

## INSTALLATION INSTRUCTIONS

# “GEMKIT-101” FAST CHARGE KIT FOR 2005 TO CURRENT MODEL-YEAR GEM VEHICLES

## INTRODUCTION

This document provides instructions for installing the ETEC 100A fast charging kit on a 2005 or newer model-year GEM vehicle. Detailed circuit, connector and pin numbers were verified to be correct on several 2005 model-year GEM vehicles. Always refer to the manufacturer's wiring diagrams for newer vehicles to ensure proper operation.

Installing this kit will put the installer in close proximity to batteries (including highly-acidic electrolyte where flooded batteries are installed) and potentially high voltage. These instructions are intended for personnel qualified to work on and around battery-powered systems. If you are not qualified, **DO NOT** proceed with this installation!

These instructions assume that the fast-charge kit was purchased with cables from ETEC. Following these instructions is a table listing all components required for the installation, including cables (by type and length) in case the installer chooses to fabricate cables.

## INSTALLATION

### STEP 1

Turn off the main disconnect located under the small access door in the middle of the center console on the dash. Remove the seat over the battery compartment (pull firmly up on the seat using the provided strap) Locate the most negative battery post and remove the cable from its terminal. Use electrical tape to cover the cable end and place it safely away from the battery terminal.

### STEP 2

Remove the upper and lower portions of the dashboard being careful to note where any accessories may have been plugged in. (See attached GEM service procedure, steps 1-7 for dash removal for details). Be sure to disconnect any wires from the lower dash panel before removing it from the vehicle. Mark any removed wires to facilitate their correct installation when reassembling the dash.

### STEP 3

Place the outer charge receptacle bezel in the location where you want the receptacle installed and trace around the inside opening (Fig. 3.1). Mark the location of the four mounting holes on the bezel and drill them out using a 1/4" drill bit. **CAUTION: ALWAYS CHECK FOR CLEARANCE BEHIND THE PANEL *BEFORE* DRILLING HOLES.** Figure 3.1 shows ETEC's recommended mounting location for the fast charge receptacle.



Figure 3.1

#### STEP 4

Cut out the opening previously traced from the bezel template and mount the charge receptacle assembly as shown in Figures 4.1 & 4.2 to the panel using the provided 2 ½” – long bolts, washers and lock nuts as shown in Figures 4.3 & 4.4. Be sure to orient the black plastic guide and receptacle so that the polarizing key is at the top of the opening, between the small pins on the receptacle.



Figure 4.1 Charge Receptacle Assembly – Expanded View



Figure 4.2 Charge Receptacle Assembly



Figure 4.3 Charge Receptacle Assembly – Mounted under the Driver GEM seat



Figure 4.4 Charge Receptacle Assembly – Mounted under the Driver's seat

#### STEP 5

Install the contactor (provided) under the seat in a location that provides adequate clearance with the batteries and other components that may be in close proximity as shown in Figures 5.1 and 5.2.



**Figure 5.1 Contactor**



**Figure 5.2 Contactor and Charge receptacle**

Route the long cable attached to terminal “A1” and the two small, white wires connected to the charging contactor under the floor and toward the front of the vehicle. Pass these back into the passenger compartment through an opening in the front of dash panel. Use nylon wire ties or other suitable clamp to neatly tie the cables and wires closely to the vehicle. Be sure to avoid any areas where the cable could chafe on sharp components.

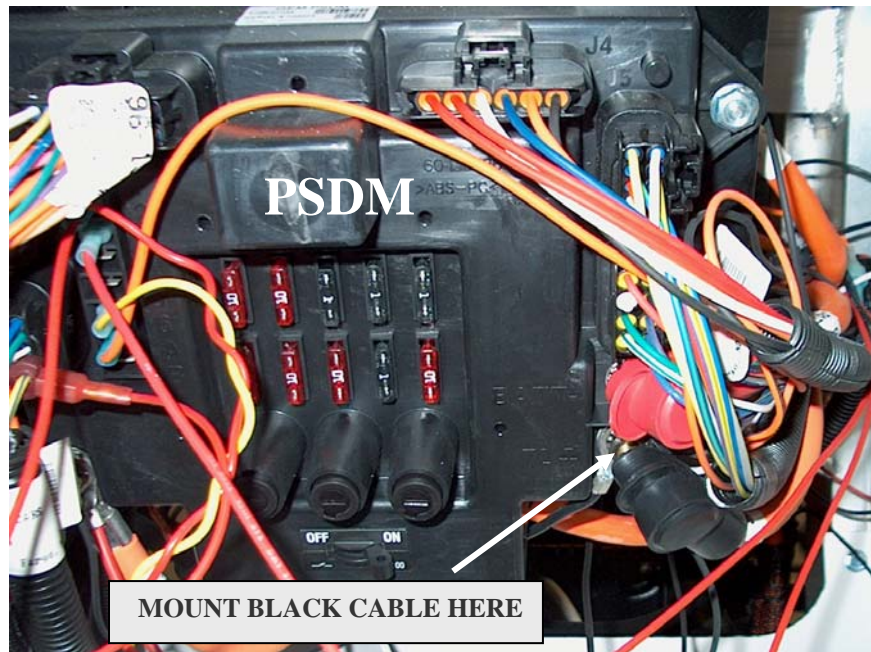
#### STEP 6

Locate the cable attached to the “+” terminal on the BIW charging receptacle (marked with red heat shrink). Connect the free end of this cable to the battery pack most positive terminal (72V+) in parallel with the existing cable on that battery terminal. Ensure the cable is securely fastened at the receptacle; torque to 40 in-lb.

Locate the short cable connected to the “-” terminal on the BIW charging receptacle (marked with black heat shrink). Securely connect this to the terminal marked “A2” on the contactor installed in Step 5. Make sure the terminals are securely fastened on both ends; 40 lb-in at the receptacle and 80 in-lb at the contactor.

#### STEP 7

Locate the PSDM at the center of the area under the dash. Remove all existing cables from the brass stud on the right side of the PSDM labeled “72V” and an earth ground symbol (See Figure 7.1).



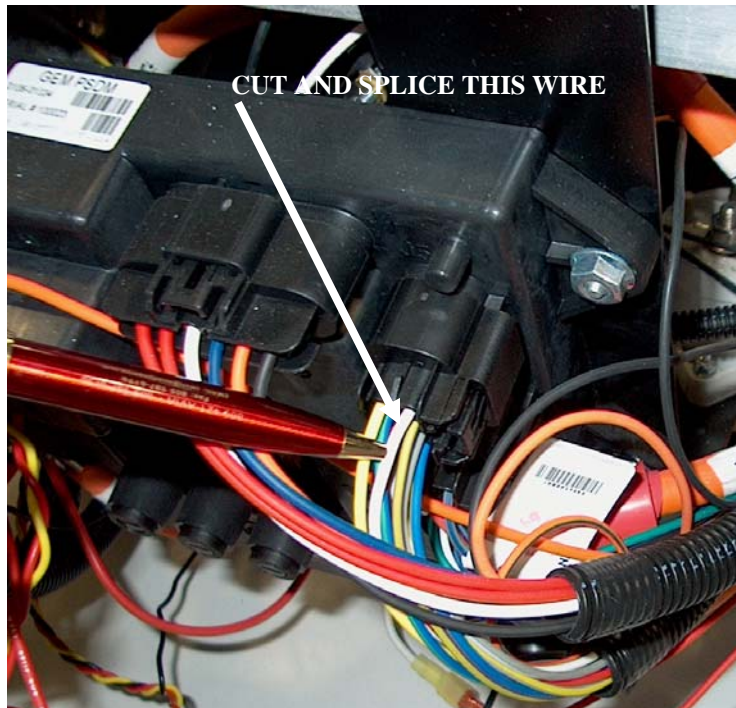
**Figure 7.1**

Mount the negative lead (black) from the charging contactor (installed in Step 5) onto the stud and replace the previously removed cables on top of that. Land all lugs such that they are flat and don't interfere with other lugs mounted on that terminal. Torque the nut to 80 in-lb.

Locate the 28" cable with green tape on the lugs mounted on the BIW charge receptacle. Mount the loose end to one of the bolts on the vertical frame next to the mounted bracket assembly.

#### STEP 8

On the PSDM, locate the white wire on Pin A of the J5 connector (upper right of the PSDM see Fig 8.1). Cut this wire half way between the connector and the wire loom. Strip ¼" of insulation from each end and crimp each half onto one of the white wires that were previously fed through the firewall. Polarity doesn't matter. Check that both wires are crimped securely into the butt connectors by gently pulling on each wire.



**Figure 8.1**

#### STEP 9

Locate the temperature sensor wire connected to terminals 5&6 on the BIW charging receptacle. Mount the temperature sensor on the nearest battery by cleaning the area with alcohol then affixing the sensor with epoxy or silicone adhesive. Be sure to locate the sensor on the top (or side) of the battery away from a lead terminal or cable lug. If the temperature sensor is packaged loose with the kit, attach the red wire to terminal 5 and the black (or clear) wire to terminal 6.

#### STEP 10

Mount the 24VAC relay (included with the kit) on the horizontal aluminum frame member under the dash just to the right of the PSDM (Figure 10.1). Run the black wires from the relay through the front of dash panel, under the vehicle to the BIW inlet. Mount the black wires on terminals 1 and 2 on the back of the BIW inlet (torque to 10 lb-in). Locate connector J4 on the PSDM. Remove it and find pin C. Tap one of the white wires connected to the relay into the wire leading to pin C by using a Scotchlok connector (included with the kit). Locate connector J3 on the PSDM and find pin M and its associated wire. Tap the other white wire from the relay into this wire, also using an included Scotchlok connector.



**Figure 10.1**

**STEP 11**

Check the terminal side of the BIW 9-pin charging receptacle on terminals 3 & 4 to see if the loop-back pilot wire is in place between these terminals. If not, use a short length of #16 wire and the appropriately-sized #6 crimp ring terminals to create a loop between these terminals. Torque to 10 in-lb.

**STEP 12**

Reconnect the battery cable removed in Step 1 and replace the seat. Turn on the main disconnect switch. Turn key switch to “On” and make sure the vehicle is operating properly. Plug the charger in and check for proper operation. If the vehicle does not turn on or does not charge, turn off the main disconnect and check the connections as described in steps 1 through 10. If the charger illuminates a fault light or will not charge, contact an ETEC service representative at 1-888-ETECEVS (383-2387).

## EQUIPMENT LIST

### COMPONENTS

Part	Description	Note
Receptacle	100A, 9-PIN BIW	
Bezel	Aluminum	
Guide	Black plastic, machined	
Charging Contactor	EV200 Kilovac or Matsushita AEV18012	Modified with 24VAC rectifier board
Temperature Sensor	Temperature Puck, white with wire lead	
Control Relay	SPST, N/C, 24VAC Coil	
Cable Kit – Optional, not included in base kit (See requirements below)	Pre-made cables for recommended installation locations	

### CABLE SCHEDULE

Description	Qty	Color	Length	Size	Termination
BIW + to Battery 72V+	1	Red	30"	#4 Welding Cable	#10 Crimp Lug & Crimp Lug Sized for Existing Batteries
BIW ‘-‘ to Charger Contactor A2	1	Black	12"	#4 Welding Cable	#10 Crimp Lug & 5/16" Crimp Lug
Charger Contactor A1 to PSDM 72V GND	1	Black	66" (2-Seat) 90" (4-Seat)	#4 Welding Cable	5/16" Crimp Lug & 1/4" Crimp Lug
BIW ‘G’ to Chassis	1	Green	18"	#4 Welding Cable	#10 Crimp Lug, 2 ea
BIW Terminals 1 & 2 to Charging Contactor Coil	2	Black	12"	18 AWG stranded, min 300V insulation	#6 Crimp Ring Terminal & Butt Splice
Charging Contactor N/C Aux to PSDM J5, Pin A	2	White	72" (2-Seat) 96" (4-Seat)	18 AWG stranded, min 300V insulation	Butt Splice

<b>Description</b>	<b>Qty</b>	<b>Color</b>	<b>Length</b>	<b>Size</b>	<b>Termination</b>
BIW Terminal 1 & 2 to 24VAC Relay Coil	2	Black	72"	18 AWG stranded, min 300V insulation	#6 Crimp Ring & ¼" Faston Receptacle
Control Relay to GEM PSDM J4, Pin C and J3, Pin M	2	White	24"	18 AWG stranded, min 300V insulation	¼" Faston Receptacle & Scotchlok Tap
Temperature Sensor to BIW Terminals 5 & 6	2		(Included with Sensor)		#6 Crimp Ring
BIW Terminals 3&4 Pilot Loop Back	1	White	4"	18 AWG stranded, min 300V insulation	#6 Crimp Ring