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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: PLUG-IN CHARGE CONTROL SYSTEM (for PHEV Model): VEHICLE CONTROL HISTORY (RoB); 2023 - 2024 MY Prius Prime [03/2023 -]		

VEHICLE CONTROL HISTORY (RoB)

CHECK VEHICLE CONTROL HISTORY (RoB) (for AC CHARGING)

(a) Using the GTS, enter the following menus.

Powertrain > Plug-in Control > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

(b) After confirming the stored Vehicle Control History (RoB) for AC charging, narrow down the cause according to the contributing factors.

NOTICE:

The numbers in the Action to be Taken column indicate the order in which operations should be performed.

HINT:

- No DTCs are output.
  If DTCs are output, first check the DTCs for related systems and perform repairs as necessary.
- Setting Charge Now to ON
  If no charge schedule has been registered, the above step is not necessary.
- Park (P) is selected.
- Turn the ignition switch off.
- Click here INFO

Vehicle Control History (RoB) (for AC Charging)

- X0545

  Charge Delayed/Canceled (Power Supply Voltage High) (X0545)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage became overvoltage (If continuing for a certain amount of time, AC charging ends)		
External Power Source/Charging Stand	Overvoltage of output voltage of external AC power source or AC charging equipment ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that the voltage of the external power source at the location where charging was performed may have been high due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally: ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X0546

  Charge Delayed/Canceled (Power Supply Voltage Low) (X0546)

MEMORIZATION CONDITION	
POSSIBLE CAUSE	ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage became undervoltage	

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
(If continuing for a certain amount of time, AC charging ends)		
User	Plug disconnected	1) Explain to the customer that the plug of the charging cable may have been disconnected during AC charging (provide instruction on usage)
Charging Environment	◦ Plug disconnected ◦ Power source switch off ◦ Power outage ◦ Circuit breaker tripped ◦ Power source stopped	1) Explain to the customer that any of the following examples may have occurred during AC charging (provide instruction on usage) ◦ The plug of the charging cable was disconnected (Malfunction such as disconnection under own weight, improper connection, cracking on the charging station side, etc.) ◦ Power outage / Circuit breaker tripped / Outlet switch turned off ◦ Power source stopped by EMS (Energy Management System)
External Power Source/Charging Stand	◦ Open in the AC line in the charging station ◦ External power source low voltage	1) Explain to the customer that the system voltage at the location where charging was performed may have been low due to the effect of a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Charging Cable	◦ Open in the AC line inside the charging cable ◦ OFF malfunction of CCID relay inside charging cable.	1) Inspect the charging cable. INFO
Vehicle	◦ Open in the AC line (AC charging inlet - Electric vehicle charger assembly) ◦ Electric vehicle charger assembly internal sensor malfunction	1) Check AC line (AC charging inlet - Electric vehicle charger assembly) INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Replace the electric vehicle charger assembly (an electric vehicle charger assembly internal sensor malfunction is suspected) INFO

- X0548

Charge Delayed/Canceled (VH Voltage/Power Supply Voltage High) (X0548)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage became overvoltage (If continuing for a certain amount of time, AC charging ends)		
External Power Source/Charging Stand	Overvoltage of output voltage of external AC power source or AC charging equipment ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that the system voltage at the location where charging was performed may have been high due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally: ◦ Vehicle control history (RoB) is detected: Replace the Electric vehicle charger assembly INFO

- X054D

Charge Delayed (Charger Temperature High) (X054D)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of charging power limiting due to overheating of the electric vehicle charger assembly (continuation of AC charging)		
Charging Environment	Ambient temperature around the electric vehicle charger assembly extremely high	1) Check that there is no foreign matter, etc., on the charger cooling blower **HINT:** If there is foreign matter, remove it 2) Explain to the customer that when the vehicle interior temperature is high, charging power is decreased due to electric vehicle charger assembly protection
Vehicle	Malfunction of HVOT or VH-DCDC temperature sensor, or PFC temperature sensor inside the electric vehicle charger assembly (stuck at an intermediate value of the high temperature range)	1) Check that there is no foreign matter, etc., on the charger cooling blower ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Proceed to 2) 2) After leaving the vehicle in a place away from direct sunlight, charge the HV battery. 3) During AC charging, using the GTS, read the value of the Data List item "PFC Boosting Circuit Temperature". ◦ 130°C (266°F) or more: Replace the electric vehicle charger assembly. INFO ◦ Lower than 130°C (266°F): Proceed to 4) 4) During AC charging, using the GTS, read the value of the Data List item "DC/DC Converter Temperature (for Charging)". ◦ 118°C (244°F) or more: Replace the electric vehicle charger assembly. INFO ◦ Lower than 118°C (244°F): Proceed to 5) 5) During AC charging, using the GTS, read the value of the Data List item "Hybrid/EV Output Temperature Sensor". ◦ 124°C (255°F) or more: Replace the electric vehicle charger assembly. INFO ◦ Lower than 124°C (255°F): Proceed to 6)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
		6) Explain to the customer that when the ambient temperature around the electric vehicle charger assembly is high, charging power is decreased due to electric vehicle charger assembly protection

- X054E

Charge Delayed/Canceled (Charger Power Supply Voltage Low) (X054E)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage became undervoltage (If continuing for a certain amount of time, AC charging ends)		
External Power Source/Charging Stand	Open in the AC line in the charging station	1) Explain to the customer that the system voltage at the location where charging was performed may have been low due to the effect of a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Charging Cable	Open in the AC line inside the charging cable	1) Inspect the charging cable. INFO
Vehicle	◦ Open in the AC line between the AC charger inlet and electric vehicle charger inlet assembly ◦ Electric vehicle charger assembly internal sensor malfunction	1) Check the AC line between the AC charger inlet and electric vehicle charger inlet assembly INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Replace the electric vehicle charger assembly INFO

- X054F

Charge Delayed (Charger Power Supply Frequency Low) (X054F)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the AC high-voltage system wave frequency became low		
External Power Source/Charging Stand	System power source low wave frequency ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that there may have been a wave frequency malfunction at the location where charging was performed due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X0550

Charge Delayed/Canceled (Charging Overcurrent) (X0550)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the electric vehicle charger assembly input current flow temporarily became overcurrent (System voltage waveform distortion)		
External Power Source/Charging Stand	System voltage waveform distortion ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that there may have been a power source voltage malfunction at the location where charging was performed due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X0552

Charge Delayed/Canceled (Charging Overvoltage) (X0552)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage became overvoltage (If continuing for a certain amount of time, AC charging ends)		
External Power Source/Charging Stand	System voltage overvoltage ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that there may have been a power source malfunction at the location where charging was performed due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X0553

Charge Delayed/Canceled (Charger Power Supply Wave Pattern Distortion) (X0553)

MEMORIZATION CONDITION	
POSSIBLE CAUSE	ACTION TO BE TAKEN
It was detected that the AC high-voltage system voltage waveform became abnormal	

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
External Power Source/Charging Stand	System voltage overvoltage ◦ Effect of power generation equipment (solar power, etc.) ◦ Effect of AC charging equipment construction	1) Explain to the customer that there may have been a power source malfunction at the location where charging was performed due to the effect of power generation equipment, a malfunction or deficiency of the AC charging equipment, etc. 2) Inspect the AC charging equipment that the customer used for charging
Vehicle	Electric vehicle charger assembly internal sensor malfunction	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X0562

Charge Canceled (Charging System) (X0562)

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
AC Charging System Low Voltage Decrease Continuation Status	1) Check the usage conditions with the user ◦ Ignition switch ON, accessories in use: User ◦ Other than the above: Vehicle	Auxiliary battery voltage has decreased.		
		User	SOC of the HV battery dropped due to excessive power consumption from the ignition switch being left ON or the use of accessories.	1) Explain to the customer that it is necessary to reduce power consumption from accessories during AC charging.
		Vehicle	Discharged auxiliary battery	1) Turn the ignition switch to ON (READY) and leave the vehicle for 15 min (to charge the auxiliary battery) 2) Explain to the customer that the auxiliary battery will discharge when the vehicle is left without being started for a long time. **HINT:** The voltage of the auxiliary battery may temporarily decrease due to reasons such as degradation of the auxiliary battery or use of vehicle accessories. 3) Inspect auxiliary battery INFO
System Impedance Increase Abnormal	**HINT:** Even if RoB item X0546 or X054E is output, if this item is "ON", follow the steps below first. 1) Check FFD "AC Charging Input Minimum Voltage History" ◦ 46 V or less: Proceed to 2)	Supplied power dropped due to impedance of the high voltage AC line, etc.		
		User	Charging plug was not securely inserted into the electrical outlet.	1) Explain to the customer that the charging plug may not have been securely connected.
		External Power Source/Charging Stand	◦ Infrastructure side circuit resistance increase ◦ System voltage	1) Explain to the customer that the system voltage at the location where charging was performed may have been low due to the effect of a malfunction or deficiency of the AC charging equipment, a

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	◦ Other than the above: Proceed to 3) 2) Perform AC charging using a known good charging cable. ◦ FFD "System Impedance Increase Abnormal" ON: External Power Source/Charging Stand, Charging cable (CPLT oscillation circuit malfunction) ◦ FFD "System Impedance Increase Abnormal" OFF: Vehicle (CPLT reception circuit malfunction) 3) Perform AC charging using the customer used charging cable. ◦ FFD "System Impedance Increase Abnormal" ON: External Power Source/Charging Stand ◦ FFD "System Impedance Increase Abnormal" OFF: Proceed to 4) 4) Perform AC charging using a known good charging cable. ◦ FFD "System Impedance Increase Abnormal" ON: Vehicle ◦ FFD "System Impedance Increase Abnormal" OFF: Charging Cable		decreased due to use of a branching adapter or an extension cord ◦ CPLT oscillation circuit malfunction	multiple socket adaptor or extension cord, etc. 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	◦ Open in the AC line in the charging cable ◦ Relay OFF malfunction ◦ CPLT oscillation circuit malfunction	1) Inspect the charging cable. INFO INFO
		Vehicle	◦ Open in the AC line between the electric vehicle charger assembly and AC charger inlet ◦ CPLT reception circuit malfunction	1) Inspect the AC line between the electric vehicle charger assembly and AC charger inlet INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Replace the electric vehicle charger assembly INFO 2) Inspect the wire harness and connectors between the AC charger inlet and plugin charge control ECU (Control Pilot Signal Circuit) INFO
Charge Interruption Connector Operation History	1) With the ignition switch ON and the charging cable used by the customer inserted, check the status of Data List item "PISW Status"	◦ The charging connector could not be correctly inserted before AC charging ◦ During AC charging, the latch release button on the charging connector was pressed for a certain amount of time or longer before the vehicle was fully charged		

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	◦ Charging cable connection: User (lock release button pressed and held (operation mistake)) ◦ Other than the above: Proceed to 2) 2) With the ignition switch ON, insert a charging cable that is confirmed to be operating normally and check the status of Data List item "PISW Status" ◦ Charging cable connection: External Power Source/Charging Stand, Charging Cable ◦ Other than the above: Vehicle	User	Lock release button pressed and held (Incorrect operation)	1) Explain to the customer that during charging, the lock release button may have been pushed for a certain amount of time, or the charging connector may not have been securely connected (provide instruction on usage)
		External Power Source/Charging Stand	PISW circuit malfunction (open)	1) Explain to the customer that a malfunction of the AC charging equipment that the customer used for charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	PISW circuit malfunction (open)	1) Inspect the charging cable. INFO
		Vehicle	◦ Service life of engagement parts on the charging connector or AC charging inlet ◦ PISW circuit malfunction	1) Inspect the wire harness and connectors between the AC charger inlet and plugin charger control ECU ◦ P0D5611: INFO ◦ P0D5615: INFO
Not Rechargeable by Power Outage	1) Check Freeze Frame Data "AC Input Voltage for Monitoring" ◦ Less than 50 V: Proceed to 2) ◦ 50 V or more: Proceed to 4) 2) Perform AC charging using the charging cable that was used by the customer. ◦ Not reproduced: User, Environment, External Power Source/Charging Stand ◦ Reproduced: Proceed to 3) 3) Perform AC charging using a known good charging cable ◦ Not reproduced: Charging Cable ◦ Reproduced: Vehicle (Inspect with a focus on electric vehicle	◦ When starting AC charging or during AC charging with the charging cable correctly connected, the AC power source was shut off (including a drop in voltage) or the CPLT signal could not be received ◦ The plug was disconnected, or the charging connector was disconnected with the AC power source shut off		
		User	Plug disconnected	1) Explain to the customer that the plug of the charging cable may have been disconnected during AC charging (provide instruction on usage)
		Charging Environment	◦ Plug disconnected ◦ Power source switch off ◦ Power outage ◦ Circuit breaker tripped ◦ Power source stopped	1) Explain to the customer that any of the following examples may have occurred during AC charging (provide instruction on usage) ◦ The plug of the charging cable was disconnected(Malfunction such as disconnection under own weight, improper connection, cracking on the charging station side, etc.) ◦ Power outage / Circuit breaker tripped / Outlet switch turned off ◦ Power source stopped by EMS (Energy Management System)

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	charger assembly) 4) Perform AC charging using a known good charging cable ◦ Plug-in charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	External Power Source/Charging Stand	◦ CPLT (control pilot signal) circuit malfunction (open/short) ◦ AC charging was suspended by AC charging station	1) Explain to the customer that a malfunction or deficiency of the AC charging equipment at the location where the customer performed charging may have been the cause **HINT:** AC charging was suspended by AC charging station (Suspend button of AC charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.) 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable. INFO
		Vehicle	◦ CPLT (control pilot signal) circuit malfunction (open/short) ◦ Electric vehicle charger assembly malfunction (open or short)	1) Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO 2) Check the AC line between the AC charger inlet and electric vehicle charger inlet assembly INFO INFO
AC Charging Prohibition Status by CPLT Non Standard Pulse Factor	1) Perform AC charging using a known good charging cable ◦ Plug-in charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	Non-standard CPLT duty received (Abnormal transmission signal from AC charging equipment)		
		External Power Source/Charging Stand	◦ Incompatibility with AC charging station used ◦ CPLT (control pilot signal) circuit malfunction (open/short)	1) Explain to the customer that the AC charging equipment at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
CPLT High Fixed Status	1) Perform AC charging using a charging cable that is confirmed to be operating normally	CPLT signal was stuck (CPLT Duty: 100%) and AC charging did not start or was stopped (AC charging equipment charging stop request)		
		External Power Source/Charging	AC charging was suspended by AC	1) Explain to the customer that the function, etc., of the AC charging

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	◦ Plug-in charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	Stand	charging station (Due to function such as suspend button of AC charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.)	station at the location where the customer performed charging may have been the cause **HINT:** AC charging was suspended by AC charging station (Suspend button of AC charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.) 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally Vehicle control history (RoB) is detected: Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
Not AC Rechargeable by HLC Communication	1) Perform AC charging using a charging cable that is confirmed to be operating normally ◦ Charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	HLC communication with an EVSE (charging station) has been detected (CPLT Duty: 5%). (When performing charging with an incompatible AC charging station)		
		External Power Source/Charging Stand	Incompatibility with AC charging equipment	1) Explain to the customer that the AC charging equipment at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally Vehicle control history (RoB) is detected: Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
IGCT Signal Status	-	Even though the charging cable was connected correctly and the CPLT signal was oscillating, IGCT did not change to ON		
		Vehicle	◦ CAN communication malfunction (body bus, powertrain bus) ◦ Smart key ECU assembly (certification ECU) malfunction ◦ IGCT circuit malfunction	1) Inspect plugin charge control ECU IGCT terminal/relay INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Proceed to 2) 2) Inspect HV control ECU IGCT terminal/relay INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Proceed to 3) 3) Check the wire harness and connectors between the HV control ECU and certification ECU
Power Feeding High at Battery Voltage Low	-	When the HV battery SOC (State of Charge) was low, it was detected that power consumption was high		
		User	HV battery SOC dropped because auxiliary power consumption increased due to the use of accessories or turning the ignition switch to ON.	1) Explain to the customer to minimize auxiliary power consumption during AC charging
Shift Position P Range Status	-	It was detected that the shift state was not set to P		
		User	Shift operation error	1) Explain to the customer that the shift state should be set to P during AC charging
IGB Signal Status	**HINT:** If IGCT Signal Status is OFF, handle that issue first.	It was detected that the power source signal was cut off		
		Vehicle	◦ CAN communication malfunction (body bus, powertrain bus)	1)Inspect the wire harnesses and connectors between the HV control ECU and certification ECU, and between the IGB terminals of the connectors.

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
			◦ Certification ECU malfunction ◦ IGB malfunction	
Charging Power Output Low Status when 6A Charging	1) Check AC Charging History (X10F0) Freeze Frame data item "Minimum Charging Permission Power during Charging" ◦ Value is a positive number or close to 0: Charging Environment ◦ Other than the above: Proceed to 2) 2) Interview the customer and ask what charging voltage they are using, if they know. ◦ 100 V: User ◦ Other than the above: Proceed to 3) 3) Check the value of "AC Power Supply Rated Current", and the difference between "AC Power Supply Rated Power" and "AC Charging Input Minimum Voltage History" ◦ Difference is large: External Power Source/Charging Stand, Charging Cable ◦ Other than the above: External Power Source/Charging Stand (AC charging stand current setting)	When the charging power was low, it was detected that the power balance was negative (HV battery SOC (State of Charge) was reducing)		
		User	HV battery SOC (State of Charge) dropped because auxiliary power consumption increased due ignition switch ON, accessory use, etc.	1) Explain to the customer that 100 V charging may be stopped when electrical components are used
		Charging Environment	Low temperature / high temperature charging	1) Explain to the customer that when the battery temperature is unsuitable, control will operate to make the temperature suitable, which may cause electrical power consumption to increase.
		External Power Source/Charging Stand	◦ Current setting of AC charging equipment ◦ Low system voltage ◦ Electrical wiring construction malfunction (floating ground, etc.)	1) Explain to the customer that charging may be stopped when the current settings are low 2) Explain to the customer that charging may be stopped due to low voltage
		Charging Cable	Power supply plug high temperature detected	1) Inspect the charging cable INFO
Charging Not Available Status at Cell Low Voltage	1) Check AC Charging History (X10F0) Freeze Frame Data item "Hybrid/EV Battery Minimum Temperature during Charging" ◦ Low temperature:	It was detected that the HV battery voltage was extremely low		
		Charging Environment	HV battery temperature is low	1) Warm up the HV battery and perform AC charging. Explain to the customer that this problem is not likely to occur if AC charging is performed directly after driving or charging is

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	Charging Environment ◦ Other than the above: Vehicle			performed in a warm environment.
		Vehicle	HV battery low voltage	1) Inspect HV battery INFO
AC Charging Stop (Low Power and Long Time Charging)	1) Interview the customer to check the ignition status during AC charging ◦ Ignition switch ON: User ◦ Ignition switch off or unknown: Proceed to 2) 2) Compare FFD items "AC Charging Input Minimum Voltage History" and "AC Power Supply Rated Power". ◦ Equal or "AC Charging Input Minimum Voltage History" is larger: Charging Environment ◦ Other than the above: External Power Source/Charging Stand	It was detected that full charge was not reached after charging continued for a long period of time (several days)		
		User	◦ HV battery SOC (State of Charge) dropped because auxiliary power consumption increased due ignition switch ON, accessory use, etc. ◦ Plug-in charging after driving under high load	1) Explain to the customer to minimize auxiliary power consumption during AC charging 2) Explain to the customer that the ignition switch should not be left on
		Charging Environment	◦ HV battery temperature is low ◦ HV battery possible charging power is small	1) Warm up the HV battery and perform AC charging Explain to the customer that this problem is not likely to occur if AC charging is performed directly after driving or charging is performed in a warm environment. 2) Explain to the customer that HV battery protection control operated
		External Power Source/Charging Stand	◦ Infrastructure side circuit resistance increase ◦ Low system voltage due to multiple socket adaptor or extension cord	1) Explain to the customer that the system voltage at the location where charging was performed may have been low due to the effect of a malfunction or deficiency of the AC charging equipment, a multiple socket adaptor or extension cord, etc. 2) Inspect the AC charging equipment that the customer used for charging
AC Charging Start Sequence Time Out Status	-	It was detected that AC charging could not start due to an unspecified cause		
		Vehicle	◦ CAN communication malfunction (charging local bus) ◦ Charging does not start due to plugin charge control ECU ◦ Charging does not start due	1) Inspect the devices to the left

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
			◦ to EV charger conditions ◦ Charging does not start due to battery ECU	
AC Charging Prohibition Status by Auxiliary Battery Voltage Low at Stop DC/DC Converter	-	It was detected that the DC/DC converter did not operate for a long period of time and the auxiliary device voltage became low		
		Vehicle	◦ Auxiliary charging could not be performed due to operation of DC/DC converter overheat protection control. ◦ Conditions occurred in which both the main and sub DC/DC converter could not be used	1) Inspect DC/DC converter Explain to the customer that this malfunction can be prevented by performing charging after waiting for heat to dissipate from the DC/DC converter 2) Inspect both the main and sub DC/DC converter
Charging Not Available Status by Win Low	-	It was detected that charging could temporarily not be performed due to the HV battery temperature or HV battery usage conditions		
		Charging Environment	HV battery received voltage low due to unsuitable HV battery temperature	1) Explain to the customer that when the HV battery temperature is unsuitable, received HV battery input power supply will decrease and charging may stop
Charging Power Low Status when SOC Low	1) Check the usage conditions with the user ◦ Ignition switch ON, accessories in use: User ◦ Other than the above: Proceed to 2) 2) Check AC Charging History (X10F0) Freeze Frame Data item "Hybrid/EV Battery Minimum Temperature during Charging" ◦ Low temperature: Charging Environment ◦ Other than the above: Vehicle	During charging, it was detected that the charging power of the HV battery was low and the HV battery SOC (State of Charge) was low.		
		User	HV battery SOC (State of Charge) decreased because auxiliary power consumption increased due ignition switch ON, accessory use, etc.	1) Explain to the customer to minimize auxiliary power consumption during AC charging
		Charging Environment	HV battery low temperature	1) Warm up the HV battery and perform AC charging Explain to the customer that this problem is not likely to occur if AC charging is performed directly after driving or charging is performed in a warm environment.
		Vehicle	Auxiliary battery degradation	1) Turn the ignition switch to ON (READY) and leave the vehicle for 15 min (to charge the auxiliary battery) 2) Explain to the customer that the auxiliary battery will become discharged after the vehicle is left for a long time

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION	
		POSSIBLE CAUSE	ACTION TO BE TAKEN
			HINT: The auxiliary battery voltage may have become temporarily low due to deterioration of the auxiliary battery, use of accessories connected to the vehicle, etc. 3) Inspect the auxiliary battery INFO

- X0578

Charge Temporarily Canceled/Canceled (Charge Availability Counter) (X0578)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
A counter value malfunction sent from the battery ECU assembly was detected		
Vehicle	◦ Battery ECU assembly internal malfunction ◦ Plug-in charge control ECU internal malfunction ◦ Electric vehicle charger assembly internal malfunction ◦ CAN Communication error	1) Check for DTCs ◦ DTCs stored: Refer to the respective DTC ◦ No DTCs: Proceed to 2) 2) Perform AC charging using an AC power source that is confirmed to be operating normally ◦ Vehicle control history (RoB) is detected: Replace the electric vehicle charger assembly INFO

- X05C0

IAC Overcurrent at Power Feeding (X05C0)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of output stopping due to overcurrent in the electric vehicle charger assembly output current (power outlet side) detection circuit		
User	◦ Short in power outlet ◦ Connection of large capacity household appliance (or multiple devices) ◦ Household appliance malfunction	1) Explain to the customer that it may occur if a large capacity household appliance (air conditioner, etc.) is connected 2) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Charging Environment Related Cause
Charging Environment	◦ Moisture around power outlet ◦ A conductive object is inserted in the outlet ◦ Multiple socket adaptor damage	1) Explain to the customer that it may occur due to the conditions surrounding the power outlet 2) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
Vehicle	◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05C1

VH Overvoltage at Power Feeding (X05C1)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of output stopping due to overvoltage in the electric vehicle charger assembly supply power output pre-step voltage (after DC/DC converter output) detection circuit		
User	Regeneration from customer connected device (power generation device, etc., which applies power from power outlet side)	1) Explain to the customer that it may have occurred due to a connected device 2) Interview the customer regarding the condition in which power was supplied and perform an inspection
Vehicle	◦ HV battery overvoltage, etc., malfunction ◦ Effect of boost converter malfunction ◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system or boost converter system) ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ DTCs or vehicle control history (RoB) not detected: Replace the electric vehicle charger assembly INFO

- X05C2

Charger Over Temperature Stop Operation Memory at Power Feeding (X05C2)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of electric vehicle charger assembly internal temperature increase during power feeding and supply power output stopping		
Charging Environment	Ambient temperature of the electric vehicle charger assembly is high	1) Check that there is no foreign matter, etc., on the charger cooling blower If there is foreign matter, remove it 2) Explain to the customer that when the vehicle interior temperature is high, charging power is decreased due to electric vehicle charger assembly protection
Vehicle	Malfunction of HVOT or VH-DCDC temperature sensor, or PFC temperature sensor inside the electric vehicle charger assembly (stuck at an intermediate value of the high temperature range)	1) Check that there is no foreign matter, etc., on the charger cooling blower 2) After leaving in the shade (location with no direct sunshine), perform AC charging 3) During AC charging, check the Data List item "PFC Boosting Circuit Temperature" ◦ 130°C (266°F) or more: Replace the electric vehicle charger assembly INFO ◦ Less than 130°C (266°F): Proceed to 4) 4) During AC charging, check the Data List item "DC/DC Converter Temperature (for Charging)"

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
		◦ 118°C (244°F) or more: Replace the electric vehicle charger assembly INFO ◦ Less than 118°C (244°F): Proceed to 5) 5) During AC charging, check the Data List item "Hybrid/EV Output Temperature Sensor" ◦ 121°C (250°F) or more: Replace the electric vehicle charger assembly. INFO ◦ Less than 121°C (250°F): Proceed to 6) 6) Explain to the customer that when the ambient temperature around the electric vehicle charger assembly is high, charging power is decreased due to electric vehicle charger assembly protection

- X05C3

Charger Hybrid/EV Battery Input Voltage Sensor Low Voltage at Power Feeding (X05C3)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of detection of low electric vehicle charger assembly input voltage (battery voltage) and temporary stop of output		
Vehicle	◦ HV battery low voltage ◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system) and check that the high voltage fuse in the No. 1 traction battery device box is not blown ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ High voltage fuse blown: Replace the No. 1 traction battery device box ◦ No problem: Replace the electric vehicle charger assembly INFO

- X05C6

VIN Overvoltage at Interior Power Feeding (X05C6)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of output stopping due to electric vehicle charger assembly supply power output overvoltage (vehicle interior power outlet supply power output voltage)		
User	Regeneration from customer connected device (power generation device, etc., which applies power from interior power outlet side))	1) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
Vehicle	◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05C7

VIN Voltage Low at Interior Power Feeding (X05C7)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History output stopping due to the electric vehicle charger assembly supply power output voltage (vehicle interior supply power output voltage) being less than the rated voltage for 10 seconds		
User	◦ Connection of large capacity household appliance (or multiple devices) ◦ Household appliance malfunction	1) Explain to the customer that the voltage may drop, although not to the point of a short (overcurrent), due to a connected device or environment 2) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Charging Environment Related Cause
Charging Environment	◦ A conductive object is inserted in the outlet ◦ Multiple socket adaptor damage	1) Explain to the customer that the voltage may drop, although not to the point of a short (overcurrent), due to a connected device or environment 2) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO
Vehicle	◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05C9

Interior Power Feeding Short Circuit at Power Feeding (X05C9)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of supply power stopping due to the detection of an electric vehicle charger assembly output terminal short during vehicle interior supply of power (power outlet side output voltage momentary decrease)		
User	◦ Short in power outlet ◦ Connection of large capacity household appliance (or multiple devices) ◦ Household appliance malfunction	1) Explain to the customer that it may occur if a large capacity household appliance (air conditioner, etc.) is connected 2) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem:

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
		Go to Charging Environment Related Cause
Charging Environment	◦ Moisture around power outlet ◦ A conductive object is inserted in the outlet ◦ Multiple socket adaptor damage	1) Explain to the customer that it may occur due to the conditions surrounding the power outlet 2) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Vehicle Related Cause
Vehicle	◦ AC Charging fuse (High voltage fuse) blown (inside No. 1 traction battery device box) ◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Check that the AC Charging fuse (High voltage fuse) inside the No. 1 traction battery device box is not blown ◦ AC Charging fuse (High voltage fuse) blown: Replace the No. 1 traction battery device box INFO ◦ No problem: Replace the electric vehicle charger assembly INFO

- X05CA

Inlet Isolation Fault at Power Feeding (X05CA)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of supply power stopping due to the detection of electric vehicle charger assembly AC input power side electrical leakage		
User	Household appliance malfunction	1) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Charging Environment Related Cause
Charging Environment	Multiple socket adaptor damage	1) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO
Vehicle	Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05CB

Interior Outlet Isolation Fault at Power Feeding (X05CB)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of supply power stopping due to the detection of electric vehicle charger assembly vehicle interior power outlet side electrical leakage		
User	Household appliance malfunction	1) Interview the customer regarding the condition in which power was supplied and perform an inspection

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
		◦ Problem: Make improvements ◦ No problem: Go to Charging Environment Related Cause
Charging Environment	Multiple socket adaptor damage	1) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO
Vehicle	Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05CC

Power Collision Malfunction (X05CC)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of supply power stopping due to the detection of charger inlet side or vehicle interior power outlet side voltage before supply power started		
User	◦ Start of supply power when a household appliance is left connected to the vehicle interior power outlet ◦ Household appliance malfunction	1) Explain to the customer that there is a possibility of residual charge being output from the household appliance 2) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Replace the electric vehicle charger assembly INFO
Vehicle	Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X05CD

Charger Hybrid/EV Battery Input Voltage Sensor Overvoltage (X05CD)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
During AC charging, AC charging temporarily stopped and restarted 3 times or more as VCHG voltage (electric vehicle charger assembly output voltage / HV battery voltage) became overvoltage (There may be a charging delay without a DTC being output)		
Vehicle	◦ HV battery overvoltage, etc., malfunction ◦ Effect of boost converter circuit malfunction ◦ Electric vehicle charger assembly internal sensor malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system or boost converter system) ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ DTCs or vehicle control history (RoB) not detected: Replace the electric vehicle charger assembly INFO

- X05CF

Charger Hybrid/EV Battery Output Current Sensor Overcurrent (X05CF)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
During charging, charging temporarily stopped and restarted 10 times or more as ICHG current (electric vehicle charger assembly output current / current flowing to the HV battery) became overcurrent (There may be a charging delay without a DTC being output)		
Vehicle	◦ Short in SMR system ◦ Electric vehicle charger assembly internal sensor malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system, air conditioning system, DC/DC converter system, or boost converter system) ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ DTCs or vehicle control history (RoB) not detected: Replace the electric vehicle charger assembly INFO

- X05D1

Charger Hybrid/EV Battery Output Voltage Sensor Overvoltage at Power Feeding (X05D1)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of output stopping due to overvoltage of the electric vehicle charger assembly pre-output voltage (before the DC/DC converter output) detection circuit		
Vehicle	◦ HV battery overvoltage, etc., malfunction ◦ Effect of boost converter malfunction ◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system or boost converter system) ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ DTCs or vehicle control history (RoB) not detected: Replace the electric vehicle charger assembly INFO

- X05D2

Charger Hybrid/EV Battery Output Current Sensor Overcurrent at Power Feeding (X05D2)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of output stopping due to overcurrent in the electric vehicle charger assembly output current (vehicle side) detection circuit		
User	◦ Short in power outlet ◦ Connection of large capacity household appliance (or multiple devices) ◦ Household appliance malfunction	1) Explain to the customer that it may occur if a large capacity household appliance (air conditioner, etc.) is connected 2) Interview the customer regarding the condition in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Charging Environment Related Cause
Charging Environment	◦ Moisture around power outlet ◦ A conductive object is inserted in the outlet ◦ Multiple socket adaptor damage	1) Explain to the customer that it may occur due to the conditions surrounding the power outlet 2) Interview the customer regarding the environment in which power was supplied and perform an inspection ◦ Problem: Make improvements ◦ No problem: Go to Vehicle Related Cause

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
Vehicle	◦ HV battery overvoltage, etc., malfunction ◦ Effect of boost converter malfunction ◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Check for DTCs and vehicle control history (RoB) (HV battery system or boost converter system) ◦ DTCs or vehicle control history (RoB) detected: Refer to DTC or vehicle control history (RoB) ◦ DTCs or vehicle control history (RoB) not detected: Replace the electric vehicle charger assembly INFO

- X05D3

VAI Overvoltage (X05D3)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of electric vehicle charger assembly output voltage sensor (external supply power outlet inlet port side) stuck high		
Vehicle	◦ Electric vehicle charger assembly internal sensor malfunction ◦ Electric vehicle charger assembly internal circuit malfunction	1) Replace the electric vehicle charger assembly INFO

- X1040

Charge Canceled (Charging Equipment (CCID Relay Stuck)) (X1040)

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
-	1) Check the condition of the charging equipment that the customer used for AC charging ◦ Charging stand: External Power Source/Charging Stand ◦ Other than the above: Charging Cable	Before there was a AC charging equipment CCID relay ON command, AC voltage was applied to the electric vehicle charger assembly for a certain amount of time.		
		External Power Source/Charging Stand	AC charging equipment CCID relay stuck closed	1) Explain to the customer that a malfunction or deficiency of the AC charging equipment at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	CCID relay connect request circuit stuck ON	1) Inspect the charging cable CCID INFO

- X1053

Charge Delayed (Low CPLT Duty) (X1053)

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
-	1) Check with the customer if they performed charging using the vehicle equipped charging cable, or if they performed charging at a charging stand ◦ Charging cable: Proceed to 2) ◦ Charging stand: Proceed to 3)	Low CPLT Duty signal received (continuation of AC charging)		
		User	Use of a charging cable other than the vehicle equipped charging cable	1) Explain to the customer that the charging cable they used may have low current-carrying capacity.

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	2) Check the charging current value of the charging cable used by the customer **HINT:** The value is stated on the back side of the CCID-BOX ○ 16 A or more: Charging Cable ○ Other than the above: User 3) Check Freeze Frame Data item "AC Charging Input Minimum Voltage History" ○ Equivalent to the rated voltage: External Power Source/Charging Stand (Current setting of AC charging stand) ○ Other than the above: External Power Source/Charging Stand (Check system power source voltage)	External Power Source/Charging Stand	○ Electrical current configured for charging stand ○ System voltage decreased due ○ Effect of AC charging equipment construction	1) Explain to the customer that a deficiency of the AC charging equipment, or AC charging stand function at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Detection of power supply plug high temperature	1) Inspect the charging cable INFO

- X10C0

Charge Delayed/Canceled (Charger Temperature High) (X10C0)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
History of charging power limiting due to overheating of the electric vehicle charger assembly (Continuation of AC charging)		
Charging Environment	Electric vehicle charger assembly cooling performance not sufficient	1) Check that there is no foreign matter, etc., on the charger cooling blower **HINT:** If there is foreign matter, remove it 2) Explain to the customer that when the vehicle interior temperature is high, plug-in charging stops due to electric vehicle charger assembly protection
Vehicle	Malfunction of HVOT or VH-DCDC temperature sensor, or PFC temperature sensor inside the electric vehicle charger assembly (stuck at an intermediate value of the high temperature range)	1) Check that there is no foreign matter, etc., on the charger cooling blower 2) After leaving in the shade (location with no direct sunshine), perform AC charging 3) During AC charging, using the GTS, read the value of the Data List items "PFC Temperature". ○ 141°C (286°F) or more: Replace the electric vehicle charger assembly INFO ○ Less than 141°C (286°F): Explain to the customer that when the vehicle interior temperature is high, plug-in charging may stop 4) During AC charging, check the Data List item "DC/DC Converter Temperature (for Charging)"

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
		◦ 129°C (264°F) or more: Replace the electric vehicle charger assembly INFO ◦ Less than 129°C (264°F): Explain to the customer that when the vehicle interior temperature is high, plug-in charging may stop 5) During AC charging, check the Data List item "Hybrid/EV Output Temperature Sensor Circuit 2" ◦ 129°C (264°F) or more: Replace the electric vehicle charger assembly INFO ◦ Less than 129°C (264°F): Explain to the customer that when the vehicle interior temperature is high, plug-in charging may stop

- X10D1

AC Charge Start Rejection/Delayed (X10D1)

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
AC Charging System Low Voltage Decrease Continuation Status	1) Check the usage conditions with the user ◦ Ignition switch ON, accessories in use: User ◦ Other than the above: Vehicle	Auxiliary battery voltage has decreased.		
		User	SOC of the HV battery dropped due to excessive power consumption from the ignition switch being left ON or the use of accessories.	1) Explain to the customer that it is necessary to reduce power consumption from accessories during AC charging.
		Vehicle	Discharged auxiliary battery	1) Turn the ignition switch to ON (READY) and leave the vehicle for 15 min (to charge the auxiliary battery) 2) Explain to the customer that the auxiliary battery will discharge when the vehicle is left without being started for a long time. **HINT:** The voltage of the auxiliary battery may temporarily decrease due to reasons such as degradation of the auxiliary battery or use of vehicle accessories. 3) Inspect auxiliary battery INFO
Charge Interruption Connector Operation History	1) With the ignition switch ON and the charging cable used by the customer inserted, check the status of Data List item "PISW Status" ◦ Charging cable connection:	◦ The charging connector could not be correctly inserted before AC charging ◦ During AC charging, the latch release button on the charging connector was pressed for a certain amount of time or longer before the vehicle was fully charged		
		User	Lock release button pressed and held	1) Explain to the customer that during charging, the lock release

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	User (lock release button pressed and held (operation mistake)) ◦ Other than the above: Proceed to 2) 2) With the ignition switch ON, insert a charging cable that is confirmed to be operating normally and check the status of Data List item "PISW Status" ◦ Charging cable connection: External Power Source/Charging Stand, Charging Cable ◦ Other than the above: Vehicle		(Incorrect operation)	button may have been pushed for a certain amount of time, or the charging connector may not have been securely connected (provide instruction on usage)
		External Power Source/Charging Stand	PISW circuit malfunction (open)	1) Explain to the customer that a malfunction of the AC charging equipment that the customer used for charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	PISW circuit malfunction (open)	1) Inspect the charging cable. INFO
		Vehicle	◦ Service life of engagement parts on the charging connector or AC charging inlet ◦ PISW circuit malfunction	1) Inspect the wire harness and connectors between the AC charger inlet and plugin charger control ECU ◦ P0D5611: INFO ◦ P0D5615: INFO
Not Rechargeable by Power Outage	1) Check Freeze Frame Data "AC Input Voltage for Monitoring" ◦ Less than 50 V: Proceed to 2) ◦ 50 V or more: Proceed to 4) 2) Perform AC charging using the charging cable that was used by the customer. ◦ Not reproduced: User, Environment, External Power Source/Charging Stand ◦ Reproduced: Proceed to 3) 3) Perform AC charging using a known good charging cable ◦ Not reproduced: Charging Cable ◦ Reproduced: Vehicle (Inspect with a focus on electric vehicle charger assembly)	◦ When starting AC charging or during AC charging with the charging cable correctly connected, the AC power source was shut off (including a drop in voltage) or the CPLT signal could not be received ◦ The plug was disconnected, or the charging connector was disconnected with the AC power source shut off		
		User	Plug disconnected	1) Explain to the customer that the plug of the charging cable may have been disconnected during AC charging (provide instruction on usage)
		Charging Environment	◦ Plug disconnected ◦ Power source switch off ◦ Power outage ◦ Circuit breaker tripped ◦ Power source stopped	1) Explain to the customer that any of the following examples may have occurred during AC charging (provide instruction on usage) ◦ The plug of the charging cable was disconnected(Malfunction such as disconnection under own weight, improper connection, cracking on the charging station side, etc.) ◦ Power outage / Circuit breaker tripped / Outlet switch turned off ◦ Power source stopped by EMS (Energy Management System)
		External Power Source/Charging Stand	◦ CPLT (control pilot signal) circuit	1) Explain to the customer that a malfunction or deficiency of the AC charging equipment at the location

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	4) Perform AC charging using a known good charging cable ◦ Plug-in charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle		◦ malfunction (open/short) ◦ AC charging was suspended by AC charging station	where the customer performed charging may have been the cause **HINT:** AC charging was suspended by AC charging station (Suspend button of AC charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.) 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	◦ CPLT (control pilot signal) circuit malfunction (open/short) ◦ Electric vehicle charger assembly malfunction (open or short)	1) Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO 2) Check the AC line between the AC charger inlet and electric vehicle charger inlet assembly INFO INFO
AC Charging Prohibition Status by CPLT Non Standard Pulse Factor	1) Perform AC charging using a known good charging cable ◦ Plug-in charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	Non-standard CPLT duty received (Abnormal transmission signal from AC charging equipment)		
		External Power Source/Charging Stand	◦ Incompatibility with AC charging station used ◦ CPLT (control pilot signal) circuit malfunction (open/short)	1) Explain to the customer that the AC charging equipment at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
CPLT High Fixed Status	1) Perform AC charging using a charging cable that is confirmed to be operating normally ◦ Plug-in charging possible:	CPLT signal was stuck (CPLT Duty: 100%) and AC charging did not start or was stopped (AC charging equipment charging stop request)		
		External Power Source/Charging Stand	AC charging was suspended by AC charging station (Due to function such as suspend button of AC	1) Explain to the customer that the function, etc., of the AC charging station at the location where the customer performed charging may have been the cause

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle		charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.)	**HINT:** AC charging was suspended by AC charging station (Suspend button of AC charging station was pushed, timer on AC charging station had elapsed, electrical power management function of AC charging station operated, AC charging station malfunction, etc.) 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally Vehicle control history (RoB) is detected: Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
Not AC Rechargeable by HLC Communication	1) Perform AC charging using a charging cable that is confirmed to be operating normally ◦ Charging possible: External Power Source/Charging Stand, Charging Cable ◦ Charging impossible or Vehicle Control History (RoB) detected again: Vehicle	HLC communication with an EVSE (charging station) has been detected (CPLT Duty: 5%). (When performing charging with an incompatible AC charging station)		
		External Power Source/Charging Stand	Incompatibility with AC charging station used	1) Explain to the customer that the AC charging equipment at the location where the customer performed charging may have been the cause 2) Inspect the AC charging equipment that the customer used for charging
		Charging Cable	Charging cable internal malfunction	1) Inspect the charging cable INFO
		Vehicle	CPLT (control pilot signal) circuit malfunction (open/short)	1) Check the power source of the power outlet 2) Perform AC charging using an AC power source that is confirmed to be operating normally Vehicle control history (RoB) is detected: Check the wire harness and connectors between the AC charger inlet and plugin charge control ECU assembly (Control Pilot Signal Circuit) INFO
IGCT Signal Status	-	Even though the charging cable was connected correctly and the CPLT signal was oscillating, IGCT did not change to ON		

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
		Vehicle	◦ CAN communication malfunction (body bus, powertrain bus) ◦ Smart key ECU assembly (certification ECU) malfunction ◦ IGCT circuit malfunction	1) Inspect plugin charge control ECU IGCT terminal/relay INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Proceed to 2) 2) Inspect HV control ECU IGCT terminal/relay INFO ◦ Abnormal: Repair malfunctioning parts ◦ No abnormalities: Proceed to 3) 3) Check the wire harness and connectors between the HV control ECU and certification ECU
Power Feeding High at Battery Voltage Low	-	When the HV battery SOC (State of Charge) was low, it was detected that power consumption was high		
		User	HV battery SOC dropped because auxiliary power consumption increased due to the use of accessories or turning the ignition switch to ON.	1) Explain to the customer to minimize auxiliary power consumption during AC charging
Shift Position P Range Status	-	It was detected that the shift state was not set to P		
		User	Shift operation error	1) Explain to the customer that the shift state should be set to P during AC charging
IGB Signal Status	**HINT:** If IGCT Signal Status is OFF, handle that issue first.	It was detected that the power source signal was cut off		
		Vehicle	◦ CAN communication malfunction (body bus, powertrain bus) ◦ Certification ECU malfunction ◦ IGB malfunction	1)Inspect the wire harnesses and connectors between the HV control ECU and certification ECU, and between the IGB terminals of the connectors.
Charging Power Output Low Status when 6A Charging	1) Check AC Charging History (X10F0) Freeze Frame data item "Minimum Charging Permission Power during Charging" ◦ Value is a positive number or close to 0: Charging Environment	When the charging power was low, it was detected that the power balance was negative (HV battery SOC (State of Charge) was reducing)		
		User	HV battery SOC (State of Charge) dropped because auxiliary power consumption increased due ignition switch ON, accessory use, etc.	1) Explain to the customer that 100 V charging may be stopped when electrical components are used

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	◦ Other than the above: Proceed to 2) 2) Interview the customer and ask what charging voltage they are using, if they know. ◦ 100 V: User ◦ Other than the above: Proceed to 3) 3) Check the value of "AC Power Supply Rated Current", and the difference between "AC Power Supply Rated Power" and "AC Charging Input Minimum Voltage History" ◦ Difference is large: External Power Source/Charging Stand, Charging Cable ◦ Other than the above: External Power Source/Charging Stand (AC charging stand current setting)			
		Charging Environment	Low temperature / high temperature charging	1) Explain to the customer that when the battery temperature is unsuitable, control will operate to make the temperature suitable, which may cause electrical power consumption to increase.
		External Power Source/Charging Stand	◦ Current setting of AC charging equipment ◦ Low system voltage ◦ Electrical wiring construction malfunction (floating ground, etc.)	1) Explain to the customer that charging may be stopped when the current settings are low 2) Explain to the customer that charging may be stopped due to low voltage
		Charging Cable	Power supply plug high temperature detected	1) Inspect the charging cable INFO
Charging Not Available Status at Cell Low Voltage	1) Check AC Charging History (X10F0) Freeze Frame Data item "Hybrid/EV Battery Minimum Temperature during Charging" ◦ Low temperature: Charging Environment ◦ Other than the above: Vehicle	It was detected that the HV battery voltage was extremely low		
		Charging Environment	HV battery temperature is low	1) Warm up the HV battery and perform AC charging Explain to the customer that this problem is not likely to occur if AC charging is performed directly after driving or charging is performed in a warm environment.
		Vehicle	Voltage of HV battery is low	1) Inspect HV battery INFO
AC Charging Stop (Low Power and Long Time Charging)	1) Interview the customer to check the ignition status during AC charging ◦ Ignition switch ON: User ◦ Ignition switch off or unknown: Proceed to 2) 2) Compare FFD items "AC Charging Input Minimum	It was detected that full charge was not reached after charging continued for a long period of time (several days)		
		User	◦ HV battery SOC (State of Charge) dropped because auxiliary power consumption increased due ignition switch	1) Explain to the customer to minimize auxiliary power consumption during AC charging 2) Explain to the customer that the ignition switch should not be left on

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
	Voltage History" and "AC Power Supply Rated Power". ◦ Equal or "AC Charging Input Minimum Voltage History" is larger: Charging Environment ◦ Other than the above: External Power Source/Charging Stand		ON, accessory use, etc. ◦ Plug-in charging after driving under high load	
		Charging Environment	◦ HV battery temperature is low ◦ HV battery permitted charging power is small	1) Warm up the HV battery and perform AC charging Explain to the customer that this problem is not likely to occur if AC charging is performed directly after driving or charging is performed in a warm environment. 2) Explain to the customer that HV battery protection control operated
		External Power Source/Charging Stand	◦ Infrastructure side circuit resistance increase ◦ Low system voltage due to multiple socket adaptor or extension cord	1) Explain to the customer that the system voltage at the location where charging was performed may have been low due to the effect of a malfunction or deficiency of the AC charging equipment, a multiple socket adaptor or extension cord, etc. 2) Inspect the AC charging equipment that the customer used for charging
AC Charging Start Sequence Time Out Status	-	It was detected that AC charging could not start due to an unspecified cause		
		Vehicle	◦ CAN communication malfunction (charging local bus) ◦ Charging does not start due to plugin charge control ECU ◦ Charging does not start due to EV charger conditions ◦ Charging does not start due to battery ECU	1) Inspect the devices to the left
AC Charging Prohibition Status by Auxiliary Battery Voltage Low at Stop DC/DC Converter	-	It was detected that the DC/DC converter did not operate for a long period of time and the auxiliary device voltage became low		
		Vehicle	◦ Auxiliary charging could not be performed due to operation of DC/DC converter overheat	1) Inspect DC/DC converter Explain to the customer that this malfunction can be prevented by performing charging after waiting for heat to dissipate from the DC/DC converter 2) Inspect both the main and sub DC/DC converter

APPLICABLE FFD	ANALYSIS PROCEDURE	MEMORIZATION CONDITION		
		POSSIBLE CAUSE		ACTION TO BE TAKEN
			protection control. ◦ Conditions occurred in which both the main and sub DC/DC converter could not be used	
Charging Not Available Status by Win Low	-	It was detected that charging could temporarily not be performed due to the HV battery temperature or HV battery usage conditions		
		Charging Environment	HV battery received voltage low due to unsuitable HV battery temperature	1) Explain to the customer that when the HV battery temperature is unsuitable, received HV battery input power supply will decrease and charging may stop

- X1100

Timer Reset (Charging Connector Reconnection) (X1100)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that a timer cancel operation was received due to a reinsertion of the charging connector		
User	Charging connector reinsertion	1) Interview customer and provide instruction on usage. INFO When timer charging is set and the charging connector is connected, the charge indicator flashes for approximately 15 seconds. Explain to the customer that if the charging connector is disconnected for 5 seconds or less and then reinserted while flashing, timer settings are disabled and AC charging starts

- X1102

Timer Reset (Gap of Current Time) (X1102)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It is detected that the plugin charge control ECU assembly internal current time and combination meter clock deviate by a certain amount of time		
Vehicle	◦ Combination meter assembly connection malfunction ◦ Meter current time malfunction ◦ Plugin charge control ECU assembly connection malfunction	1) Check the combination meter assembly connections INFO 2) Check with the customer if the combination meter internal clock deviates by 3 minutes or more within 1 week ◦ There is time deviation: Replace the combination meter assembly INFO **HINT:** ◦ If a deviation of 3 minutes or more within 1 week of the combination meter internal clock occurs despite setting the correct time, it is judged that there is a deviation of time ◦ If the size of the deviation between the combination meter assembly displayed time and correct time is unknown, or a time deviation always occurs, set the combination meter internal clock to the correct time and check if a deviation occurs again after 1 week 3) Replace the plugin charge control ECU assembly INFO

- X1103

Timer Reset (Time Information Abnormal) (X1103)

MEMORIZATION CONDITION		
POSSIBLE CAUSE		ACTION TO BE TAKEN
It was detected that the time information from the combination meter cannot be received correctly		
Vehicle	◦ Meter current time malfunction ◦ Plugin charge control ECU assembly connection malfunction	1) Check with the customer if the combination meter assembly clock display is operating incorrectly (time does not change, there is no abnormal time (E.g. 25:60, etc.), etc.) ◦ There is an operation malfunction: Replace the combination meter assembly INFO 2) Replace the plugin charge control ECU assembly INFO

CHECK VEHICLE CONTROL HISTORY (RoB) (about PLUG-IN CHARGING HISTORY)

HINT:

- The following Vehicle Control History (RoB) items are stored each time plug-in charging is performed, and are also stored when plug-in charging completes without error from start to finish. For this reason, the fact that they are output does not directly indicate any malfunction or problem.
- By identifying a plug-in event from the customer interview and then checking the Freeze Frame Data for that event, they can be useful in obtaining a detailed understanding of the situation.

(a) Using the GTS, enter the following menus.

Powertrain > Plug-in Control > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

(b) Select a Vehicle Control History (RoB) item about plug-in charging history.

HINT:

- Vehicle Control Histories (RoBs) about plug-in charging history are stored even if the plug-in charging has not started in fact.
- If any Vehicle Control History (RoB) item about plug-in charging history were stored, assume that plug-in charging has been attempted.

Vehicle Control History (RoB) (about Plug-in Charging History)

CODE	TESTER DISPLAY	DESCRIPTION
X10F0	AC Charging History	When AC normal charging is carried out, this is stored

(c) Check the Freeze Frame Data recorded with the Vehicle Control History (RoB) item about plug-in charging history.

Plug-in Charging History Detail FFD (for AC Charging)

APPLICABLE FFD	DESCRIPTION	NOTE
Total Distance Traveled	Distance driven	-
Total Distance Traveled - Unit	Unit of distance driven	km or mile
Remote e Air Control Use History	History of remote air conditioning being performed during charging	History of the remote e-air control function being activated while plug-in charging. When used, plug-in charging time will extend.
My Room Use History	History of My Room Mode being performed	History of the My-Room function being activated while plug-in charging. When used, plug-in charging time will extend.
SOC of Immediately after Wake Up	SOC (State of Charge) when charging started	If the SOC at the start of plug-in charging is low, the time needed to reach a full charge will be longer. If this value is 0 %, plug-in charging has not started. (not represent a malfunction of HV battery.)
Hybrid/EV Battery Total Voltage at Charging Start	Voltage of HV battery at the start of plug-in charging	If the HV battery voltage is low, battery protection may suppress the charging power, and plug-in charging time will become longer.

APPLICABLE FFD	DESCRIPTION	NOTE
Hybrid/EV Battery Maximum Temperature during Charging	Maximum HV battery temperature while plug-in charging	If this value shows -128°C (-198°F), it means that AC plug-in charging has not started. (not represent a malfunction of battery temperature sensor.)
Hybrid/EV Battery Minimum Temperature during Charging	Minimum HV battery temperature while plug-in charging	If this value shows 127°C (261°F), it means that AC plug-in charging has not started. (not represent a malfunction of battery temperature sensor.)
Hybrid/EV Battery Temperature Rising History	History of battery warming function usage while plug-in charging	History of the battery warming function being activated while plug-in charging. When used, plug-in charging time will extend.
Hybrid/EV Battery Cooling History	History of battery cooling function usage before plug-in charging or while plug-in charging	History of the battery cooling function being activated before charging or while plug-in charging When used, plug-in charging time will extend.
Connector Unlock History during Charging	Charging connector unlock history during plug-in charging	-
Minimum Cable Permission Current during Charging	Minimum cable permitted current while plug-in charging	Plug-in charging time may extend depending on limitation by charging cable specification. If this value shows 262.14 A, it means that AC plug-in charging has not started. (not represent a malfunction of charging cable.)
Charger Power Supply Voltage Type	Voltage of power supply infrastructure at the start of plug-in charging	Even when the customer believes the power source to be 200 V, depending on the actual voltage it could be identified as a 100 V system. In such a situation, AC charging time can be longer than the customer anticipates. If there is no problem with the vehicle, check the infrastructure.
6A Charging Mode Switching History	Whether there is history of switching to 6A mode	Indicates whether there is history of switching to low power charging mode. Check the charging cable and external AC power source/charging stand.
DTC Detection History	History of DTC output during that plug-in charging cycle	Indicates that DTC was output. If DTCs are stored, handle those DTCs first.
Record on Behavior Detection History	History of Vehicle Control History (RoB) output during that charging cycle	Indicates that Vehicle Control History (RoB) was output If Vehicle Control Histories (RoBs) are stored, handle those Vehicle Control Histories (RoBs) first.
Charging History Information	Information displayed on the meter when plug-in charging completes.	Stores the reason that plug-in charging ended (comparable to meter display). If charging could not be started, the value for the previous plug-in charging is displayed.
AC Charging Input Minimum Voltage History	Minimum voltage of power supply infrastructure during plug-in charging	If the value of this item is low despite "Charging Voltage (Average Effective Value)" equal to "Charger Power Supply Voltage Type", it means that voltage has dropped momentarily. If this value shows -3276.8 V, it means that AC plug-in charging has not started. (not represent a malfunction of electric vehicle charger assembly or other.)
Total Number of AC Charging	Cumulative plug-in AC charging operations	-
AC Charging Total Time	Cumulative plug-in AC charging time	-
Charging Elapsed Time	Time for which AC charging performed	Displays actual charging time.
AC Input Voltage for Monitoring before Charging	Infrastructure voltage value immediately before the start of plug-in charging	Measure the deviation of the Vin sensor in the charger. If the deviation is large, it will affect the charging time. When the disparity is extremely large, a DTC is stored. If this value shows 32767.5 V, there is possibility of not having started in AC plug-in charging. (not represent a malfunction of the electric vehicle charger assembly.) In the case, read the value of Data List item "AC Input Voltage for Monitoring" during AC plug-in charging, with plug side of charging cable disconnected.
Charging Voltage (Trip Crest Value)	Maximum voltage value while plug-in charging	To calculate power supply quality, divide Average Effective Value by Trip Crest Value.

APPLICABLE FFD	DESCRIPTION	NOTE
		The worse the power supply quality, the higher the value of this item, and the AC plug-in charging time is extended. **HINT:** 1.4 to 1.5: optimal value
Charging Voltage (Average Effective Value)	Average voltage value while plug-in charging	The low value of this item means that the infrastructure voltage is chronically low. If this item is lower than the infrastructure voltage standard value, the AC plug-in charge time will become longer than a prospect. **HINT:** Check if the value is low more than approximately 5 % than the infrastructure voltage standard value. In the case of the above, check the plug-in charging equipment condition (including the charging cable). It may be one of the causes of the plug-in charge time extension.
AC Power Supply Rated Current	Rated current value during plug-in charging	The maximum charging current value that the charging station could supply during plug-in charging
Maximum Charging Current Setting (200V)	The charge current setting as set by the customer	When the customer has set a Charging Limit, the charging current is less than the maximum and plug-in charging time will extend.
Minimum Charging Permission Power during Charging	Minimum permitted power while plug-in charging (Win)	Plug-in charging time is usual if the absolute value of this item is higher than the output capacity of the AC charging stand. If this value shows -327.68 kW, it means that AC plug-in charging has not started. (not represent a malfunction of HV battery.)
Timer Setting	Whether charging schedule set	If the charging schedule is set, simply inserting the charging connector will not cause plug-in charging to start.

VEHICLE CONTROL HISTORY FREEZE FRAME DATA (PLUG-IN CONTROL)

(a) Using the GTS, enter the following menus.

Powertrain > Plug-in Control > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

(b) Select a Vehicle Control History (RoB) item to access the applicable Freeze Frame Data.

(c) Check the Freeze Frame Data recorded with the Vehicle Control History (RoB).

Click here INFO

Vehicle Control History Freeze Frame Data

TESTER DISPLAY
Shift Position P Range Status
Smoothed Value of BATT Voltage
Total Distance Traveled
Total Distance Traveled - Unit
Ready Status
IGB Signal
IGB ON Request
IGCT Signal Status
IGCT Keeping Request
IG2 Signal Status
PISW Status

TESTER DISPLAY
Hybrid/EV Control System Control Mode
Hybrid/EV Output Driver Drive Status
Hybrid/EV Output Temperature Sensor
Hybrid/EV Communication Enable Information (Hybrid/EV Battery Local Bus)
WIN Control Limit Power
WOUT Control Limit Power
A/C Consumption Power
A/C Useable Power
Remote Air Control System
Remote e Air Control Use History
ACRL Drive Request
My Room Use History
My Room Operation
Not AC Rechargeable by HLC Communication
HV/EV Battery Total Voltage
Charging Voltage for Hybrid/EV Battery
Hybrid/EV Battery SOC
Hybrid/EV Battery Voltage
SOC of Immediately after Wake Up
Hybrid/EV Battery Temperature when Charging Start
Hybrid/EV Battery Total Voltage at Charging Start
Hybrid/EV Battery Maximum Temperature
Hybrid/EV Battery Minimum Temperature
Hybrid/EV Battery Maximum Temperature during Charging
Hybrid/EV Battery Minimum Temperature during Charging
Hybrid/EV Battery Charging/Power Feeding Permission Status with Hybrid/EV Battery Thermal Keep
Hybrid/EV Battery Charging Power
Hybrid/EV Battery Temperature Rising History
Hybrid/EV Battery Control Status on Thermal Keeping and Charging
Hybrid/EV Battery Current for Hybrid/EV Battery Control
Hybrid/EV Battery Cooling History
Charging Not Available Status at Cell Low Voltage
Auxiliary Battery Voltage Low Status
Auxiliary Battery Voltage Low Status from Hybrid/EV Battery
Auxiliary Battery Voltage Low Status from Hybrid/EV
ICHG Current (Instantaneous Value)
Charging Lid Switch Status
Charging Lid Lamp Status
Hood Courtesy Switch Signal
Charging Indicator lighting Request
AC Charging Inlet Type
AC Charging Inlet Insert Status
AC Inlet Over Temperature Status

TESTER DISPLAY
Inlet Soak Time at DC Charge Start
Charging Connector Connect Status
Charging Connector Connect Status Voltage
Charging Connector Lock Pin Status
Charging Connector Lock Motor Unlock Direction Revolution Request Current
Charging Connector Lock Motor Lock Direction Revolution Request Current
Interlock Operation Status
Power Feeding Connecter Power Supply Switch
Connector Unlock History during Charging
Charge Interruption Connector Operation History
Minimum Cable Permission Current during Charging
Charger Power Supply Voltage Type
Charger Operation Status
Charger Operation Request
Charger Drive Permission Signal
Charger Input Power
Charger Output Power
Charger Cooling Fan Driving Duty
Charger Cooling Fan Revolution
Charging Control Information
Charging Control Signal Status
6A Charging Mode Switching History
Current Time (hour)
Current Time (sec)
Current Time (min)
Current Time (day of the week)
DTC Detection History
Record on Behavior Detection History
System Impedance Increase Abnormal
Power Feeding High at Battery Voltage Low
Charging Start Waiting Release Status
Charging History Information
AC Charging Prohibition Status by Auxiliary Battery Voltage Low at Stop DC/DC Converter
AC Charging Start Sequence Time Out Status
AC Charging
AC Charging Stop (Low Power and Long Time Charging)
AC Charging Operation Status
AC Charging Input Minimum Voltage History
Charging Not Available Status by Win Low
Total Number of AC Charging
AC Charging Total Time
Number of Charge Canceled (Power Failure)
Charging State Elapsed Time

TESTER DISPLAY
Target Charging Power
Target Charging Power from Charger
Charging Power Upper Limit Value
Charging Required Time Calculation Status
Charging Required Time
Charging Elapsed Time
AC Input Voltage for Monitoring
AC Input Voltage for Control
AC Input Voltage for Monitoring before Charging
Target AC Input Voltage for Control
AC Input Voltage Instantaneous Value 1 for Waveform Monitoring
AC Input Voltage Instantaneous Value 2 for Waveform Monitoring
AC Input Voltage Instantaneous Value 3 for Waveform Monitoring
AC Input Voltage Instantaneous Value 4 for Waveform Monitoring
AC Input Voltage Instantaneous Value 5 for Waveform Monitoring
AC Input Voltage Instantaneous Value 6 for Waveform Monitoring
AC Input Voltage Instantaneous Value 7 for Waveform Monitoring
AC Input Voltage Instantaneous Value 8 for Waveform Monitoring
AC Input Voltage Instantaneous Value 9 for Waveform Monitoring
AC Input Voltage Instantaneous Value 10 for Waveform Monitoring
AC Input Voltage Instantaneous Value 11 for Waveform Monitoring
AC Input Voltage Instantaneous Value 12 for Waveform Monitoring
AC Input Voltage Instantaneous Value 13 for Waveform Monitoring
AC Input Voltage Instantaneous Value 14 for Waveform Monitoring
AC Input Voltage Instantaneous Value 15 for Waveform Monitoring
AC Input Voltage Instantaneous Value 16 for Waveform Monitoring
Time Cycle of Charging Voltage Zero Crossing Point
Plug-in Control ECU Voltage (VOMS5)
Plug-in Control ECU Voltage Request (SMP5)
Plug-in Control Module System Voltage (Plus)
Plug-in Control Module System Voltage (Minus)
Charging Voltage (Trip Crest Value)
Charging Voltage (Average Effective Value)
AC Power Supply Rated Current
AC Power Supply Rated Power
AC Input Current
Charging Current Upper Limit
Charging Current Duty from Charger
Time Cycle of Charging Current Duty from Charger
CPLT High Fixed Status
AC Charging Prohibition Status by CPLT Non Standard Pulse Factor
CPLT Pulse Status
AM/PM

TESTER DISPLAY
Charging Current Limit Status from Charger
Maximum Charging Current Setting (200V)
Charging Power Limit (Charging Voltage Low)
Charging Power Output Low Status when 6A Charging
Charging Power Low Status when SOC Low
Minimum Charging Permission Power during Charging
Timer Setting
Timer Wait Request
Not Rechargeable by Power Outage
Charging/Power Feeding Start Request Judgment
Charging/Power Feeding Switching Switch Request
Charging/Power Feeding Switching Switch Status
AC Power Feeding Control Mode
AC Charging System Low Voltage Decrease Continuation Status
Power Feeding Isolation Fault Detection
Power Feeding Inverter Operation Status
Power Feeding INV Activate Request
Power Feeding INV Activate Status
Power Feeding INV Output Frequency Setting
Power Feeding INV Output Voltage Setting
PFC Boosting Circuit Driver Drive Status
Voltage after Boosting by PFC Boosting Circuit
PFC Boosting Circuit Current Amplitude
PFC Temperature
High Voltage Circuit Shutdown Signal
DC/DC Converter Operation Status
DC/DC Converter Driver Drive Status (for Charging)
DC/DC Converter Temperature (for Charging)
AC 100V Switch Indicator Lighting Request
AC Charging Negative Relay Status
AC Charging Positive Relay Status
AC Charging Precharge Relay Status
AC Charging Negative Relay Drive Request
AC Charging Positive Relay Drive Request
AC Charging Precharge Relay Drive Request
Plug-in Control ECU Power Supply Relay Confirmed Status
Charging Relay Connect Request in CCID Box from CCID Box
Rush Current Prevention Resistance Relay Activate Request
VAI
VAO

CHECK VEHICLE CONTROL HISTORY (RoB) (HV)

(a) Using the GTS, enter the following menus.

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

NOTICE:

The numbers in the Action to be Taken column indicate the order in which operations should be performed.

VEHICLE CONTROL HISTORY FREEZE FRAME DATA (HV)

(a) Using the GTS, enter the following menus.

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

(b) Select a Vehicle Control History (RoB) item to access the applicable Freeze Frame Data.

(c) Check the Freeze Frame Data recorded with the Vehicle Control History (RoB).

Click here INFO