

# SECTION **STC**

## STEERING CONTROL SYSTEM

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# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:000000007579103

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 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 ignition ON or engine running, 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 ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

#### Service Notice or Precautions for EPS System

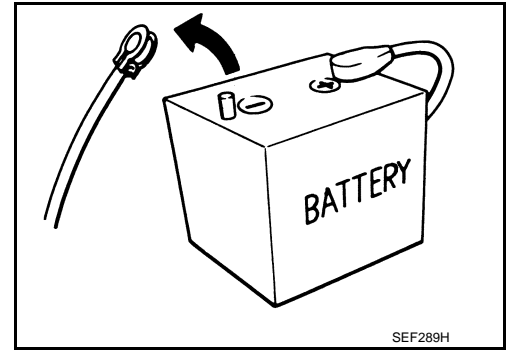
INFOID:000000007579104

- 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 battery voltage is proper.
  - Check connection conditions of each connector are proper.

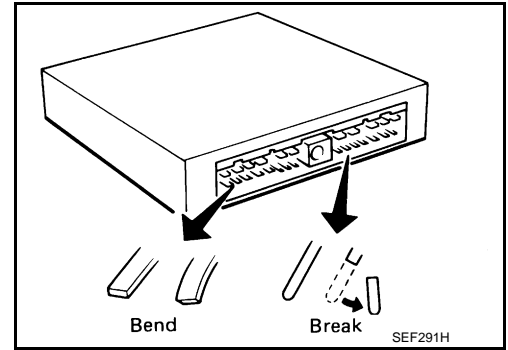
# PRECAUTIONS

## < PRECAUTION >

- Before connecting or disconnecting the EPS control unit harness connector, turn ignition switch "OFF" and disconnect battery ground cable. Because battery voltage is applied to EPS control unit even if ignition switch is turned "OFF".



- 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.



# COMPONENT PARTS

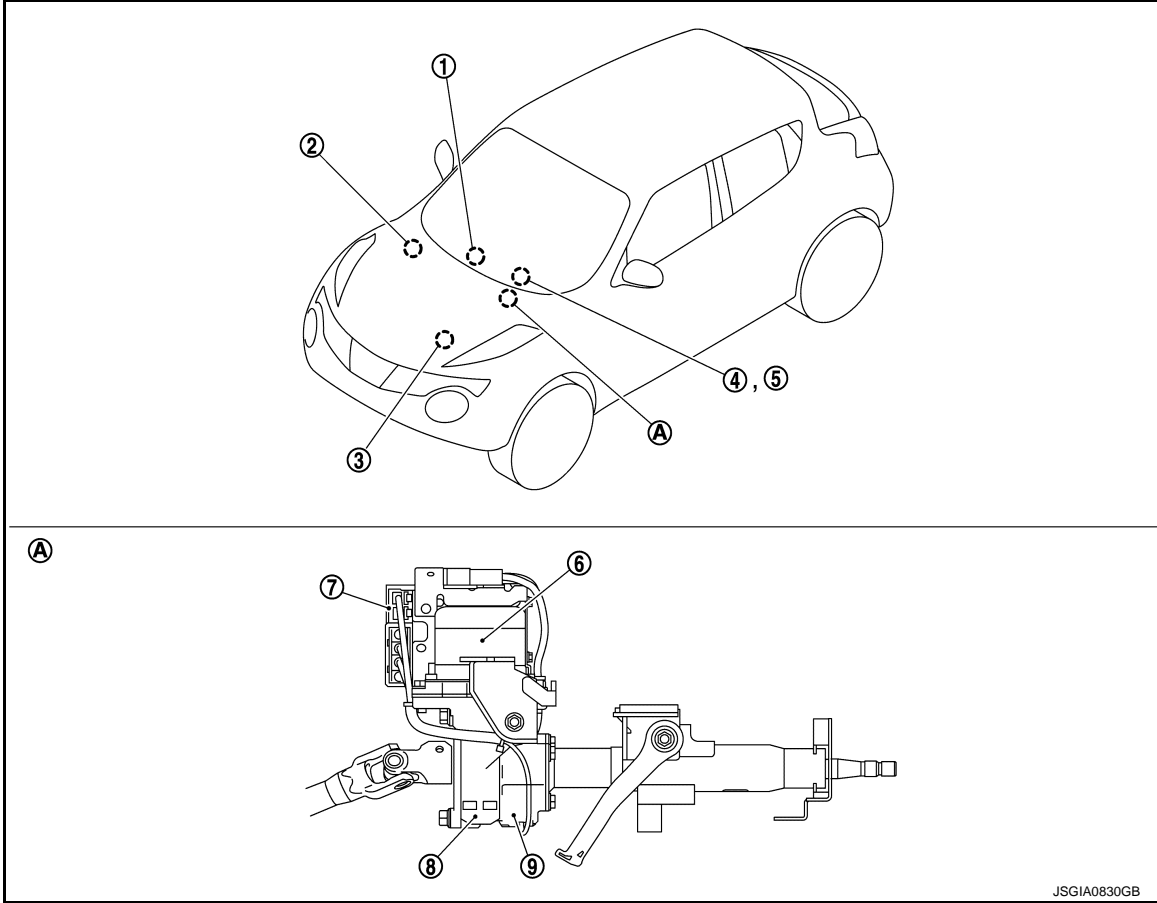
< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### COMPONENT PARTS

#### Component Parts Location

INFOID:000000007579105



JSGIA0830GB

- |   |  |  |
|---|--|--|
| 1. Multi display unit*<br>Refer to <a href="#">DMS-3, "Component Parts Location"</a> .              | 2. ABS actuator and electric unit (control unit)<br>Refer to <a href="#">BRC-8, "Component Parts Location"</a> | 3. ECM<br>Refer to <a href="#">EC-16, "ENGINE CONTROL SYSTEM : Component Parts Location"</a> |
| 4. Combination meter<br>Refer to <a href="#">MWI-5, "METER SYSTEM : Component Parts Location"</a> . | 5. EPS warning lamp<br>(In combination meter)  | 6. EPS motor   |
| 7. EPS control unit   | 8. Reduction gear  | 9. Torque sensor   |
| A. Steering column assembly   |  |  |

\*: Models with Integrated Control System

#### Component Description

INFOID:000000007579106

Components parts	Reference
EPS control unit	<a href="#">STC-6, "EPS Control Unit"</a>
EPS motor	<a href="#">STC-6, "EPS Motor"</a>
Torque sensor	<a href="#">STC-6, "Torque Sensor"</a>
Reduction gear	<a href="#">STC-6, "Reduction Gear"</a>
EPS warning lamp	<a href="#">STC-7, "EPS SYSTEM : System Description"</a>

# COMPONENT PARTS

## < SYSTEM DESCRIPTION >

Components parts	Reference
ECM	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.</li> <li>- Engine status signal</li> </ul>
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>
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> <li>• Turns ON the EPS warning lamp according to the signal from EPS control unit via CAN communication.</li> </ul>
Multi display unit*	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.</li> <li>- ECO mode signal</li> <li>- NORMAL mode signal</li> <li>- SPORT mode signal</li> </ul>

\*: Models with Integrated Control System

### EPS Control Unit

INFOID:000000007579107

- 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).
- In SPORT mode, changes the steering assist characteristic to enhance a stable steering feel according to the mode signals from multi display unit via CAN communication. (Models with Integrated Control System)

### EPS Motor

INFOID:000000007579108

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

### Torque Sensor

INFOID:000000007579109

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

### Reduction Gear

INFOID:000000007579110

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

# SYSTEM

< SYSTEM DESCRIPTION >

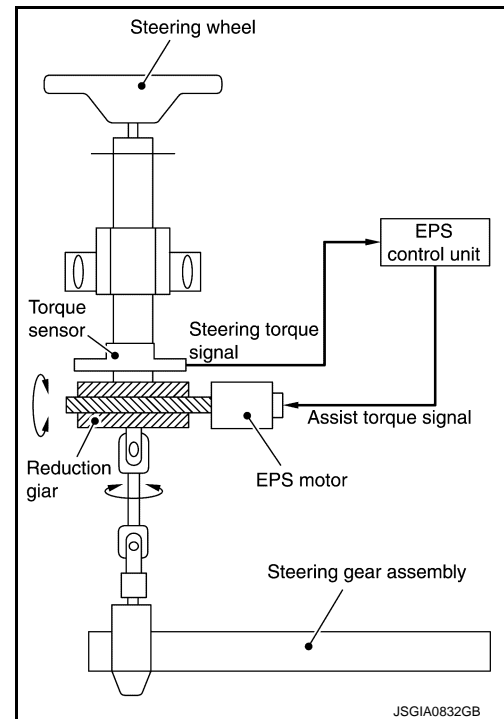
## SYSTEM

### EPS SYSTEM

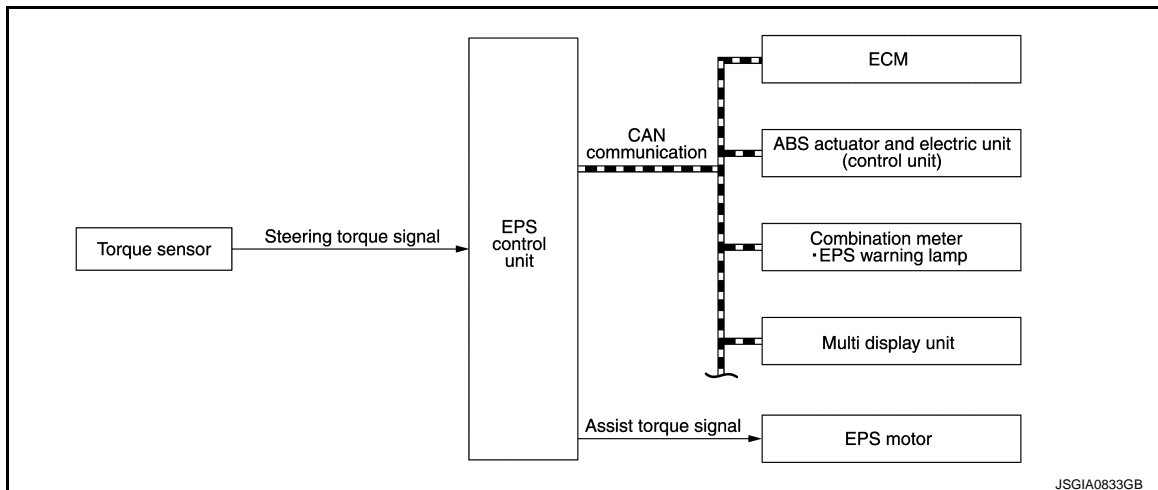
#### EPS SYSTEM : System Description

INFOID:000000007579111

- 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-8. "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-8. "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).
- In SPORT mode, changes the steering assist characteristic to enhance a stable steering feel according to the mode signals from multi display unit via CAN communication. (Models with Integrated Control System)



#### SYSTEM DIAGRAM



Multi display unit is applied to models with Integrated Control System.

#### INPUT/OUTPUT SIGNAL

Communicates the signal from each control unit via CAN communication.

Control unit	Signal status
ECM	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.</li> <li>- Engine status signal</li> </ul>
ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.</li> <li>- Vehicle speed signal</li> </ul>

# SYSTEM

## < SYSTEM DESCRIPTION >

Control unit	Signal status
Combination meter	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.               <ul style="list-style-type: none"> <li>- Vehicle speed signal</li> </ul> </li> <li>• Receives mainly the following signals from EPS control unit via CAN communication.               <ul style="list-style-type: none"> <li>- EPS warning lamp signal</li> </ul> </li> </ul>
Multi display unit*	<ul style="list-style-type: none"> <li>• Transmits mainly the following signals to EPS control unit via CAN communication.               <ul style="list-style-type: none"> <li>- ECO mode signal</li> <li>- NORMAL mode signal</li> <li>- SPORT mode signal</li> </ul> </li> </ul>

\*: Models with Integrated Control System

### EPS WARNING LAMP INDICATION

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

Condition	EPS warning lamp
Ignition switch ON. (Lamp check)	ON
Engine running.	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 : Fail-Safe

INFOID:000000007579112

- 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, enters into a manual steering state. (Control turning force steering wheel becomes heavy.)

### EPS SYSTEM : Protection Function

INFOID:000000007579113

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:000000007579114

#### FUNCTION

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

Diagnostic test 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-DIAG RESULTS MODE

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 ignition 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 ignition 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 MODE

Monitor item (Unit)	Remarks
BATTERY VOLT (V)	Displays the power supply voltage for EPS control unit.
TORQUE SENSOR (Nm)	Displays steering wheel turning force detected by torque sensor.
MOTOR CURRENT (A)	Displays the current value consumed by EPS motor.* <sup>1</sup>
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) or (°F)	Displays the temperature of the EPS control unit.
ASSIST LEVEL (%)	Normally displays 100%. In case of an excessive stationary steering, the assist curvature gradually falls. However, it return to 100% when left standing.* <sup>2</sup>
VEHICLE SPEED (km/h) or (MPH)	Vehicle speed is displayed from vehicle speed signal via CAN communication.* <sup>3</sup>
WARNING LAMP (On/Off)	EPS warning lamp control status is displayed.
ENGINE STATUS (Stop/Run)	Engine speed is displayed from engine status signal via CAN communication.
STEERING MODE (NORMAL/SPORT)* <sup>4</sup>	Display the driving mode of Integrated Control System received through CAN communication.

## DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

### < SYSTEM DESCRIPTION >

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- \*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 ignition switch in turned ON.
- \*4: Displays NORMAL in models without Integrated Control System.

# EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

## ECU DIAGNOSIS INFORMATION

### EPS CONTROL UNIT

Reference Value

INFOID:000000007579115

VALUES ON THE DIAGNOSIS TOOL

**CAUTION:**

The output signal indicates the EPS control unit calculation data. The normal values will be displayed even in the event that the output circuit (harness) is open.

Monitor item	Data monitor		
	Condition	Display value	
BATTERY VOLT	Ignition switch: ON	Battery voltage	
TORQUE SENSOR	Engine running	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	Engine running	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	Engine running	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	Engine running	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	Ignition switch ON or engine running	Displays temperature of inside of EPS control unit [°C (°F)]	
ASSIST LEVEL	Engine running	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	
ENGINE STATUS	Engine not running	Stop	
	Engine running	Run	
STEERING MODE <sup>*4</sup>	Engine running	Driving mode of Integrated Control System: Except SPORT	NORMAL
		Driving mode of Integrated Control System: SPORT	SPORT

\*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.

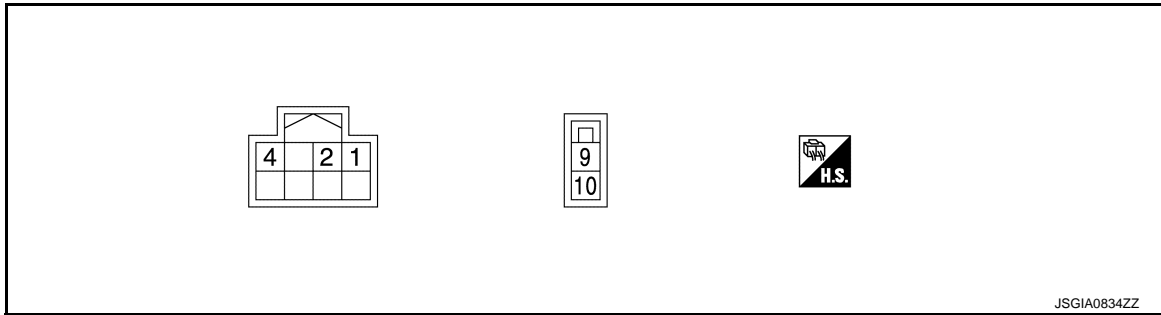
\*3: It is not a malfunction, though it might not be corresponding just after ignition switch in turned ON.

\*4: Displays NORMAL in models without Integrated Control System.

# EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

## TERMINAL LAYOUT



## 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 (LG)	Ground	Ignition power supply	Input	Ignition switch: ON	9 – 18.2 V
				Ignition switch: OFF	0 V
9 (R)	Ground	Battery power supply	Input	Always	9 – 18.2 V
10 (B)	Ground	Ground	—	Always	0 V

## Fail-Safe

INFOID:000000007579116

- 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, enters into a manual steering state. (Control turning force steering wheel becomes heavy.)

## Protection Function

INFOID:000000007579117

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

INFOID:000000007579118

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 VEHICLE SPEED SIGNAL
3	C1601 BATTERY POWER SUPPLY
4	Other than the above

# EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

## DTC Index

INFOID:000000007579119

DTC	Items (CONSULT screen terms)	Reference
C1601	BATTERY VOLT	<a href="#">STC-18, "DTC Logic"</a>
C1604	TORQUE SENSOR	<a href="#">STC-20, "DTC Logic"</a>
C1606	EPS MOTOR	<a href="#">STC-21, "DTC Logic"</a>
C1607	EEPROM	<a href="#">STC-22, "DTC Logic"</a>
C1608	CONTROL UNIT	<a href="#">STC-22, "DTC Logic"</a>
C1609	CAN VHCL SPEED	<a href="#">STC-23, "DTC Logic"</a>
U1000	CAN COMM CIRCUIT	<a href="#">STC-24, "DTC Logic"</a>

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# ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM


< WIRING DIAGRAM >

## WIRING DIAGRAM


### ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

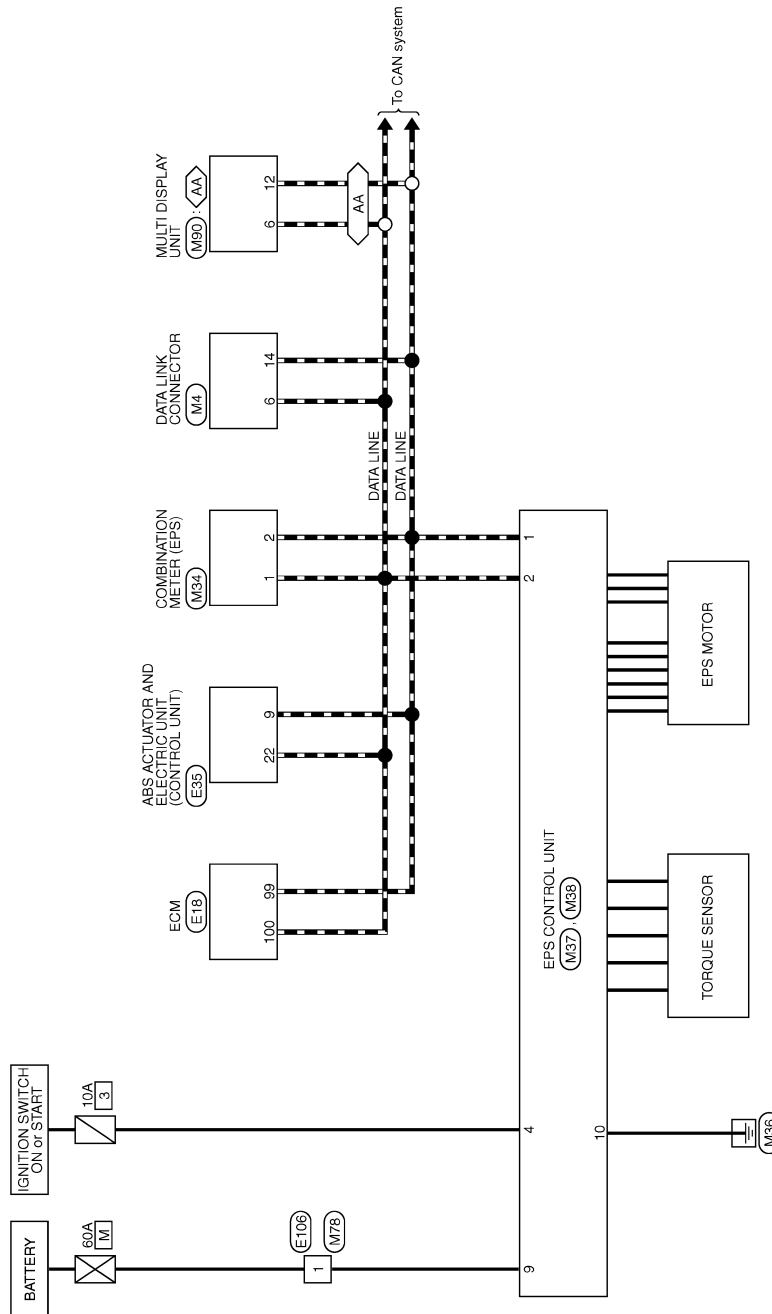
#### Wiring Diagram

INFOID:000000007579120

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

 : With automatic A/C



2010/08/30

JCGWA0280GB

# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000007579121

DETAILED FLOW

#### 1. INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-16, "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-12, "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 for “EPS”.

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-12, "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-43, "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?

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# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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

Memo

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# C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### C1601 BATTERY POWER SUPPLY

#### DTC Logic

INFOID:000000007579123

#### 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>• Battery</li></ul>

#### DTC CONFIRMATION PROCEDURE

##### 1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition 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 ignition switch OFF to ON.
2. Perform "EPS" self-diagnosis.

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

- YES >> Proceed to diagnosis procedure. Refer to [STC-18, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

#### Diagnosis Procedure

INFOID:000000007579124

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

1. Turn ignition 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 ignition switch ON.

**CAUTION:**  
**Never start the engine.**

# 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 ignition 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 ignition power supply circuit. Refer to [PG-23. "Wiring Diagram - IGNITION POWER SUPPLY -"](#).  
NO >> Repair or replace error-detected parts.

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

1. Turn ignition 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 ignition switch ON.  
**CAUTION:**  
**Never start the engine.**
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 ignition switch OFF.
2. Check the 60A fusible link (M).
3. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 60A fusible link (M).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to [PG-11. "Wiring Diagram - BATTERY POWER SUPPLY -"](#).  
NO >> Repair or replace error-detected parts.

### 6.CHECK TERMINALS AND HARNESS CONECTORS

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-9. "Removal and Installation"](#).  
NO >> Repair or replace error-detected parts.

# C1604 TORQUE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

## C1604 TORQUE SENSOR

### DTC Logic

INFOID:000000007579125

### 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 ignition 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 ignition switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1604" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-20, "Diagnosis Procedure"](#).  
NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007579126

#### 1. CHECK TERMINALS AND HARNESS CONECTORS

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 ignition switch OFF, and then wait 10 seconds and more.
3. Perform self-diagnosis for "EPS".

Is DTC "C1604" detected?

- YES >> Torque sensor is malfunctioning. Replace steering column assembly. Refer to [ST-9, "Removal and Installation"](#).  
NO >> Check intermittent incident. Refer to [GI-43, "Intermittent Incident"](#).

# C1606 EPS MOTOR

< DTC/CIRCUIT DIAGNOSIS >

## C1606 EPS MOTOR

### DTC Logic

INFOID:000000007579127

### 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 ignition 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 ignition switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1606" detected?

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

### Diagnosis Procedure

INFOID:000000007579128

#### 1. PERFORM SELF-DIAGNOSIS

##### With CONSULT

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

Is DTC "C1606" detected?

- YES >> EPS motor is malfunctioning. Replace steering column assembly. Refer to [ST-9, "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.

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# C1607, C1608 EPS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

## C1607, C1608 EPS CONTROL UNIT

### DTC Logic

INFOID:000000007579129

### 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 ignition 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 ignition switch OFF to ON.
2. Perform "EPS" self-diagnosis.

Is DTC "C1607" or "C1608" detected?

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

### Diagnosis Procedure

INFOID:000000007579130

#### 1. CHECK TERMINALS AND HARNESS CONECTORS

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 ignition switch OFF, and then wait 10 seconds and more.
3. Perform self-diagnosis for "EPS".

Is DTC "C1607" or "C1608" detected?

- YES >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-9. "Removal and Installation"](#).  
NO >> Check intermittent incident. Refer to [GI-43. "Intermittent Incident"](#).

# C1609 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

## C1609 VEHICLE SPEED SIGNAL

### DTC Logic

INFOID:000000007579131

### 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 ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2. DTC REPRODUCTION PROCEDURE

##### With CONSULT

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

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

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

### Diagnosis Procedure

INFOID:000000007579132

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

##### With CONSULT

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

##### Is any DTC detected?

- YES >> Check the DTC.  
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-9. "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:000000007579133

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:000000007579134

### 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 ignition 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 ignition switch OFF to ON.
2. Perform "EPS" self-diagnosis.

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

YES >> Proceed to diagnosis procedure. Refer to [STC-24, "Diagnosis Procedure"](#).

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000007579135

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



# EPS WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

## EPS WARNING LAMP

### Component Function Check

INFOID:000000007579136

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

Check that the EPS warning lamp turns ON when ignition switch turns ON. Then, EPS warning lamp turns OFF after the engine is started.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Perform trouble diagnosis. Refer to [STC-25, "Diagnosis Procedure"](#).

### Diagnosis Procedure

INFOID:000000007579137

#### 1. PERFORM SELF-DIAGNOSIS

##### With CONSULT

1. Turn the ignition 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

##### With CONSULT

1. Turn the ignition switch ON.  
**CAUTION:**  
**Never start the engine.**
2. Select "DATA MONITOR" of "EPS" and select "WARNING LAMP".
3. Check that the EPS warning lamp is turned ON.
4. Start the engine.  
**CAUTION:**  
**Never drive the vehicle.**
5. Check that the EPS warning lamp is turned OFF.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to [MWI-42, "COMBINATION METER : Diagnosis Procedure"](#).

NO >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-9, "Removal and Installation"](#).

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# EPS WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

---

## SYMPTOM DIAGNOSIS

### EPS WARNING LAMP DOES NOT TURN ON

#### Description

INFOID:000000007579138

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

#### Diagnosis Procedure

INFOID:000000007579139

#### 1. CHECK EPS WARNING LAMP

---

Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-25, "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.

# EPS WARNING LAMP DOES NOT TURN OFF

< SYMPTOM DIAGNOSIS >

## EPS WARNING LAMP DOES NOT TURN OFF

### Description

INFOID:000000007579140

EPS warning lamp does not turn OFF several seconds after engine started.

### Diagnosis Procedure

INFOID:000000007579141

#### 1.PERFORM SELF-DIAGNOSIS

##### With CONSULT

1. Turn the ignition 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

Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-25, "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

Perform the trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-18, "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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# STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

## STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

### Description

INFOID:000000007579142

Steering wheel turning force is heavy or light.

### Diagnosis Procedure

INFOID:000000007579143

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

Check that the EPS warning lamp turns ON when ignition switch turns ON. Then, EPS warning lamp turns OFF after the engine is started.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> GO TO 2.

#### 2. PERFORM SELF-DIAGNOSIS

 **With CONSULT**

1. Turn the ignition 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 3.

#### 3. CHECK EPS CONTROL UNIT SIGNAL

 **With CONSULT**

1. Start the engine.  
**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".

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-21, "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-7, "Inspection"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-17, "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:000000007579144

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

### Diagnosis Procedure

INFOID:000000007579145

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

Check the EPS warning lamp while engine is running.

Does the EPS warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-27, "Diagnosis Procedure"](#).

#### 2. CHECK WHEEL ALIGNMENT


Check the wheel alignment. Refer to [FSU-6, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Adjustment of wheel alignment. Refer to [FSU-6, "Inspection"](#).

#### 3. CHECK EPS CONTROL UNIT SIGNAL

 With CONSULT

1. Start the engine.

**CAUTION:**

**Never drive the vehicle.**

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

3. Select "DATA MONITOR" of "EPS" and select "TORQUE SENSOR".

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-21, "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-4, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-17, "Inspection"](#).

# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

## UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

### Description

INFOID:000000007579146

Unbalance steering wheel turning force (torque variation).

### Diagnosis Procedure

INFOID:000000007579147

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

Check the EPS warning lamp while engine is running.

Does the EPS warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-27, "Diagnosis Procedure"](#).

#### 2. CHECK STEERING COLUMN AND STEERING GEAR

Check the steering column assembly and steering gear assembly.

- Steering column assembly. Refer to [ST-9, "Exploded View"](#).
- Steering gear assembly. Refer to [ST-14, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the specific malfunctioning part.

#### 3. CHECK EPS CONTROL UNIT SIGNAL

##### With CONSULT

1. Start the engine.

##### **CAUTION:**

**Never drive the vehicle.**

2. Turn steering wheel from full left stop to full right stop.
3. Select "DATA MONITOR" of "EPS" and select "TORQUE SENSOR".
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-21, "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-7, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-17, "Inspection"](#).

# EPS CONTROL UNIT

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### EPS CONTROL UNIT

#### Removal and Installation

INFOID:000000007579148

**CAUTION:**

**Disconnect battery negative terminal before starting operations.**

Never remove EPS control unit from steering column assembly. When replacing EPS control unit, replace steering column assembly. Refer to [ST-9, "Removal and Installation"](#).

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