



Technical Service BULLETIN

August 14, 2002

Title:

ELECTRIC VEHICLE CHARGER DIAGNOSIS

Models:

'02 RAV4 EV

EV002-02

ELECTRIC VEHICLE

Introduction This Service Bulletin provides a diagnostic troubleshooting procedure for the Toyota Magne Charge™ inductive charger model TCG 2000 included with the 2002 RAV4 EV. By following the procedure, a determination can be made whether the issue requires charger repair, vehicle repair, or customer monitoring.

NOTE:

This bulletin does not apply to 1998 – 2001 model year fleet leased RAV4 electric vehicles used with conductive EVI chargers or inductive GM chargers. If you suspect a problem with either of these chargers contact the manufacturer.

- EVI (888) 823-8077
- GM (800) 482-6644

Applicable Vehicles

- **2002** model year **RAV4 EV** vehicles.

Warranty Information

| OP CODE | DESCRIPTION | TIME | OFF | T1 | T2 |
|---------|----------------------------|------|-----|----|----|
| N/A | Not Applicable to Warranty | – | – | – | – |

Diagnostic Procedure

The Toyota TCG 2000 inductive charger is warranted for 3 years from the date of installation. Clean Fuel Connection, Inc. (CFCI) provides charger warranty and non-warranty service in California at (888) 890-GOEV.

As most chargers are installed at the customer's residence or business, determining the cause of failure, either vehicle or charger, is important to prevent the customer from being sent back and forth between the dealer and CFCI. To eliminate this confusion, the following documents were created to aid in charger/vehicle problem diagnosis:

- RAV4 EV Charger Diagnostic Worksheet
- RAV4 EV Charger Diagnostic Flowchart
- Charging Frequently Asked Questions



Diagnostic Procedure (Continued)

RAV4 EV Charger Diagnostic Worksheet

Directions for completing the Diagnostic Worksheet.

- Fill out Dealer and Customer information in **Section 1** below.
- Fill out the Description of Charger Problem in **Section 2**.
 - Contact CFCI for service at (888) 890-GOEV if any of the following conditions are identified by the customer.
 - The problem charger was not provided with the vehicle (e.g. a public charger).
 - The charger is physically damaged. If so, which part(s): _____.
 - The RAV4 EV does not charge with the problem charger but does charge acceptably with another charger. Provide location of the other charger: _____.
 - Bring the RAV4 EV vehicle to Dealer for diagnosis if either of the following two conditions are identified by the customer.
 - Vehicle doesn't charge, doesn't start (READY remains off), and cannot be jump started.
 - Vehicle will not charge on more than one charger.
 - For intermittent charge, or not fully charged conditions, see the Frequently Asked Questions.
 - Otherwise, troubleshoot charger problem with customer using the RAV4 EV Charger Diagnostic Flowchart. Error symbol identified from the flowchart: _____.
- If charger requires service, fax this completed RAV4 EV Charger Diagnostic Worksheet to CFCI at (626) 445-1450.

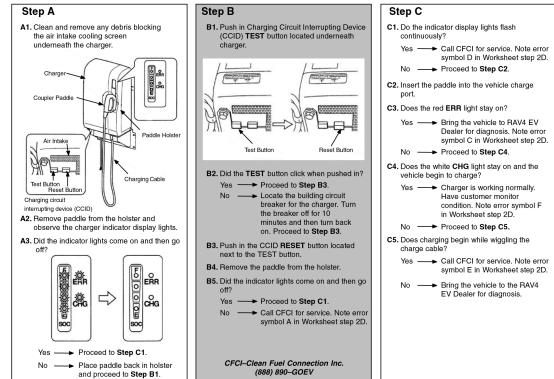
Section 1

| Toyota Dealer Information | | | |
|---------------------------|------------------------------|----------------------|-----------------------------------|
| Dealer Name: | Dealer Contact Name: | Dealer Phone Number: | |
| | | | |
| Vehicle Information | | | |
| VIN: | Production Date: | Mileage: | |
| | | | |
| Customer Information | | | |
| Name: | Phone Number (Home): | Phone Number (Work): | |
| | | | |
| Street Address: | City: | State and Zip Code: | |
| | | | |
| Charger Information | | | |
| Failure Date: | Approximate Air Temperature: | Serial Number: | Installation Date (For Warranty): |
| | | | |

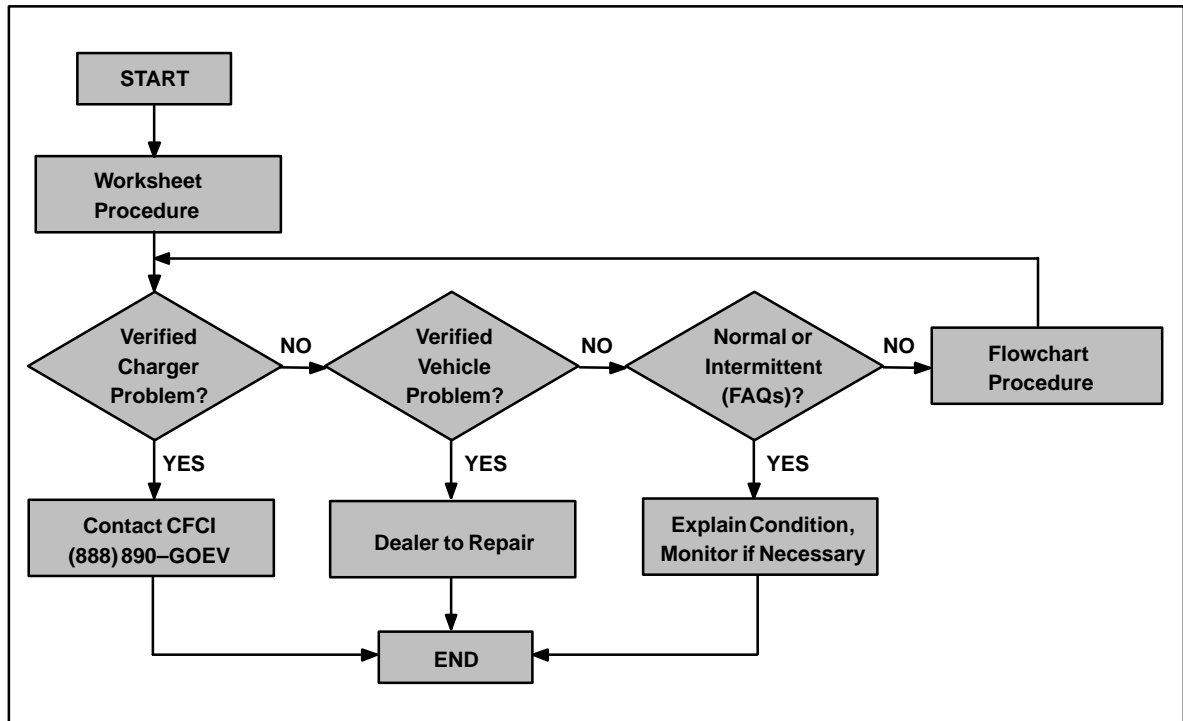
Section 2

| |
|---------------------------------|
| Description of Charger Problem: |
| |
| |

RAV4 EV Charger Diagnostic Flowchart



When receiving a customer contact for a charging problem, start by following the directions in the Worksheet as shown in the diagram below. The Worksheet will determine the course of action and may guide you to the Flowchart or Frequently Asked Questions.



**Diagnostic
Procedure**
(Continued)

By following the diagnostic procedures, the condition may be determined to be one of the following:

- **Charger**

Completely fill out the RAV4 EV Charger Diagnostic Worksheet information and then fax the Worksheet to CFCI at (626) 445–1450 for service.

- **Vehicle**

Inform the customer to bring the vehicle in for Dealer repair. If necessary, RAV4 EV Roadside Assistance may be contacted during the basic warranty period at (800) 771–1841.

- **Normal or Intermittent Condition**

Reference the RAV4 EV Charging Frequency Asked Questions in this Service Bulletin. Explain the condition to the customer, and if necessary, monitor the condition.

For additional assistance, contact the RAV4 EV Toyota Technical Assistance System (TAS) at (310) 468–4348.

**Charging
Frequently
Asked
Questions****1. Why does my vehicle not charge and not start (READY remains off)?**

The most likely cause is the 12-Volt lead-acid auxiliary battery is discharged.

Correction:

- Jump start the 12-Volt auxiliary battery. Roadside Assistance is available for retail 2002 RAV4 EV customers during the basic warranty period by calling (800) 771-1841. Have a qualified service garage test the 12-Volt battery condition.

2. Why does my vehicle not indicate a full charge?

The RAV4 EV determines the state of full charge by sensing the battery pack temperature during charging. If the ambient temperature is hot during charging or the batteries are hot from heavy use just prior to charging, the vehicle will interrupt charging and the cooling fans will operate to try and cool the battery pack to a lower temperature so that it can restart the charging sequence. If the temperature cannot be lowered in 5 hours, the vehicle will stop the charging process to prevent the batteries from becoming discharged. It will not restart the charging process.

Correction:

- Charge in a cooler environment such as indoors.
- Use the on-board timer feature to delay charge at cooler ambient temperatures (see Owner's Manual section 1-3 for procedure).

30 minutes after the completion of charge, the RAV4 EV will go "to sleep" in order to prevent the 12-Volt auxiliary battery from discharging. Once the vehicle is in the sleep mode, even if the charger is left connected, the vehicle will not recharge the batteries if the State Of Charge (SOC) drops due to self-discharge. If the vehicle is left for any extended period of time, the RAV4 EV battery will self-discharge just like any other battery. The self-discharge rate is a function of time and temperature. As an example, it is common to lose up to 4% SOC per day at 77°F.

Correction:

- This is a normal condition. To fully charge after the vehicle is left for an extended period, remove the paddle from the charge port, place the paddle in charger holster to reset, then reinsert the paddle into the charge port to begin a new charge sequence.

3. Why did my vehicle not charge even though the paddle was inserted?

If the paddle is not fully inserted into the charge port or if the paddle is inserted, removed, and then reinserted within 2 seconds, charging will not start. This is a characteristic of the RAV4 EV.

Correction:

- Place the paddle back into the charger holster. Remove the paddle (allow at least 2 seconds) and then insert into the vehicle charge port.
- Always verify the charging sequence has begun before leaving the area. This may be done by:
 - a. Observing the white CHG (charge) light is illuminated on the charger indicator display.
 - b. Verifying the RAV4 EV vehicle battery cooling fans are operating with a slight suction at the air inlet vents on either rear side of the vehicle.

**Charging
Frequently
Asked
Questions**
(Continued)

4. My vehicle intermittently charges for an extended period even though the State of Charge is close to 100%.

This is a normal function. The RAV4 EV will trickle charge (approximately 2 hours) at low current periodically to equalize the battery pack. This will prolong the life of the battery pack and maintain the range.

Correction:

- This is normal operation.

5. My vehicle does not get the advertised range of 125 miles per charge.

While there are many factors in determining range, a few of the major factors are:

- Vehicle load (heavier loads require more electric power).
- Accelerator usage (fast starts & acceleration consume more electric power).
- HVAC operation (air conditioner and heater use requires more electric power).
- Ambient Temperature.
 - Cold weather is more dense and produces additional drag.
 - Cold weather reduces the amount of usable energy from the batteries.
 - Hot weather discharges the batteries quicker.
- Tire Pressure (low tire pressure increases rolling resistance).
- Terrain (hills, grades, unpaved roads require additional electric power).

Correction:

- Minimize range reducing factors above.