FLASH”.



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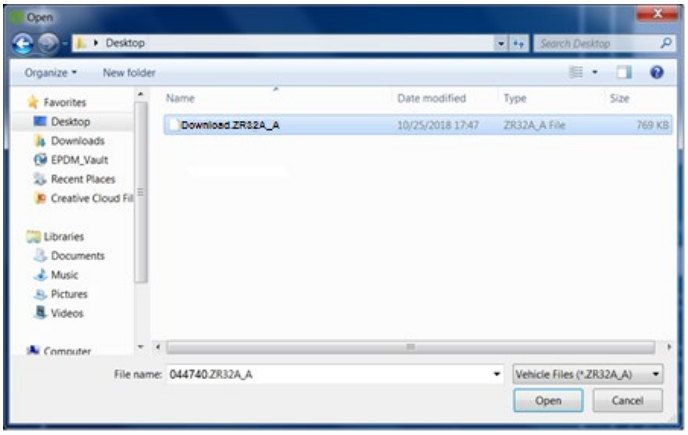
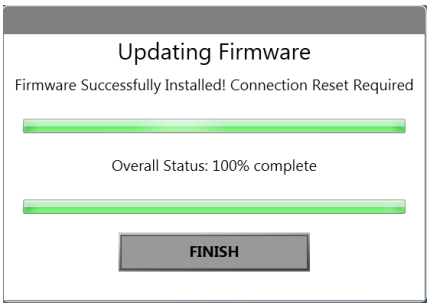
4. In the pop-up window, select the software flash file to load to the controller.



5. The Programming window will come up and will take a few minutes to complete. The process will flash 5 different files to the controller.

6. After the controller is updated the tool will automatically try to copy over the original configuration into the new software. Since there is a possibility that configuration options change it is important to check the configuration after restarting the vehicle.



7. Once the process has finished, cycle power to the bus by moving the driver master switch back to the off position before continuing.

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Appendix B

VEHICLE SOFTWARE UPDATE PROCEDURE

Description

This document contains the necessary information to update the Proterra Vehicle Integration Controller. This controller provides the electrical integration of ancillary systems on 800V models. It owns the vehicle operational state control, startup and shutdown, steering, pneumatics, thermal management, and brake interlock controls.

Tools/Programs Required

Tools Required:

- Laptop Computer
- Nexiq USB-Link 2

Programs Required:

- Proterra Diagnostics Tool

Software Files Required / Preparation

It is recommended that you download any files local to your machine. To program the vehicle controller, you will need a *.hex data file. This file will contain memory address and data information that will be written to the controller in order to update the user code space. This will not update the boot loader or other firmware files.

IMPORTANT! NEVER access the software from the USB memory device, ALWAYS copy the software files to your computer hard drive and access the software from this location.

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Preparing the Vehicle to be Programmed

When programming a vehicle, it is critical that the low voltage batteries remain connected throughout the process. Ensure that the LV batteries are fully charged before starting the process. If they are low, you can use the vehicle to recharge them buy turning on high voltage or you can place the bus on a low voltage charger for the duration of the process.

Connecting to the Vehicle

1. Power up and login to the Proterra-Supplied laptop or a comparable PC that has the Proterra Diagnostics Tool software installed with a valid license.

2. Turn **ON** the 12/24V rear Vehicle Master Disconnect located at the curbside rear charge port access panel.

Vehicle Master Disconnect

3. Connect the Nexiq USB Link2 device to the laptop and to the OBDII Diagnostic Port located in the Street-Side wheel well box.

4. Press and hold the Street-Side Wheel Well WORK LIGHT switch until the work lights turn on.

5. On the laptop, double-click on the Proterra Diagnostics Tool software icon to start the software.

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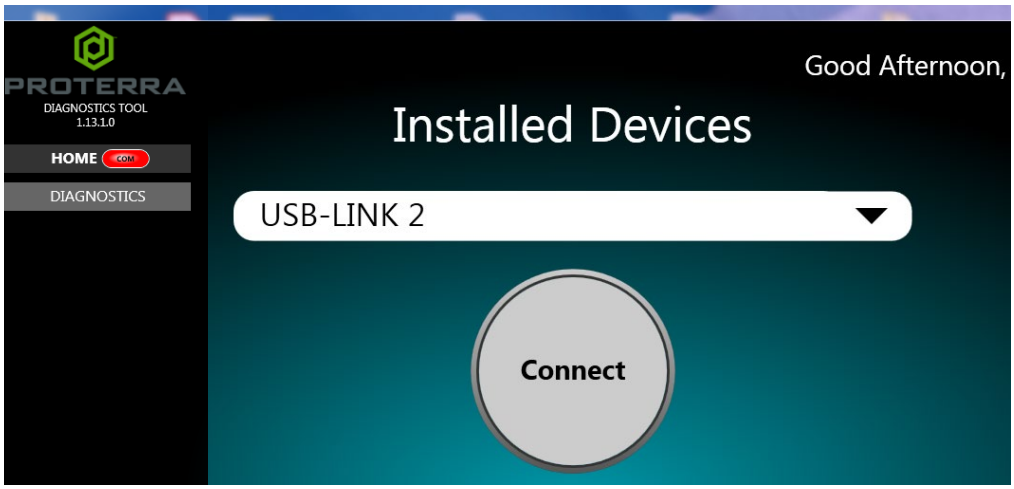
6. When the program opens, read and click OK for the high voltage safety prompt.

7. On the Home tab, select the appropriate device from the drop down and click “Connect”.



8. Once the diagnostic tool has connected to the vehicle, you will have a VIN number and connection status displayed on the home screen, and tabs available to navigate. If you don’t see the Home Screen, double check that the low voltage batteries are connected and that the Nexiq tool is plugged in.
   Note: 800V Proterra vehicles are equipped with an automatic battery disconnect that will protect the low voltage batteries from a deep discharge.

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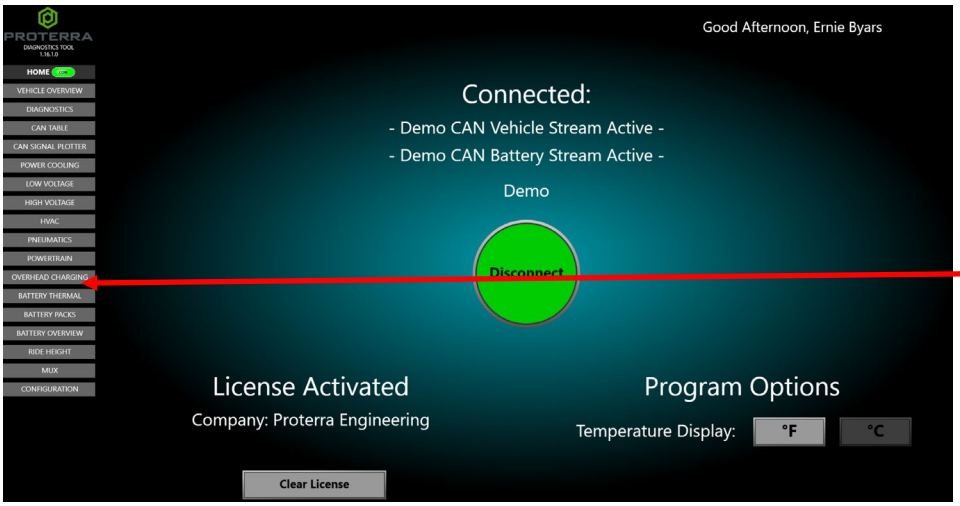
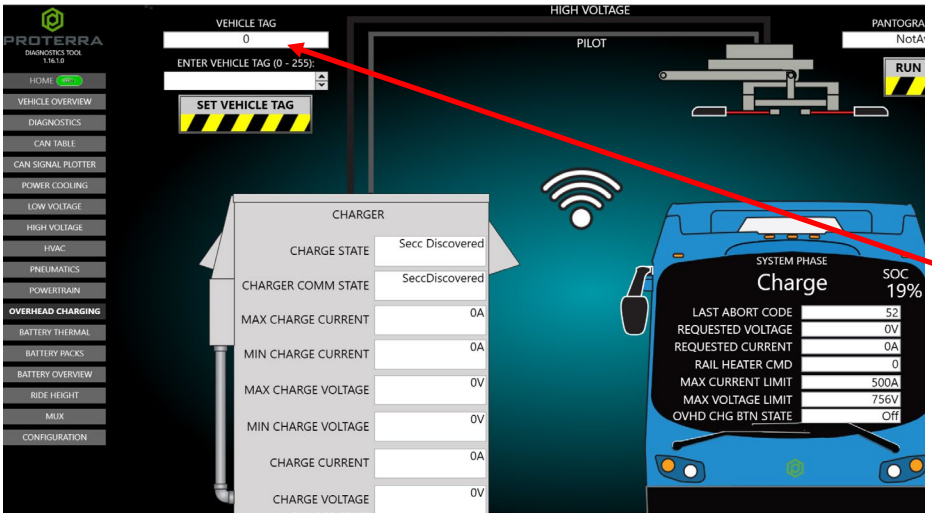
Update Using the Proterra Diagnostic Tool

1. Click on the “Overhead Charging” button on the left side of the screen.
   Note: If the bus that you are working on is not capable of Overhead Charging, skip to step 3 below.



Click “Overhead Charging”

2. Record the value displayed in the “Vehicle Tag” data field. This will be re-entered into the controller after the software update.



Record Vehicle Tag

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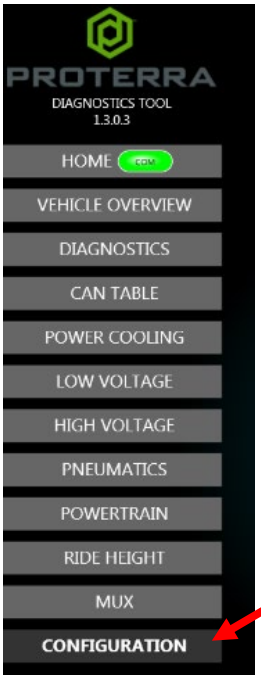
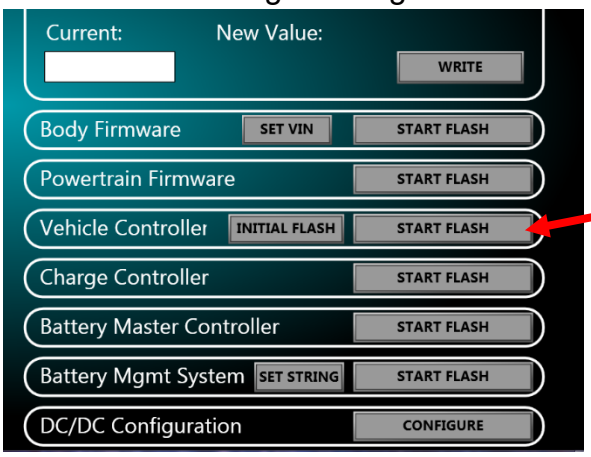
3. Navigate to the CONFIGURATION tab in the left menu.



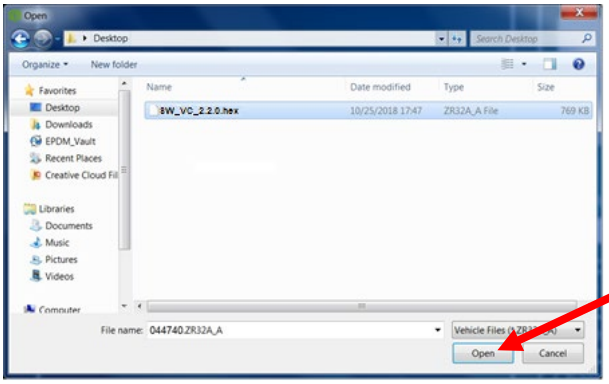
Click
CONFIGURATION

4. Select the option for Vehicle Controller “START FLASH”.
NOTICE: The “INITIAL FLASH” button is only for offline programing of the Vehicle Controller with an Offline Programming Kit.



Beside Vehicle Controller,
Click **START FLASH**

5. In the pop-up window, select the software flash file to load the controller.



Select the file and
Click Open

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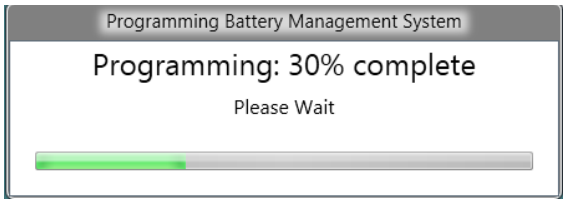
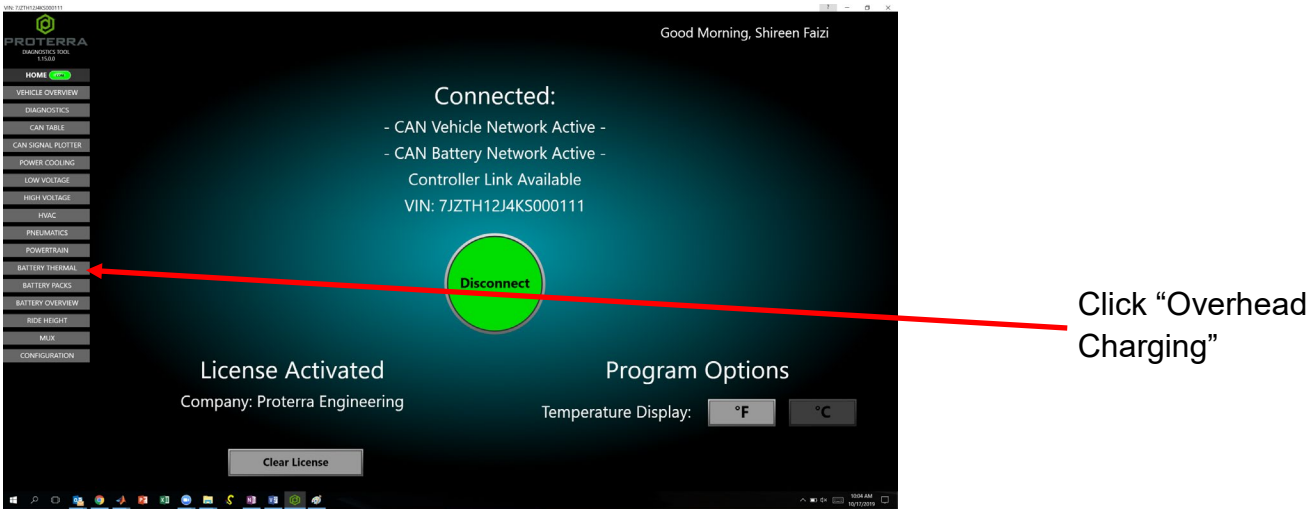
6. The Programming window will come up and may take a few minutes to complete.



7. After completing the software update, Turn **OFF** the Work Light switch inside the street side wheel well box.

8. Click on the “Overhead Charging” button on the left side of the screen.
Note: If the bus that you are working on is not capable of Overhead Charging, skip to step 10 below.



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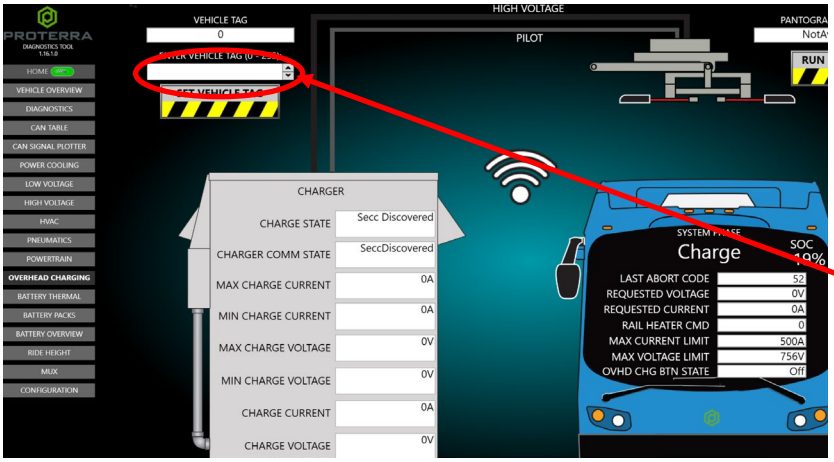
9. The following screen will appear. Enter the “Vehicle Tag” that you recorded previously into the field circled in red below. Click the Button under the field. This will populate the “Vehicle Tag” into the field above and into the controller.



Click “Button”

10. Turn **OFF** the 12/24V rear Vehicle Master Disconnect located behind the vehicle curbside rear charge port access panel, wait 10 seconds, and then turn back to ON.

Vehicle Master Disconnect

11. Verify that the vehicle turns on with no faults and that it is capable of charging.

12. Return the vehicle to service.

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Appendix C

HVAC INVERTER SOFTWARE UPDATE PROCEDURE

Description

This document contains the necessary information to update the Proterra HVAC Inverter. The Inverter supplies AC current to operate the HVAC System.

Tools/Programs Required

Tools Required:

- Laptop Computer with Mobile Starter Software installed
- PCAN Dongle
- Octopus Cable

Programs Required:

- Mobile Starter Software including Commissioning and Diagnostic Panels

Software Files Required / Preparation

It is recommended that you download any files local to your machine. To program the HVAC Inverter, you will need the *.SDTE file and *.hex file in the “Service Bulletin” folder that you downloaded earlier. These files contain the update for the HVAC Inverter.

IMPORTANT! NEVER access the software from the USB memory device, ALWAYS copy the software files to your computer hard drive and access the software from this location.

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Preparing the Vehicle to be Programmed

When programming a vehicle, it is critical that the low voltage batteries remain connected throughout the process. Ensure that the LV batteries are fully charged before starting the process. If they are low, you can use the vehicle to recharge them buy turning on high voltage or you can place the bus on a low voltage charger for the duration of the process.

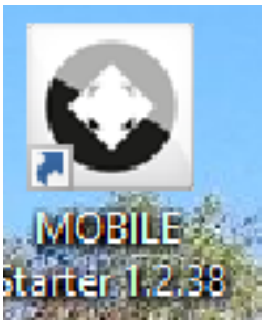
Connecting to the Vehicle

1. Turn the Driver's Master Switch to the **ACC** position.

2. Turn the Hazzard Switch on.

3. Power up and login to the Proterra-Supplied laptop or a comparable PC that has the Mobile Starter software installed.

4. Open the Mobile Starter software by double clicking its icon.



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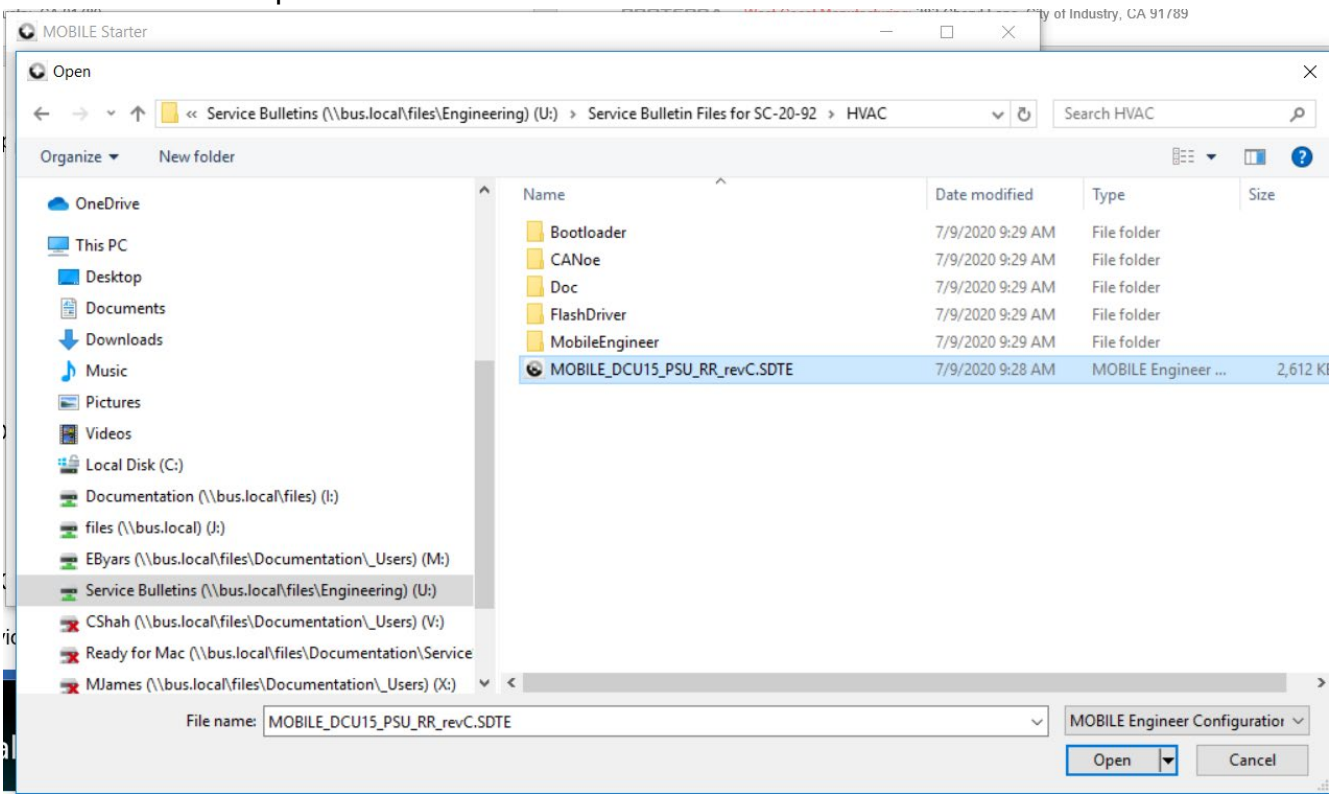
5. The following screen is displayed.

6. Click on “File” in the menu and then click “Open”. Navigate to the location where the files were saved earlier and open the HVAC Folder.



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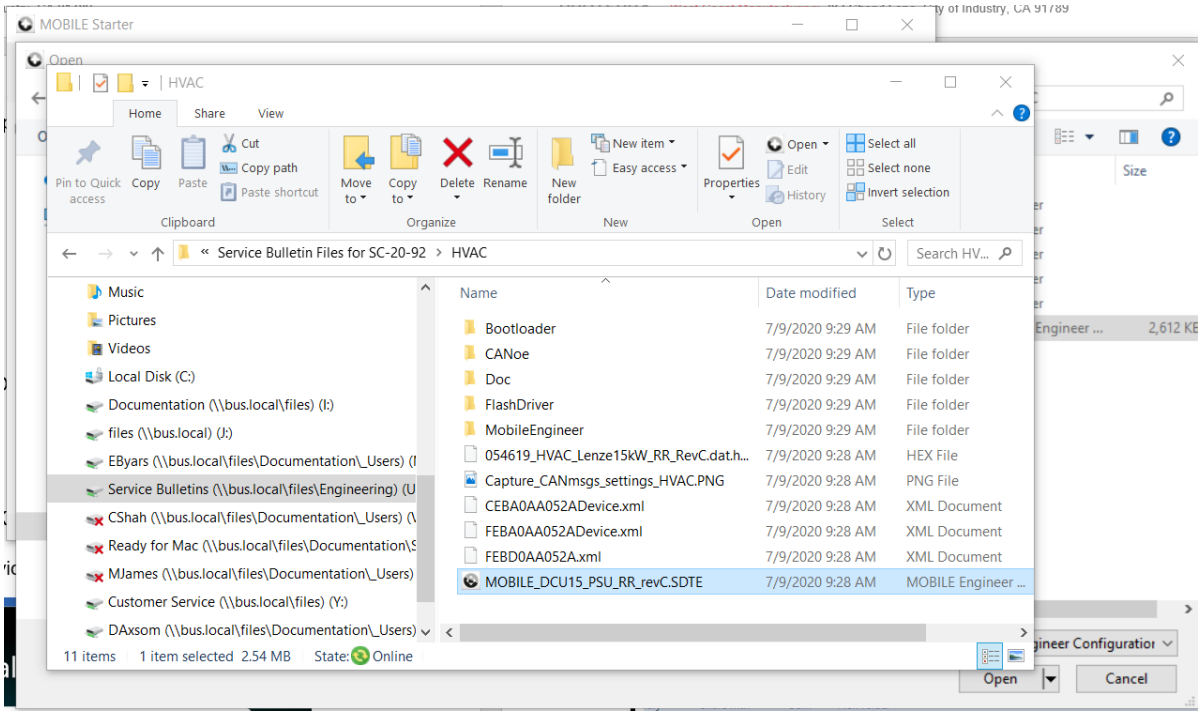
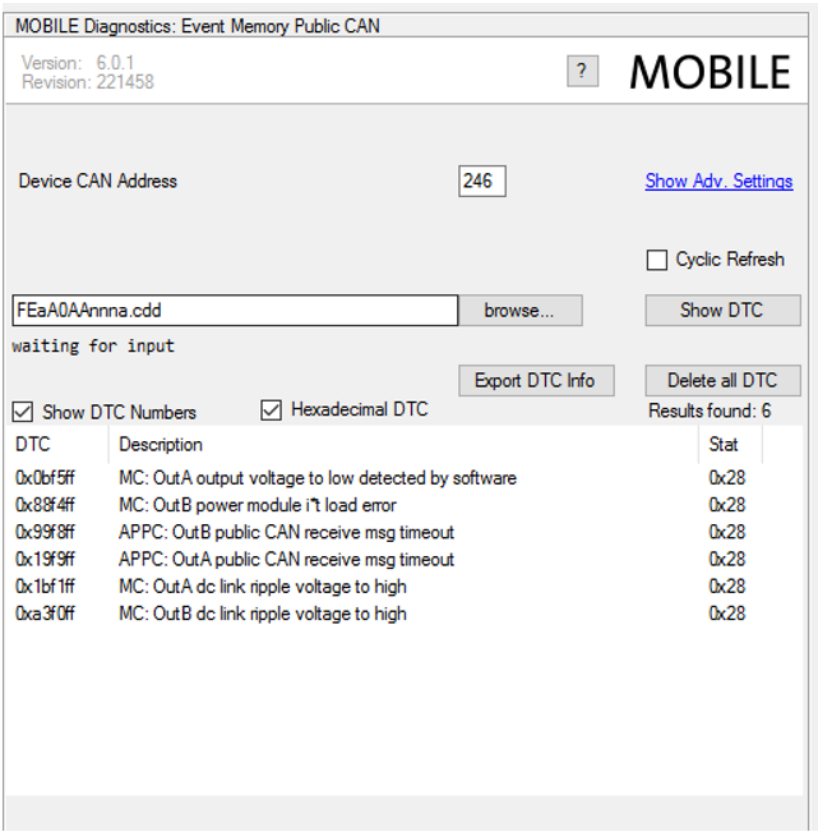
7. Double click on the MOBILE_DCU15_PSU_RR_revC.SDTE file to open it.



8. Under the Diagnostic Panel run the Event Memory Public CAN task. Verify that the Device CAN address is 246.



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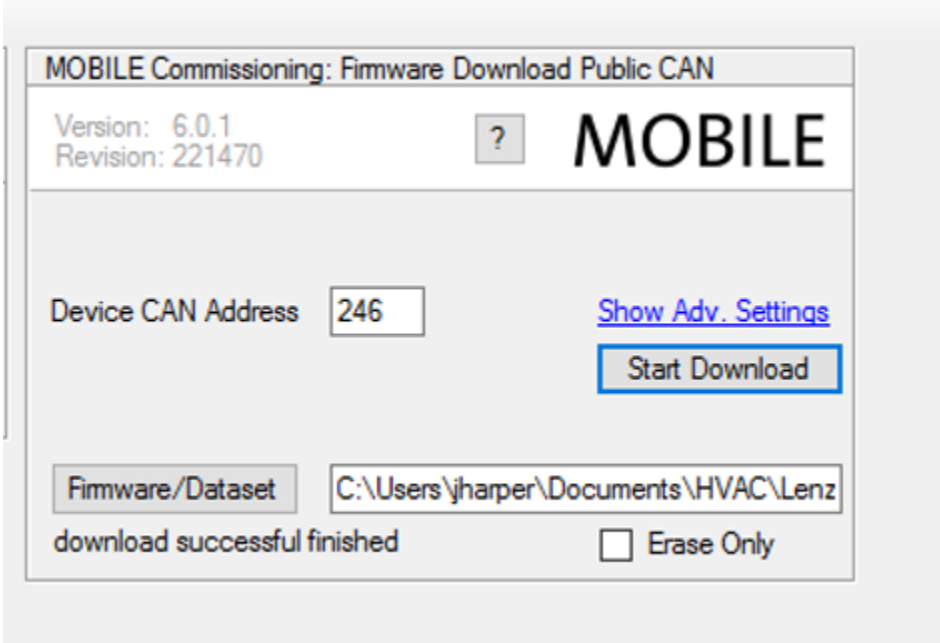
9. Click the “Show DTC” button. Make a screenshot of this screen and email it to jharper@proterra.com.

10. Click the “Delete all DTC” button.

11. Run the Commissioning Firmware Download Public CAN panel.



12. Click the “Firmware/Dataset” button.

13. Navigate to the location where the service campaign files were stored.

14. Double click on the 054619_HVAC_Lenze15kW_RR_RevC.dat to open it.

15. Click the “Start Download” button.

16. The panel will display “download successful finished” when the process is complete.

17. Power the bus off using the Master Switch. Leave the switch off for at least 10 seconds. Turn the Master Switch on.

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18. Turn off the Hazzard Switch.

19. Return the bus to service after the software update process is complete.

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