

# SECTION **STC**

## STEERING CONTROL SYSTEM

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# PRECAUTIONS

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## PRECAUTION

### PRECAUTIONS

#### Precaution for Technicians Using Medical Electric

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##### OPERATION PROHIBITION

###### **WARNING:**

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

##### NORMAL CHARGE PRECAUTION

###### **WARNING:**

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) during normal charge operation.

##### PRECAUTION AT TELEMATICS SYSTEM OPERATION

###### **WARNING:**

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

##### PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

###### **WARNING:**

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

#### Point to Be Checked Before Starting Maintenance Work

INFOID:000000007634107

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

###### **NOTE:**

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

#### Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000007634108

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS

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# PRECAUTIONS

## < PRECAUTION >

system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

### **WARNING:**

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

## PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

### **WARNING:**

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the power switch ON, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the power switch OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.

## Precautions for Removing Battery Terminal

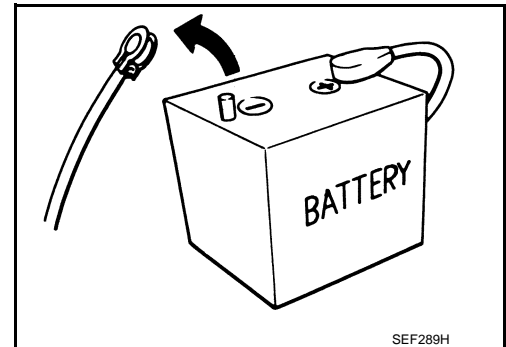
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- When removing the 12V battery terminal, turn OFF the power switch and wait at least 5 minutes.

### **NOTE:**

ECU may be active for several minutes after the power switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- Always disconnect the battery terminal within 60 minutes after turning OFF the power switch. Even when the power switch is OFF, the 12V battery automatic charge control may automatically start after a lapse of 60 minutes from power switch OFF.
- Disconnect 12V battery terminal according to the following steps.



## WORK PROCEDURE

1. Check that EVSE is not connected.

### **NOTE:**

If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.

2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).
3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.

### **NOTE:**

If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.

4. Remove 12V battery terminal within 60 minutes after turning the power switch OFF → ON → OFF.

### **CAUTION:**

- After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.
- After turning the power switch OFF, if “Remote A/C” is activated by user operation, stop the air conditioner and start over from Step 1.

### **NOTE:**

Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

# PRECAUTIONS

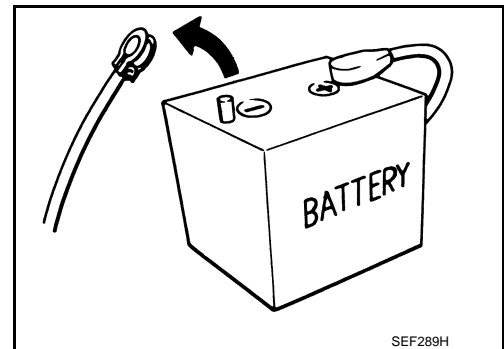
## < PRECAUTION >

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the power switch.  
**NOTE:**  
If the power switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.  
**NOTE:**  
The removal of 12V battery may cause a DTC detection error.

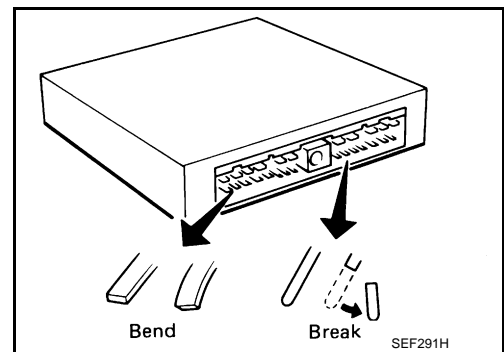
## Service Notice and Precautions for EPS System

INFOID:000000007634110

- Check the following item when performing the trouble diagnosis.
- Check any possible causes by interviewing the symptom and it's condition from the customer if any malfunction, such as EPS warning lamp is turned ON, occurs.
- Check if air pressure and size of tires are proper, the specified part is used for the steering wheel, and control unit is genuine part.
- Check if the connection of steering column assembly and steering gear assembly is proper (there is not looseness of mounting bolts, damage of rods, boots or sealants, and leakage of grease, etc.).
- Check if the wheel alignment is adjusted properly.
- Check if there is any damage or modification to suspension or body resulting in increased weight or altered ground clearance.
- Check if installation conditions of each link and suspension are proper.
- Check if the 12V battery voltage is proper.
- Check connection conditions of each connector are proper.
- Before connecting or disconnecting the EPS control unit harness connector, turn power switch "OFF" and disconnect 12V battery ground cable. Because battery voltage is applied to EPS control unit even if power switch is turned "OFF". Refer to [STC-4, "Precautions for Removing Battery Terminal"](#).



- When connecting or disconnecting pin connectors into or from EPS control unit, take care not to damage pin terminals (bend or break).
- When connecting pin connectors, make sure that there are no bends or breaks on EPS control unit pin terminal.
- During quick steering, rasping noise may be heard from around the steering wheel. This is not a malfunction. The noise is an operating noise of the EPS system under normal conditions. If the rasping noise occurs during slow steering, this may not be an operating noise of the system. In this case, it is necessary to find out the location of the noise and repair, if necessary.



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# COMPONENT PARTS

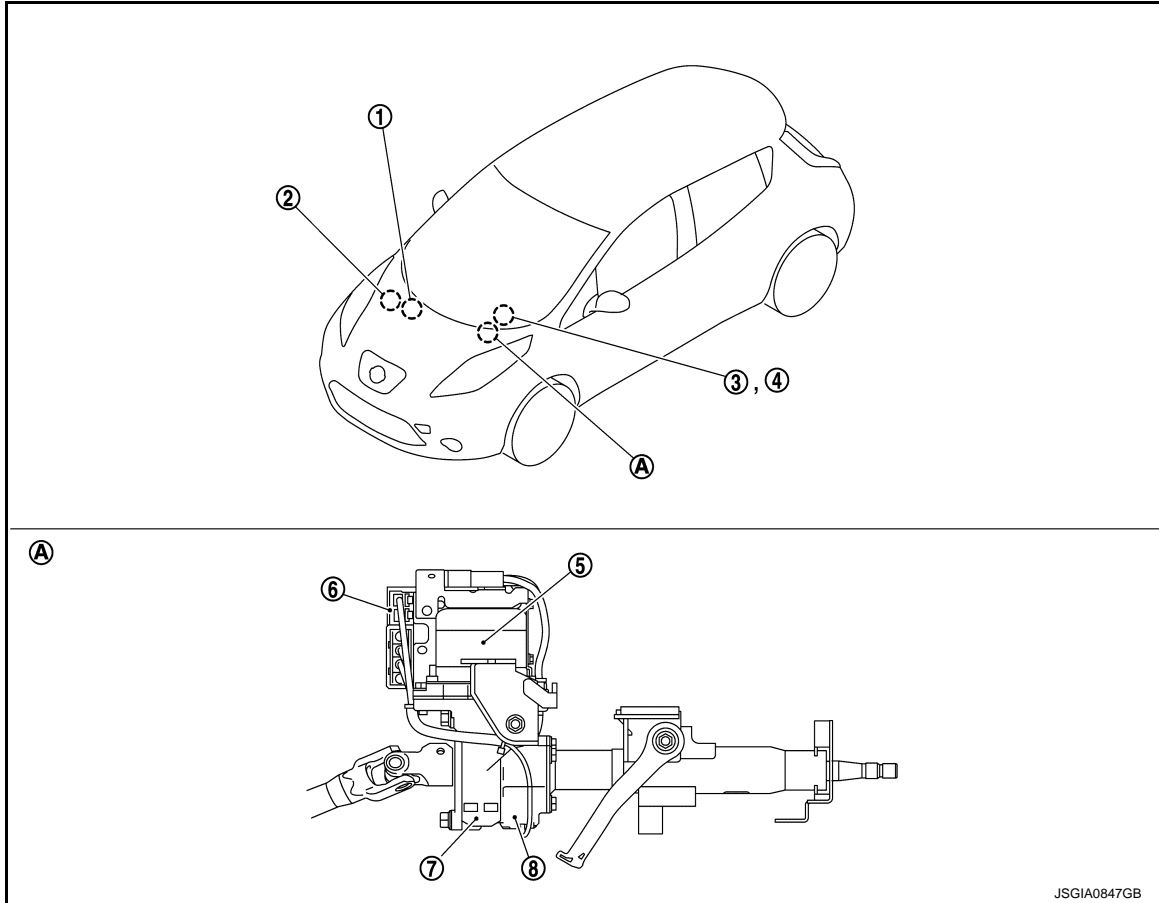
< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### COMPONENT PARTS

#### Component Parts Location

INFOID:000000007634111



A. Steering column assembly

No.	Component	Function
1	VCM (Vehicle Control Module)	<ul style="list-style-type: none"> <li>Transmits mainly the following signals to EPS control unit via CAN communication.</li> <li>- Power steering start activation request signal</li> </ul> Refer to <a href="#">EVC-17, "Component Parts Location"</a> for detailed installation location.
2	ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> <li>Transmits mainly the following signal to EPS control unit via CAN communication.</li> <li>- Vehicle speed signal</li> </ul> Refer to <a href="#">BRC-10, "Component Parts Location"</a> for detailed installation location.
3	Combination meter	<ul style="list-style-type: none"> <li>Transmits mainly the following signal to EPS control unit via CAN communication.</li> <li>- Vehicle speed signal</li> </ul> Refer to <a href="#">MWI-7, "METER SYSTEM : Component Parts Location"</a> for detailed installation location.
4	EPS warning lamp	<ul style="list-style-type: none"> <li>Turns ON the EPS warning lamp according to the signal from EPS control unit via CAN communication.</li> </ul> <a href="#">STC-8, "EPS SYSTEM : System Description"</a>
5	EPS motor	<a href="#">STC-7, "EPS Motor, Torque Sensor, Reduction Gear"</a>

# COMPONENT PARTS

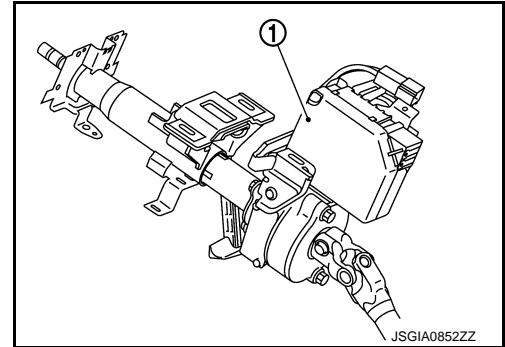
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No.	Component	Function
6	EPS control unit	STC-7. "EPS Control Unit"
7	Reduction gear	STC-7. "EPS Motor, Torque Sensor, Reduction Gear"
8	Torque sensor	STC-7. "EPS Motor, Torque Sensor, Reduction Gear"

### EPS Control Unit

INFOID:000000007634112

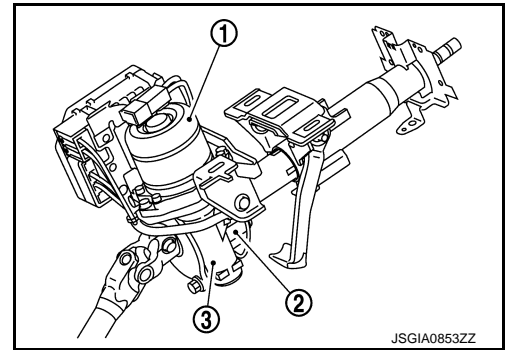
- EPS control unit (1) is installed to steering column assembly.
- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according to the driving condition.
- EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control).



### EPS Motor, Torque Sensor, Reduction Gear

INFOID:000000007634113

EPS motor (1), torque sensor (2) and reduction gear (3) are installed to steering column assembly.



#### EPS MOTOR

EPS motor provides the assist torque by the control signal from EPS control unit.

#### TORQUE SENSOR

Torque sensor detects the steering torque, and transmits the signal to EPS control unit.

#### REDUCTION GEAR

Reduction gear increases the assist torque provided from EPS motor with worm gears, and outputs to the column shaft.

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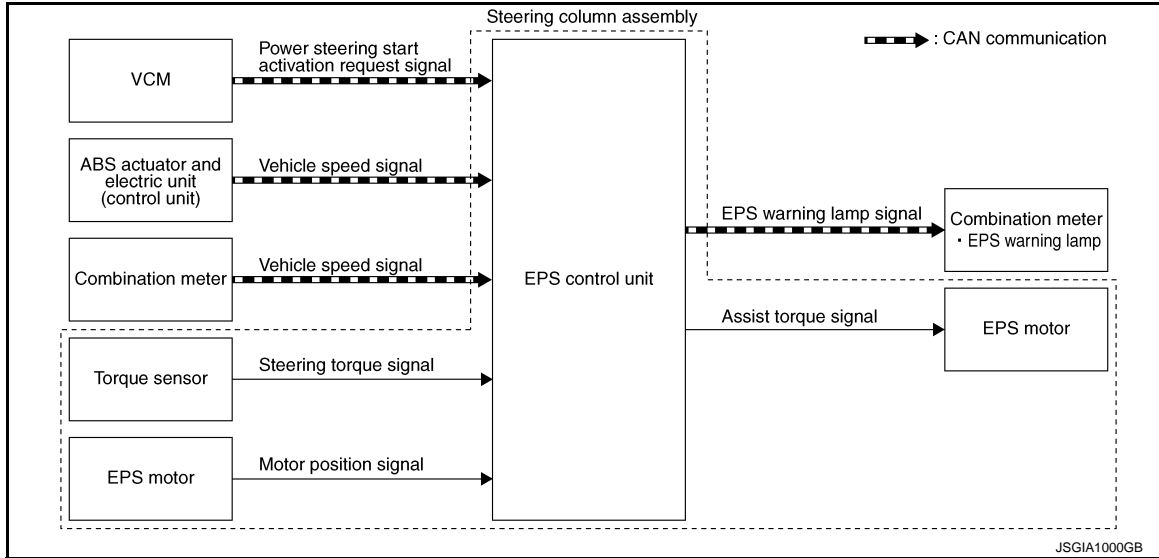
## SYSTEM

### EPS SYSTEM

#### EPS SYSTEM : System Description

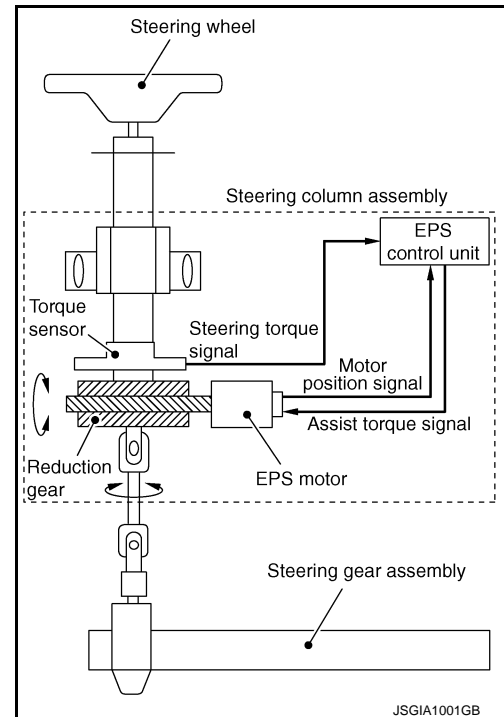
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#### SYSTEM DIAGRAM



#### DESCRIPTION

- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according to the driving condition.
- In case of an error in the electrical system, the fail-safe function stops output signals to the EPS motor. Refer to [STC-9. "EPS SYSTEM : Fail-Safe"](#).
- EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control). Refer to [STC-9. "EPS SYSTEM : Protection Function"](#).
- Extensive steering at low speed will cause the EPS control unit and EPS motor to heat up, once temperature reaches critical point EPS control unit will reduce current to reduce heat up. System will recover as temperature lowers (reduced or no assistance).



#### EPS WARNING LAMP INDICATION

- Turn ON when there is a malfunction in EPS system. If indicates that fail-safe mode is engaged and enters a manual steering state (Control turning force steering wheel becomes heavy).
- Also turns ON when power switch is turned ON, for purpose of lamp check. Turns OFF after the vehicle is READY state, if system is normal.

Condition	EPS warning lamp
Power switch ON (Lamp check)	ON



# SYSTEM

## < SYSTEM DESCRIPTION >

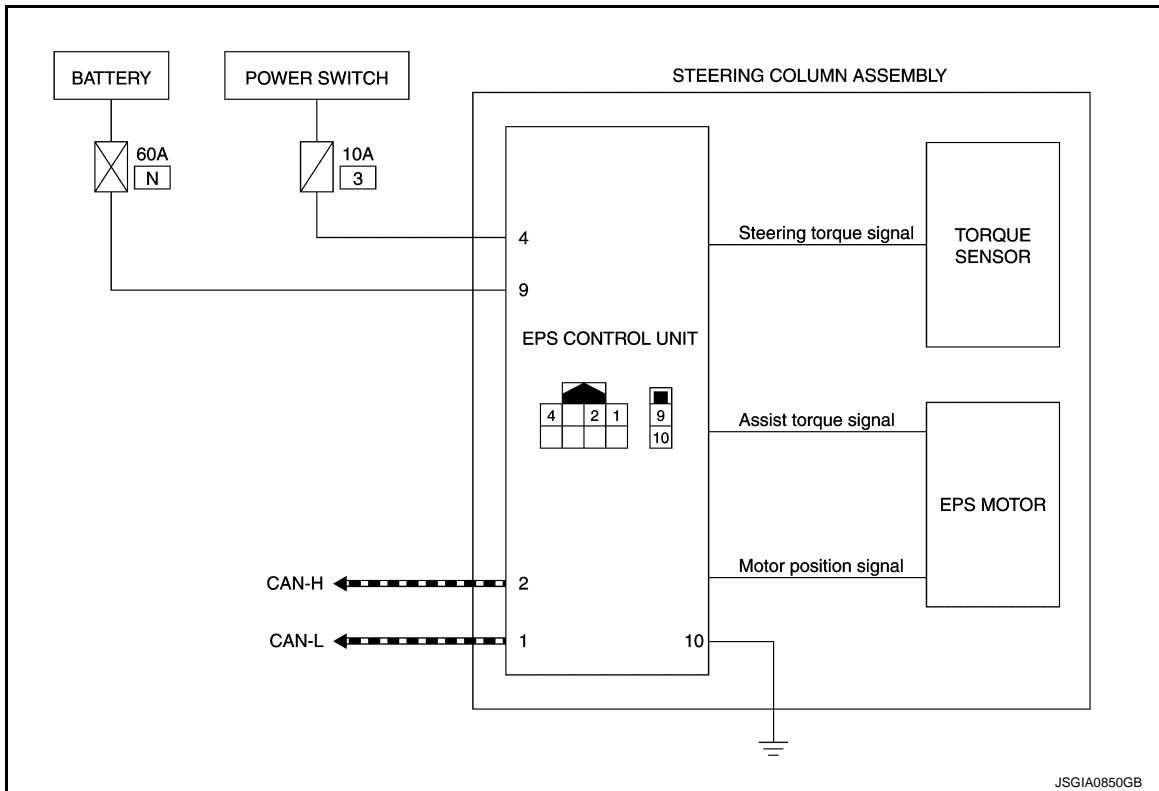
Condition	EPS warning lamp
When vehicle is READY state	OFF
EPS system malfunction [Other diagnostic item]	ON

### CAUTION:

EPS warning lamp also turns ON due to data reception error, CAN communication error etc.

## EPS SYSTEM : Circuit Diagram

INFOID:000000007634115



## EPS SYSTEM : Fail-Safe

INFOID:000000007634116

- If any malfunction occurs in the system and control unit detects the malfunction, EPS warning lamp on combination meter turns ON to indicate system malfunction.
- When EPS warning lamp is ON, the system enters into a manual steering state. (Control turning force steering wheel becomes heavy.)
- Under abnormal vehicle speed signal conditions, vehicle speed is judged as constant.

## EPS SYSTEM : Protection Function

INFOID:000000007634117

EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control). While activating overload protection control, the assist torque gradually decreases, and the steering wheel turning force becomes heavy. The normal assist torque is recovered if the steering wheel is not turned for a while.

# DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

< SYSTEM DESCRIPTION >

## DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

### CONSULT Function

INFOID:000000007634118

### APPLICATION ITEMS

CONSULT can display each diagnostic item using the diagnostic test modes shown following.

Diagnostic mode	Function
ECU identification	The part number stored in the control unit can be read.
Self diagnostic result	Self-diagnostic results and freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the EPS control unit can be read.

\*: The following diagnosis information is erased by erasing.

- DTC
- Freeze frame data (FFD)

### ECU IDENTIFICATION

Displays the part number stored in the control unit.

### SELF-DIAGNOSTIC RESULT

Refer to [STC-13, "DTC Index"](#).

When "CRNT" is displayed on self-diagnosis result.

- The system is presently malfunctioning.

When "PAST" is displayed on self-diagnosis result.

- System malfunction in the past is detected, but the system is presently normal.

### FREEZE FRAME DATA (FFD)

The following vehicle status is recorded when DTC is detected and is displayed on CONSULT.

Item name	Display item
IGN COUNTER (0 – 39)	<p>The number of times that power switch is turned ON after the DTC is detected is displayed.</p> <ul style="list-style-type: none"> <li>• When "0" is displayed: It indicates that the system is presently malfunctioning.</li> <li>• When except "0" is displayed: It indicates that system malfunction in the past is detected, but the system is presently normal.</li> </ul> <p><b>NOTE:</b> Each time when power switch is turned OFF to ON, numerical number increases in 1→2→3...38→39. When the operation number of times exceeds 39, the number do not increase and "39" is displayed until self-diagnosis is erased.</p>

### DATA MONITOR

Monitor item (Unit)	Remarks
BATTERY VOLT (V)	Displays the power supply voltage for EPS control unit.
STEERING ASSIST REQUEST (On/Off)	Condition of steering assist request is displayed from power steering start activation signal via CAN communication.
TORQUE SENSOR (Nm)	Displays steering wheel turning force detected by torque sensor.
MOTOR CURRENT (A)	Displays the current value consumed by EPS motor.*1
MOTOR SIG (A)	Displays the current commanded value to EPS motor.
ASSIST TORQUE (Nm)	Displays assist torque of EPS motor being output by the electric power steering.
C/U TEMP [°C (°F)]	Displays the temperature of inside of the EPS control unit.
ASSIST LEVEL (%)	Normally displays 100%. In case of an excessive stationary steering, the assist curvature gradually falls. However, it returns to 100% when left standing.*2
VEHICLE SPEED [km/h (MPH)]	Vehicle speed is displayed from vehicle speed signal via CAN communication.*3
WARNING LAMP (On/Off)	EPS warning lamp control status is displayed.

## DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

### < SYSTEM DESCRIPTION >

- \*1: Almost in accordance with the value of "MOTOR SIG". It is not a malfunction though these values are not accorded when steering quickly.
- \*2: Normally displays 100%. In case of an excessive stationary steering, the assist curvature gradually falls. However, it returns to 100% when left standing.
- \*3: It is not a malfunction, though it might not be corresponding just after power switch in turned ON.

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# EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

## ECU DIAGNOSIS INFORMATION

### EPS CONTROL UNIT

Reference Value

INFOID:000000007634119

#### VALUES ON THE DIAGNOSIS TOOL

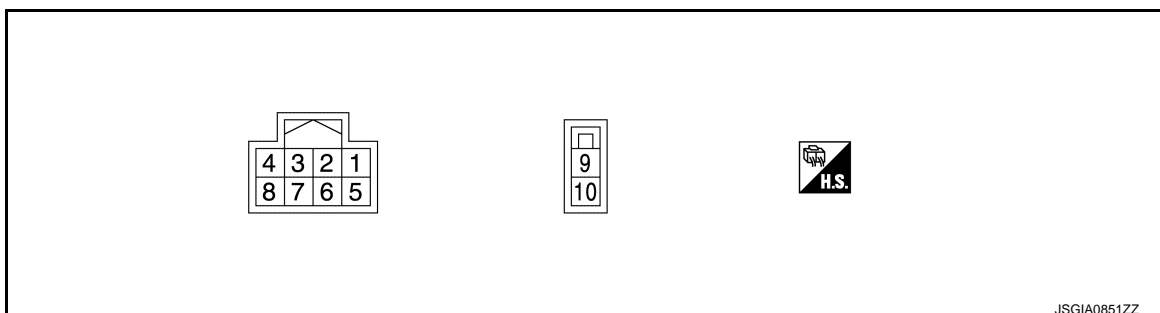
Monitor item	Condition		Value / Status
BATTERY VOLT	Power switch: ON		9 – 18.2 V
STEERING ASSIST REQUEST	Vehicle state: Except READY		Off
	Vehicle state: READY		On
TORQUE SENSOR	Vehicle state: READY	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
		Steering wheel: Right turn	Positive value (Nm)
		Steering wheel: Left turn	Negative value (Nm)
MOTOR CURRENT	Vehicle state: READY	Steering wheel: Not steering (There is no steering force)	Approx. 0 A
		Steering wheel: Right or left turn	Displays consumption current of EPS motor (A) <sup>*1</sup>
MOTOR SIG	Vehicle state: READY	Steering wheel: Not steering (There is no steering force)	Approx. 0 A
		Steering wheel: Right turn	Positive value (A)
		Steering wheel: Left turn	Negative value (A)
ASSIST TORQUE	Vehicle state: READY	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
		Steering wheel: Right or left turn	Displays assist torque of EPS motor (Nm)
C/U TEMP	Power switch: ON or Vehicle state: READY		Displays temperature of inside of EPS control unit [°C (°F)]
ASSIST LEVEL	Vehicle state: READY		100 % <sup>*2</sup>
VEHICLE SPEED	Vehicle stopped		0 km/h (0 mph)
	While driving		Approximately equal to the indication on speedometer <sup>*3</sup> (inside of ±10%)
WARNING LAMP	EPS warning lamp: ON		On
	EPS warning lamp: OFF		Off

\*1: Almost in accordance with the value of "MOTOR SIG". It is not a malfunction though these values are not accorded when steering quickly.

\*2: Normally displays 100%. In case of an excessive stationary steering, the assist curvature gradually falls. However, it returns to 100% when left standing.

\*3: It is not a malfunction, though it might not be corresponding just after power switch in turned ON.

#### TERMINAL LAYOUT



# EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

## PHYSICAL VALUES

Terminal No. (Wire Color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
1 (P)	—	CAN-L	Input/Output	—	—
2 (L)	—	CAN-H	Input/Output	—	—
4 (V)	Ground	Power supply (Power switch)	Input	Power switch: ON	9 – 18.2 V
				Power switch: OFF	0 V
9 (R)	Ground	Power supply (12V Battery)	Input	Always	9 – 18.2 V
10 (B)	Ground	Ground	—	Always	0 V

## Fail-Safe

INFOID:000000007634120

- If any malfunction occurs in the system and control unit detects the malfunction, EPS warning lamp on combination meter turns ON to indicate system malfunction.
- When EPS warning lamp is ON, the system enters into a manual steering state. (Control turning force steering wheel becomes heavy.)
- Under abnormal vehicle speed signal conditions, vehicle speed is judged as constant.

## Protection Function

INFOID:000000007634121

EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control). While activating overload protection control, the assist torque gradually decreases, and the steering wheel turning force becomes heavy. The normal assist torque is recovered if the steering wheel is not turned for a while.

## DTC Inspection Priority Chart

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When multiple DTCs are detected simultaneously, check one by one depending on the following priority list.

Priority	Priority order item (DTC)
1	U1000 CAN COMM CIRCUIT
2	C1609 CAN VHCL SPEED
3	C1601 BATTERY VOLT
4	Other than the above

## DTC Index

INFOID:000000007634123

DTC	Items (CONSULT screen terms)	Reference
C1601	BATTERY VOLT	<a href="#">STC-19, "DTC Logic"</a>
C1604	TORQUE SENSOR	<a href="#">STC-21, "DTC Logic"</a>
C1606	EPS MOTOR	<a href="#">STC-22, "DTC Logic"</a>
C1607	EEPROM	<a href="#">STC-23, "DTC Logic"</a>
C1608	CONTROL UNIT	<a href="#">STC-23, "DTC Logic"</a>
C1609	CAN VHCL SPEED	<a href="#">STC-24, "DTC Logic"</a>
U1000	CAN COMM CIRCUIT	<a href="#">STC-25, "DTC Logic"</a>

### NOTE:

If some DTCs are displayed at the same time, refer to [STC-13, "DTC Inspection Priority Chart"](#).

# ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

< WIRING DIAGRAM >


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## WIRING DIAGRAM

### ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

#### Wiring Diagram

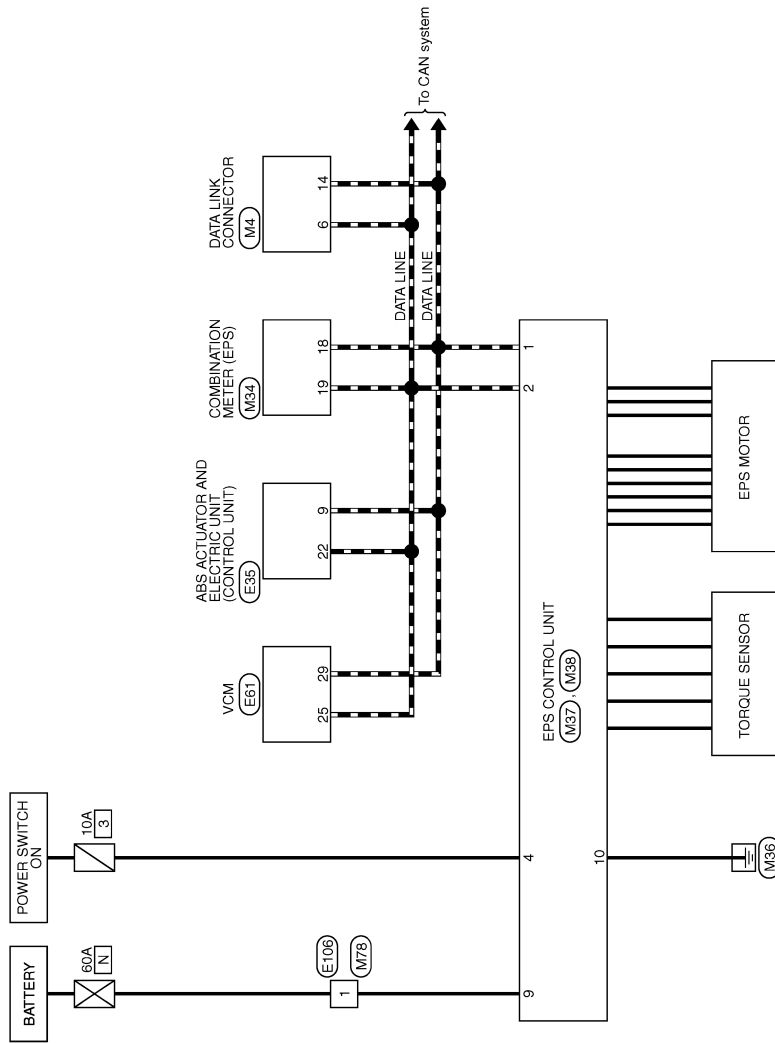
INFOID:000000007634124

For connector terminal arrangements, harness layouts, and alphabets in a  (option abbreviation; if not described in wiring diagram), refer to [GI-12, "Connector Information"](#).

# ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

< WIRING DIAGRAM >

## ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM



2010/10/29

JCGWA0296GB

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# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

#### Work Flow

INFOID:000000007634125

#### DETAILED FLOW

##### 1. INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-17, "Diagnostic Work Sheet"](#) and reproduce symptoms as well as fully understand it. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if necessary.

**CAUTION:**

**Customers are not professional. Never guess easily like “maybe the customer means that...,” or “maybe the customer mentions this symptom”.**

>> GO TO 2.

##### 2. CHECK SYMPTOM

Reproduce the symptom that is indicated by the customer, based on the information from the customer obtained by interview. Also check that the symptom is not caused by protection function. Refer to [STC-13, "Protection Function"](#).

**CAUTION:**

**When the symptom is caused by normal operation, fully inspect each portion and obtain the understanding of customer that the symptom is not caused by a malfunction.**

>> GO TO 3.

##### 3. PERFORM SELF-DIAGNOSIS

**With CONSULT**

Perform self-diagnosis.

Is any DTC detected?

YES >> Record or print DTC and freeze frame data (FFD). GO TO 4.

NO >> GO TO 6.

##### 4. RECHECK SYMPTOM

**With CONSULT**

1. Erase self-diagnostic results.

2. Perform DTC confirmation procedures for the error detected system.

**NOTE:**

If some DTCs are detected at the same time, determine the order for performing the diagnosis based on [STC-13, "DTC Inspection Priority Chart"](#).

Is any DTC detected?

YES >> GO TO 5.

NO >> Check harness and connectors based on the information obtained by interview. Refer to [GI-51, "Intermittent Incident"](#).

##### 5. REPAIR OR REPLACE ERROR-DETECTED PARTS

- Repair or replace error-detected parts.
- Reconnect part or connector after repairing or replacing.
- When DTC is detected, erase self-diagnostic results for “EPS”.

>> GO TO 7.

##### 6. IDENTIFY ERROR-DETECTED SYSTEM BY SYMPTOM DIAGNOSIS

Estimate error-detected system based on symptom diagnosis and perform inspection.

Can the error-detected system be identified?



# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

YES >> GO TO 7.

NO >> Check harness and connectors based on the information obtained by interview. Refer to [GI-51](#), "[Intermittent Incident](#)".

## 7. FINAL CHECK

### With CONSULT

1. Check the reference value for EPS control unit.
2. Recheck the symptom and check that symptom is not reproduced on the same conditions.

### Is the symptom reproduced?

YES >> GO TO 3.

NO >> INSPECTION END

## Diagnostic Work Sheet

INFOID:000000007634126

### Description

- In general, customers have their own criteria for a problem. Therefore, it is important to understand the symptom and status well enough by asking the customer about his/her concerns carefully. To systemize all the information for the diagnosis, prepare the interview sheet referring to the interview points.
- In some cases, multiple conditions that appear simultaneously may cause a DTC to be detected.

### Interview sheet sample

Interview sheet					
Customer name	MR/MS	Registration number		Initial year registration	
		Vehicle type		VIN	
Storage date		Mileage	km (Mile)		
Symptom		<input type="checkbox"/> The steering wheel position (center) is in the wrong position.			
		<input type="checkbox"/> EPS warning lamp turns on.			
		<input type="checkbox"/> Noise <input type="checkbox"/> Vibration			
		<input type="checkbox"/> Others ( )			
First occurrence		<input type="checkbox"/> Recently <input type="checkbox"/> Others ( )			
Frequency of occurrence		<input type="checkbox"/> Always <input type="checkbox"/> Under a certain conditions of <input type="checkbox"/> Sometimes (time(s)/day)			
Climate conditions		<input type="checkbox"/> Irrelevant			
	Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloud <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Others ( )			
	Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Temperature [Approx. °C °F]			
	Relative humidity	<input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low			
Road conditions		<input type="checkbox"/> Urban area <input type="checkbox"/> Suburb area <input type="checkbox"/> High way			
		<input type="checkbox"/> Mounting road (uphill or down hill) <input type="checkbox"/> Rough road			
Operation conditions, etc.		<input type="checkbox"/> Irrelevant			
		<input type="checkbox"/> During driving <input type="checkbox"/> During acceleration <input type="checkbox"/> At constant speed driving			
		<input type="checkbox"/> During deceleration <input type="checkbox"/> During cornering (right curve or left curve)			
		<input type="checkbox"/> During steering			

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# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## Interview sheet

Customer name	MR/MS	Registration number		Initial year registration	
		Vehicle type		VIN	
Storage date		Mileage	km (Mile)		
Other conditions					

Memo

# C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### C1601 BATTERY POWER SUPPLY

#### DTC Logic

INFOID:000000007634127

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1601	BATTERY VOLT	When a power supply voltage to the EPS control unit is maintained at 18.2 V or more or at less than 9 V continuously for five second or more.	<ul style="list-style-type: none"><li>• Harness or connector</li><li>• EPS control unit</li><li>• Fuse</li><li>• Power supply system</li><li>• 12V Battery</li></ul>

#### DTC CONFIRMATION PROCEDURE

##### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

##### 2. DTC REPRODUCTION PROCEDURE

###### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

###### Is DTC "C1601" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-19, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

#### Diagnosis Procedure

INFOID:000000007634128

##### 1. CHECK EPS CONTROL UNIT GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect EPS control unit harness connector.
3. Check continuity between EPS control unit harness connector terminal and ground.

EPS control unit		—	Continuity
Connector	Terminal		
M38	10	Ground	Existed

4. Connect EPS control unit harness connector.

###### Is the inspection result normal?

- YES >> GO TO 2.  
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

##### 2. CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT (1)

1. Check voltage between EPS control unit harness connector terminals and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M37	4	Ground	Approx. 0 V

2. Turn power switch ON.

**CAUTION:**  
**Never set the vehicle to READY.**

# C1601 BATTERY POWER SUPPLY

## < DTC/CIRCUIT DIAGNOSIS >

3. Check voltage between EPS control unit harness connector and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M37	4	Ground	9 – 18.2 V

### Is the inspection result normal?

- YES >> GO TO 4.  
NO >> GO TO 3.

## 3.CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT (2)

1. Turn power switch OFF.
2. Check the 10A fuse (#3).
3. Check the harness for open or short between EPS control unit harness connector No.4 terminal and the 10A fuse (#3).

### Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power switch ON power supply. Refer to [PG-30. "Wiring Diagram - ON POWER SUPPLY -"](#).  
NO >> Repair or replace error-detected parts.

## 4.CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT (3)

1. Turn power switch OFF.
2. Check voltage between EPS control unit harness connector terminals and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	9 – 18.2 V

3. Turn power switch ON.  
**CAUTION:**  
**Never set the vehicle to READY.**
4. Check voltage between EPS control unit harness connector and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	9 – 18.2 V

### Is the inspection result normal?

- YES >> GO TO 6.  
NO >> GO TO 5.

## 5.CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT (4)

1. Turn power switch OFF.
2. Check the 60A fusible link (N).
3. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 60A fusible link (N).

### Is the inspection result normal?

- YES >> Perform the trouble diagnosis for 12V battery power supply. Refer to [PG-16. "Wiring Diagram - BATTERY POWER SUPPLY -"](#).  
NO >> Repair or replace error-detected parts.

## 6.CHECK TERMINALS AND HARNESS CONNECTORS

Check the EPS control unit pin terminals for damage or loose connection with harness connector.

### Is the inspection result normal?

- YES >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-30. "Removal and Installation"](#).  
NO >> Repair or replace error-detected parts.

# C1604 TORQUE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

## C1604 TORQUE SENSOR

### DTC Logic

INFOID:000000007634129

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1604	TORQUE SENSOR	When torque sensor output signal is malfunctioning.	<ul style="list-style-type: none"><li>• Harness or connector</li><li>• Torque sensor</li><li>• EPS control unit</li></ul>

### DTC CONFIRMATION PROCEDURE

#### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1604" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-21, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007634130

#### 1. CHECK TERMINALS AND HARNESS CONNECTORS

Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

Is the inspection result normal?

- YES >> GO TO 2.  
NO >> Repair or replace error-detected parts.

#### 2. PERFORM SELF-DIAGNOSIS

##### With CONSULT

1. Erase self-diagnostic results for "EPS".
2. Turn the power switch OFF, and then wait 10 seconds and more.
3. Turn the power switch OFF to ON.
4. Perform self-diagnosis for "EPS".

Is DTC "C1604" detected?

- YES >> Torque sensor is malfunctioning. Replace steering column assembly. Refer to [ST-30, "Removal and Installation"](#).  
NO >> Check intermittent incident. Refer to [GI-51, "Intermittent Incident"](#).

# C1606 EPS MOTOR

< DTC/CIRCUIT DIAGNOSIS >

## C1606 EPS MOTOR

### DTC Logic

INFOID:000000007634131

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1606	EPS MOTOR	When the motor driver malfunction of EPS control unit or EPS motor malfunction is detected.	<ul style="list-style-type: none"><li>• Harness or connector</li><li>• EPS motor</li><li>• EPS control unit</li></ul>

### DTC CONFIRMATION PROCEDURE

#### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### Ⓟ With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1606" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-22, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007634132

#### 1. PERFORM SELF-DIAGNOSIS

##### Ⓟ With CONSULT

1. Erase self-diagnostic results for "EPS".
2. Turn the power switch OFF, and then wait 10 seconds and more.
3. Turn the power switch OFF to ON.
4. Perform self-diagnosis for "EPS".

Is DTC "C1606" detected?

- YES >> EPS motor is malfunctioning. Replace steering column assembly. Refer to [ST-30, "Removal and Installation"](#).  
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

# C1607, C1608 EPS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

## C1607, C1608 EPS CONTROL UNIT

### DTC Logic

INFOID:000000007634133

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1607	EEPROM	When the memory (EEPROM) system malfunction is detected in EPS control unit.	EPS control unit
C1608	CONTROL UNIT	When the internal malfunction is detected in EPS control unit.	

### DTC CONFIRMATION PROCEDURE

#### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### Ⓜ With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1607" or "C1608" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-23. "Diagnosis Procedure"](#).  
NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007634134

#### 1. CHECK TERMINALS AND HARNESS CONNECTORS

Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

Is the inspection result normal?

- YES >> GO TO 2.  
NO >> Repair or replace error-detected parts.

#### 2. PERFORM SELF-DIAGNOSIS

##### Ⓜ With CONSULT

1. Erase self-diagnostic results for "EPS".
2. Turn the power switch OFF, and then wait 10 seconds and more.
3. Turn the power switch OFF to ON.
4. Perform self-diagnosis for "EPS".

Is DTC "C1607" or "C1608" detected?

- YES >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-30. "Removal and Installation"](#).  
NO >> Check intermittent incident. Refer to [GI-51. "Intermittent Incident"](#).

# C1609 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

## C1609 VEHICLE SPEED SIGNAL

### DTC Logic

INFOID:000000007634135

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1609	CAN VHCL SPEED	<ul style="list-style-type: none"><li>Malfunction is detected in vehicle speed signal that is output from ABS actuator and electric unit (control unit) via CAN communication.</li><li>ABS actuator and electric unit (control unit) input signal error is detected.</li></ul>	<ul style="list-style-type: none"><li>Harness or connector</li><li>CAN communication line</li><li>EPS control unit</li><li>ABS malfunction</li><li>- Vehicle speed signal error</li></ul>

### DTC CONFIRMATION PROCEDURE

#### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### With CONSULT

- Turn the power switch OFF to ON.
- Perform "EPS" self-diagnosis.

##### Is DTC "C1609" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-24, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007634136

#### 1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

##### With CONSULT

- Turn the power switch OFF to ON.
- Perform "ABS" self-diagnosis.

##### Is any DTC detected?

- YES >> Check the DTC. Refer to [BRC-50, "DTC Index"](#).  
NO >> GO TO 2.

#### 2. PERFORM SELF-DIAGNOSIS

##### With CONSULT

Perform "EPS" self-diagnosis.

##### Is DTC "C1609" detected?

- YES >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-30, "Removal and Installation"](#).  
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any item are damaged, repair or replace error-detected parts.



# U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## U1000 CAN COMM CIRCUIT

### Description

INFOID:000000007634137

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

### DTC Logic

INFOID:000000007634138

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	EPS control unit is not transmitting/receiving CAN communication signal for 2 seconds or more.	<ul style="list-style-type: none"><li>• CAN communication error</li><li>• EPS control unit</li></ul>

### DTC CONFIRMATION PROCEDURE

#### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

##### Is DTC "U1000" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-25, "Diagnosis Procedure"](#).

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007634139

Proceed to [LAN-15, "Trouble Diagnosis Flow Chart"](#).

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# EPS WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

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## EPS WARNING LAMP

### Component Function Check

INFOID:000000007634140

#### 1. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check that the EPS warning lamp turns ON when power switch turns ON. Then, EPS warning lamp turns OFF after the vehicle is READY state.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis. Refer to [STC-26, "Diagnosis Procedure"](#).

### Diagnosis Procedure

INFOID:000000007634141

#### 1. PERFORM SELF-DIAGNOSIS

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##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-13, "DTC Index"](#).

NO >> GO TO 2.

#### 2. CHECK EPS WARNING LAMP SIGNAL

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##### With CONSULT

1. Select "DATA MONITOR" of "EPS" and select "WARNING LAMP".
2. Check that the item in "DATA MONITOR" is "On".
3. Set the vehicle to READY.

**CAUTION:**

**Never drive the vehicle.**

4. Check that the item in "DATA MONITOR" is "Off".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to [MWI-83, "COMBINATION METER : Diagnosis Procedure"](#).

NO >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-30, "Removal and Installation"](#).

# EPS WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### EPS WARNING LAMP DOES NOT TURN ON

#### Description

INFOID:000000007634142

EPS warning lamp does not turn ON when turning power switch ON from OFF. (Check the illumination of the EPS warning lamp.)

#### Diagnosis Procedure

INFOID:000000007634143

#### 1. CHECK EPS WARNING LAMP

Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-26, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.
- NO >> Repair or replace the specific malfunctioning part.

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# EPS WARNING LAMP DOES NOT TURN OFF

< SYMPTOM DIAGNOSIS >

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## EPS WARNING LAMP DOES NOT TURN OFF

### Description

INFOID:000000007634144

EPS warning lamp does not turn OFF several seconds after the vehicle is READY state.

### Diagnosis Procedure

INFOID:000000007634145

#### 1. PERFORM SELF-DIAGNOSIS

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##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

##### Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-13, "DTC Index"](#).  
NO >> GO TO 2.

#### 2. CHECK EPS WARNING LAMP

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Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-26, "Diagnosis Procedure"](#).

##### Is the inspection result normal?

- YES >> GO TO 3.  
NO >> Repair or replace the specific malfunctioning part.

#### 3. CHECK EPS CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT

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Perform the trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-19, "Diagnosis Procedure"](#).

##### Is the inspection result normal?

- YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.  
NO >> Repair or replace the specific malfunctioning part.

# STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

## STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

### Description

INFOID:000000007634146

Steering wheel turning force is heavy or light.

### Diagnosis Procedure

INFOID:000000007634147

#### 1. PERFORM SELF-DIAGNOSIS

##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

##### Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-13, "DTC Index"](#).  
NO >> GO TO 2.

#### 2. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check that the EPS warning lamp turns ON when power switch turns ON. Then, EPS warning lamp turns OFF after the vehicle is READY state.

##### Is the inspection result normal?

- YES >> GO TO 3.  
NO >> Perform trouble diagnosis of EPS warning lamp. Refer to [STC-26, "Diagnosis Procedure"](#).

#### 3. CHECK EPS CONTROL UNIT SIGNAL (1)

##### With CONSULT

1. Set the vehicle to READY.
2. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS".

##### Dose the item in "DATA MONITOR" indicate "100%"?

- YES >> GO TO 6.  
NO >> GO TO 4.

#### 4. CHECK EPS CONTROL UNIT SIGNAL (2)

##### With CONSULT

Select "BATTERY VOLT" in "DATA MONITOR" in "EPS".

##### Dose the item in "DATA MONITOR" indicate "10.5 V" or more?

- YES >> GO TO 5.  
NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-19, "Diagnosis Procedure"](#).

#### 5. CHECK EPS CONTROL UNIT SIGNAL (3)

##### With CONSULT

1. Select "C/U TEMP" in "DATA MONITOR" in "EPS".
2. Stop the EPS system until the item in "DATA MONITOR" becomes "85°C (185°F)" or less.

##### **NOTE:**

While stopping the EPS system, do not turn steering wheel.

3. Check that the symptom continues.

##### Dose the symptom continue?

- YES >> GO TO 6.  
NO >> The assist torque decreases because of protection function. This is not malfunction. INSPECTION END

#### 6. CHECK EPS CONTROL UNIT SIGNAL (4)

##### With CONSULT

1. Set the vehicle to READY.

##### **CAUTION:**

**Never drive the vehicle.**

2. Turn steering wheel from full left stop to full right stop.

# STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

## < SYMPTOM DIAGNOSIS >

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3. Select "TORQUE SENSOR" in "DATA MONITOR" in "EPS".

Monitor item	Condition	Display value
TORQUE SENSOR	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
	Steering wheel: Right turn	Positive value (Nm)
	Steering wheel: Left turn	Negative value (Nm)

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

## 7.CHECK EPS MOTOR

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Perform the trouble diagnosis of EPS motor. Refer to [STC-22, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace the specific malfunctioning part.

## 8.CHECK STEERING WHEEL TURNING FORCE

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Check the steering wheel turning force. Refer to [ST-28, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-39, "Inspection"](#).

# UNBALANCE STEERING WHEEL TURNING FORCE AND RETURN BETWEEN RIGHT AND LEFT

< SYMPTOM DIAGNOSIS >

## UNBALANCE STEERING WHEEL TURNING FORCE AND RETURN BETWEEN RIGHT AND LEFT

### Description

INFOID:000000007634148

Unbalance steering wheel turning force and return between right and left.

### Diagnosis Procedure

INFOID:000000007634149

#### 1. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check the EPS warning lamp while the vehicle is READY state.

Does the EPS warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-28, "Diagnosis Procedure"](#).

#### 2. CHECK WHEEL ALIGNMENT

Check the wheel alignment. Refer to [FSU-11, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Adjustment of wheel alignment. Refer to [FSU-11, "Inspection"](#).

#### 3. CHECK EPS CONTROL UNIT SIGNAL

##### With CONSULT

1. Set the vehicle to READY.

##### **CAUTION:**

**Never drive the vehicle.**

2. Turn steering wheel from full left stop to full right stop.

3. Select "TORQUE SENSOR" in "DATA MONITOR" in "EPS".

4. Perform the torque sensor inspection.

Monitor item	Condition	Display value
TORQUE SENSOR	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
	Steering wheel: Right turn	Positive value (Nm)
	Steering wheel: Left turn	Negative value (Nm)

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

#### 4. CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-22, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace the specific malfunctioning part.

#### 5. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-28, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-39, "Inspection"](#).

# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

## UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

### Description

INFOID:000000007634150

Unbalance steering wheel turning force (torque variation).

### Diagnosis Procedure

INFOID:000000007634151

#### 1. PERFORM SELF-DIAGNOSIS

##### With CONSULT

1. Turn the power switch OFF to ON.
2. Perform "EPS" self-diagnosis.

##### Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-13, "DTC Index"](#).  
NO >> GO TO 2.

#### 2. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check the EPS warning lamp while the vehicle is READY state.

##### Does the EPS warning lamp turn OFF?

- YES >> GO TO 3.  
NO >> Refer to [STC-28, "Diagnosis Procedure"](#).

#### 3. CHECK STEERING COLUMN AND STEERING GEAR

Check the steering column assembly and steering gear assembly.

- Steering column assembly. Refer to [ST-30, "Exploded View"](#).
- Steering gear assembly. Refer to [ST-35, "Exploded View"](#).

##### Is the inspection result normal?

- YES >> GO TO 4.  
NO >> Repair or replace the specific malfunctioning part.

#### 4. CHECK EPS CONTROL UNIT SIGNAL (1)

##### With CONSULT

1. Set the vehicle to READY.

##### **CAUTION:**

**Never drive the vehicle.**

2. Turn steering wheel from full left stop to full right stop.
3. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS".

##### Dose the item in "DATA MONITOR" maintain "100%"?

- YES >> GO TO 7.  
NO >> GO TO 5.

#### 5. CHECK EPS CONTROL UNIT SIGNAL (2)

##### With CONSULT

Select "BATTERY VOLT" in "DATA MONITOR" in "EPS".

##### Dose the item in "DATA MONITOR" indicate "10.5 V" or more?

- YES >> GO TO 6.  
NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-19, "Diagnosis Procedure"](#).

#### 6. CHECK EPS CONTROL UNIT SIGNAL (3)

##### With CONSULT

1. Select "C/U TEMP" in "DATA MONITOR" in "EPS".
2. Stop the EPS system until the item in "DATA MONITOR" becomes "85°C (185°F)" or less.

##### **NOTE:**

While stopping the EPS system, do not turn steering wheel.

3. Check that the symptom continues.



# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

## < SYMPTOM DIAGNOSIS >

### Dose the symptom continue?

YES >> GO TO 7.

NO >> The assist torque decreases because of protection function. This is not malfunction. INSPECTION END

## 7.CHECK EPS CONTROL UNIT SIGNAL (4)

### With CONSULT

1. Set the vehicle to READY.

#### **CAUTION:**

**Never drive the vehicle.**

- Turn steering wheel from full left stop to full right stop.
- Select "TORQUE SENSOR" in "DATA MONITOR" in "EPS".
- Perform the torque sensor inspection.

Monitor item	Condition	Display value
TORQUE SENSOR	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
	Steering wheel: Right turn	Positive value (Nm)
	Steering wheel: Left turn	Negative value (Nm)

### Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

## 8.CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-22, "Diagnosis Procedure"](#).

### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace the specific malfunctioning part.

## 9.CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-28, "Inspection"](#).

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-39, "Inspection"](#).

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## EPS CONTROL UNIT

< REMOVAL AND INSTALLATION >

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# REMOVAL AND INSTALLATION

## EPS CONTROL UNIT

### Removal and Installation

INFOID:000000007634152

**CAUTION:**

Disconnect 12V battery negative terminal before starting operations. Refer to [STC-4, "Precautions for Removing Battery Terminal"](#).

Never remove EPS control unit from steering column assembly. When replacing EPS control unit, replace steering column assembly. Refer to [ST-30, "Removal and Installation"](#).