

# 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:000000012188133

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. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

#### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which 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 the SR section.
- Do not 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:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT 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 three minutes before performing any service.

#### Service Notice and Precautions for Hydraulic Pump Electric Power Steering System

INFOID:000000012188134

- Check each tire for proper air pressure and size. Refer to [MA-36, "WHEELS : Inspection"](#).
- Verify that the steering system components are genuine NISSAN parts and have been installed properly.
- Check the steering column for loose attaching bolts.
- Check the steering gear for loose attaching bolts. Check the inner sockets and outer sockets for damage or wear. Inspect the boots and seals for leakage of power steering fluid.
- Verify proper wheel alignment. Refer to [FSU-23, "Wheel Alignment \(Unladen\\*\)"](#).
- Check for any damage, wear, or modification to the suspension and body that would result in increased weight or an improper wheelarch height. Refer to [FSU-24, "Wheelarch Height \(Unladen\\*<sup>1</sup>\)"](#).
- Check for proper battery voltage.
- Verify that all power steering pump connections are clean and fully seated.
- Verify that only genuine NISSAN E-PSF is used. Use of any power steering fluid other than genuine NISSAN E-PSF will prevent the power steering system from proper operation.
- An audible high pitch noise may be heard from the engine compartment when the steering wheel is operated, particularly at low speeds such as a parking lot maneuver. This condition is not a malfunction, rather normal system operation. Steering at low speeds or parking lot maneuvers demands higher hydraulic assistance, resulting in larger power steering pump load and increased system noise.
- The power steering pump is electrically controlled by the power steering control module.
- Before connecting or disconnecting the power steering control module harness connectors, turn ignition switch "OFF" and disconnect battery ground cable. Battery voltage is applied to power steering control module even if ignition switch is turned "OFF".

# COMPONENT PARTS

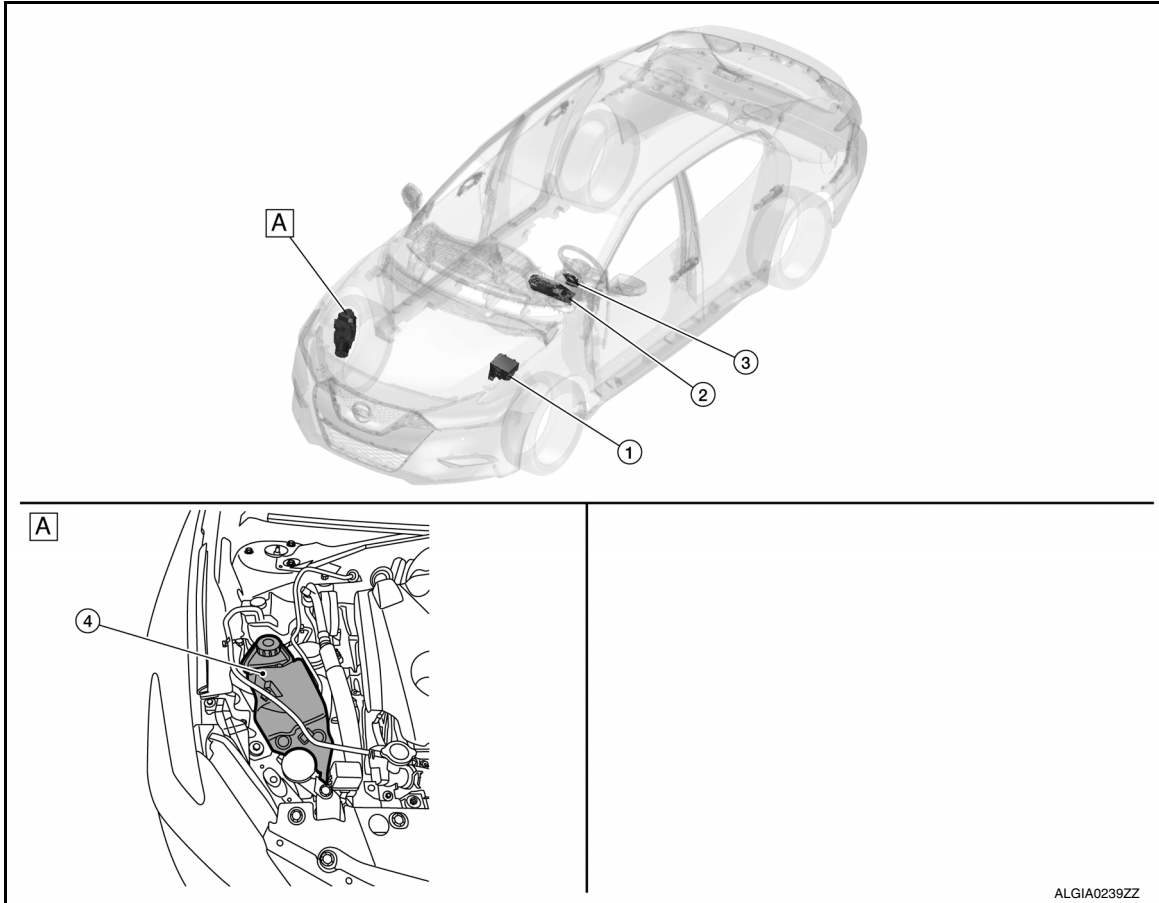
< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### COMPONENT PARTS

#### Component Parts Location

INFOID:000000012188135



A. Engine room right side

No.	Component	Function
1.	IPDM E/R	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Engine status signal</li> </ul> - Refer to <a href="#">PCS-5. "Component Parts Location"</a> for detailed installation location.
2.	Combination meter	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Vehicle speed signal</li> </ul> - Refer to <a href="#">PCS-5. "Component Parts Location"</a> for detailed installation location. <p>The hydraulic pump electric power steering system warning lamp turns ON according to the signal received by CAN communication from the power steering control module.</p>
3.	Steering angle sensor	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Steering angle sensor signal</li> </ul> - Refer to <a href="#">PCS-5. "Component Parts Location"</a> for detailed installation location.

# COMPONENT PARTS

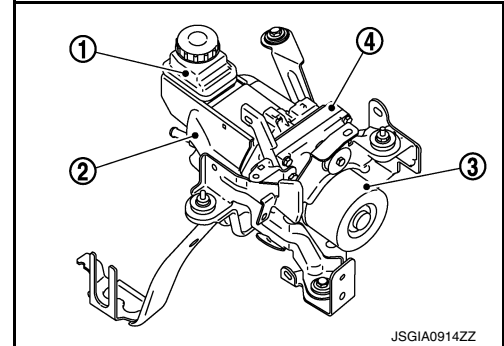
## < SYSTEM DESCRIPTION >

No.	Component	Function
4.	Reservoir tank	<a href="#">STC-5. "Power Steering Oil Pump Assembly"</a>
	Power steering oil pump	
	Power steering motor	
	Power steering control module	

### Power Steering Oil Pump Assembly

INFOID:000000012188136

The power steering oil pump assembly is primarily composed of the reservoir tank (1), power steering oil pump (2), power steering motor (3), and power steering control module (4).



#### RESERVOIR TANK

Fluid is filled from the reservoir tank.

#### POWER STEERING OIL PUMP

The power steering oil pump is driven by the power steering motor and generates hydraulic oil pressure in the system.

#### POWER STEERING MOTOR

The power steering motor is controlled by the power steering control module and drives the power steering oil pump.

#### POWER STEERING CONTROL MODULE

By receiving steering angle sensor signal and vehicle speed signal, the power steering control module calculates hydraulic pressure of the hydraulic pump electric power steering system according to the driving conditions. The power steering control module controls the power steering motor.

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# SYSTEM

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## SYSTEM

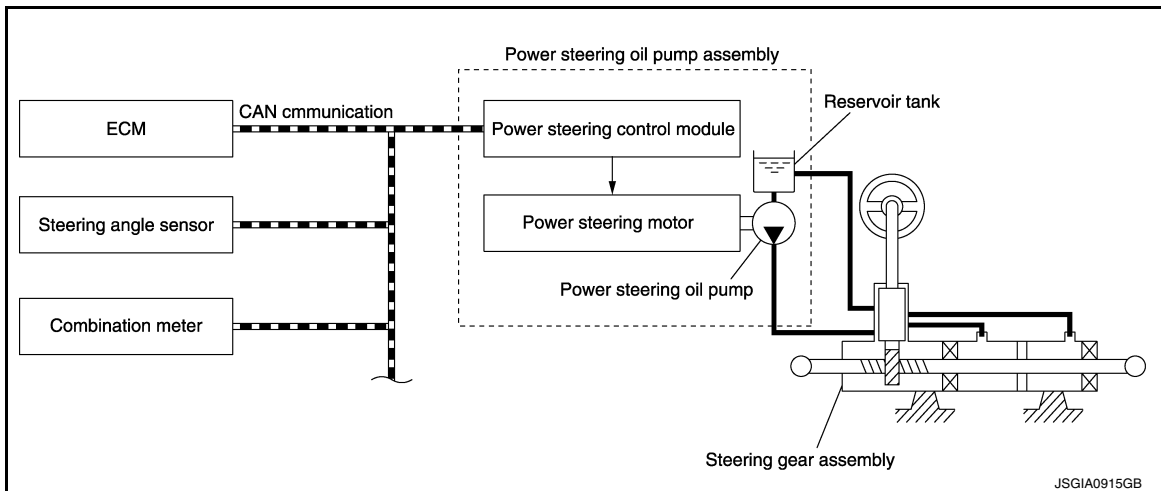
### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : System Description

INFOID:000000012188137

- The system is composed primarily of the power steering oil pump assembly (power steering control module, power steering motor, power steering oil pump, and reservoir tank), hydraulic pipes, and steering gear assembly.
- The power steering control module controls the speed of the power steering motor according to the vehicle speed and steering angle speed. By changing the power steering oil pump flow, the power steering control module controls the steering assist force.
- According to the power steering motor control, the system hydraulic pressure is transmitted from the power steering motor to the power steering oil pump. The power steering oil pump is driven by the system hydraulic pressure.
- After engine start, the hydraulic pump electric power steering system performs control.
- When a malfunction occurs in the system, the fail-safe function stops the hydraulic pump electric power steering system (manual steering state) or restricts its operation (certain steering assist force). Refer to [STC-8, "HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Fail-safe"](#).
- When the power steering function is used continuously in an extreme manner, the protective function reduces the output to the power steering motor. Refer to [STC-9, "HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Protection Function"](#).

### SYSTEM DIAGRAM



### INPUT/OUTPUT SIGNAL

Communicates the signal from each control unit via CAN communication.

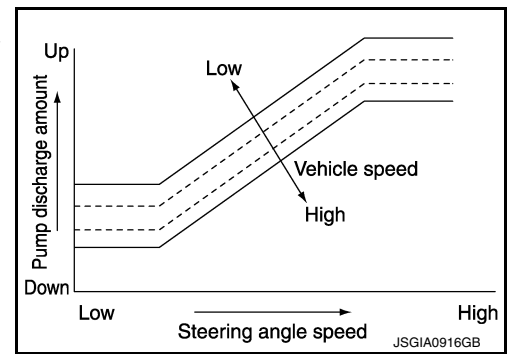
Control unit	Signal status
ECM	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Engine status signal</li> </ul>
Steering angle sensor	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Steering angle sensor signal</li> </ul>
Combination meter	Transmits mainly the following signal to power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Vehicle speed signal</li> </ul> Receives mainly the following signal from power steering control module via CAN communication: <ul style="list-style-type: none"> <li>• Hydraulic pump electric power steering warning lamp signal</li> </ul>

### OPERATION CHARACTERISTICS

# SYSTEM

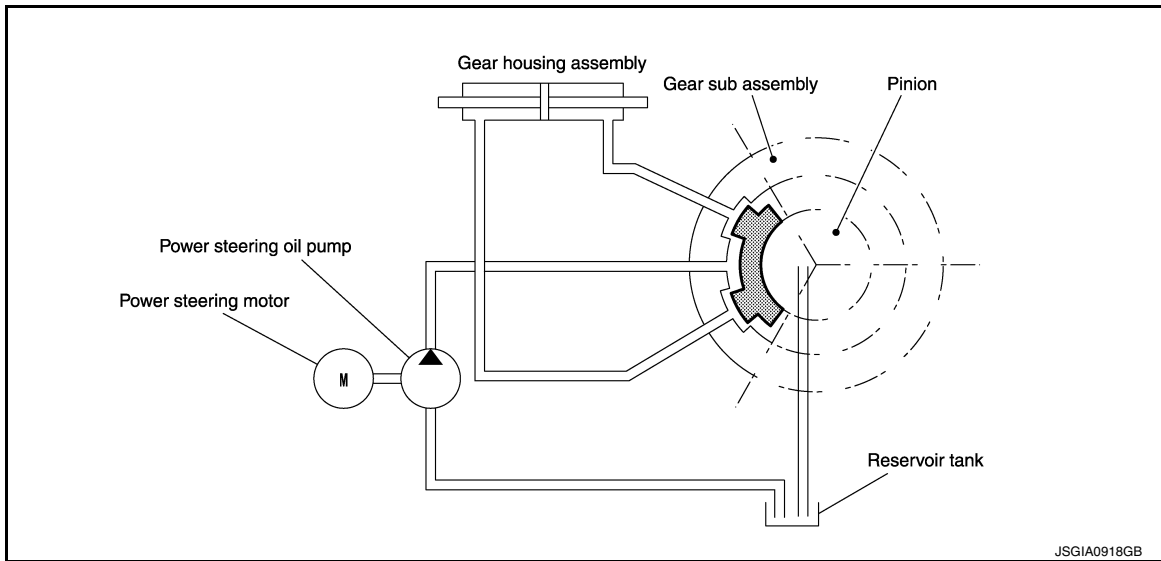
## < SYSTEM DESCRIPTION >

When the steering angle speed is high or the vehicle speed is low, force is generated by increasing discharge amount from the power steering oil pump and by raising system hydraulic pressure.



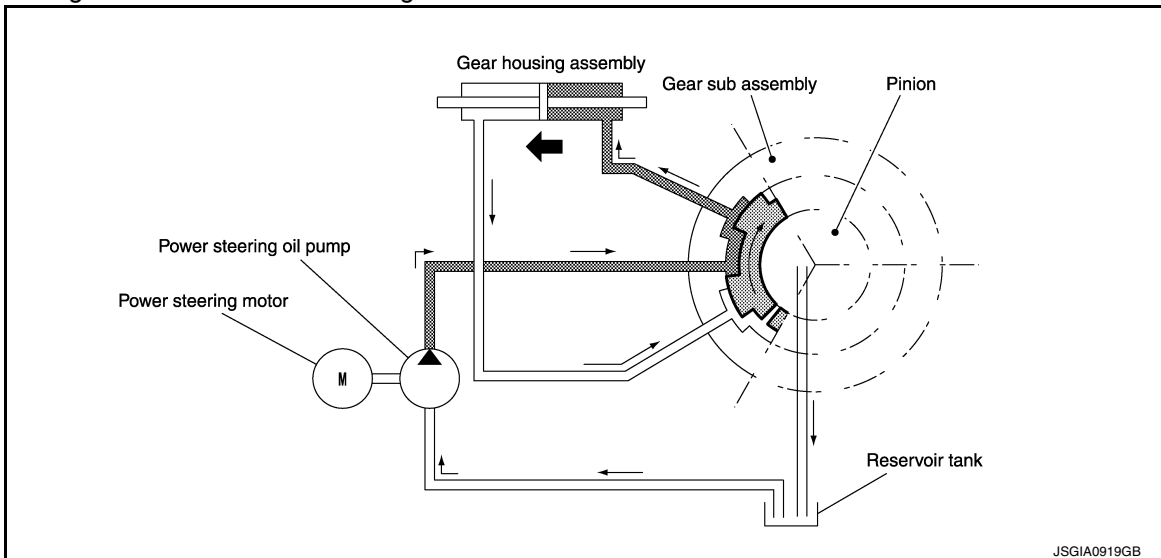
## OPERATION PRINCIPLE

When Steering Wheel is in the Neutral Position



Because the hydraulic routes open at the power steering pump, right side of gear housing, left side of gear housing, and reservoir tank, the hydraulic pressure applied to the right side and left side of the gear housing is equal and no steering assist force is generated.

When Steering Wheel is Rotated to the Right



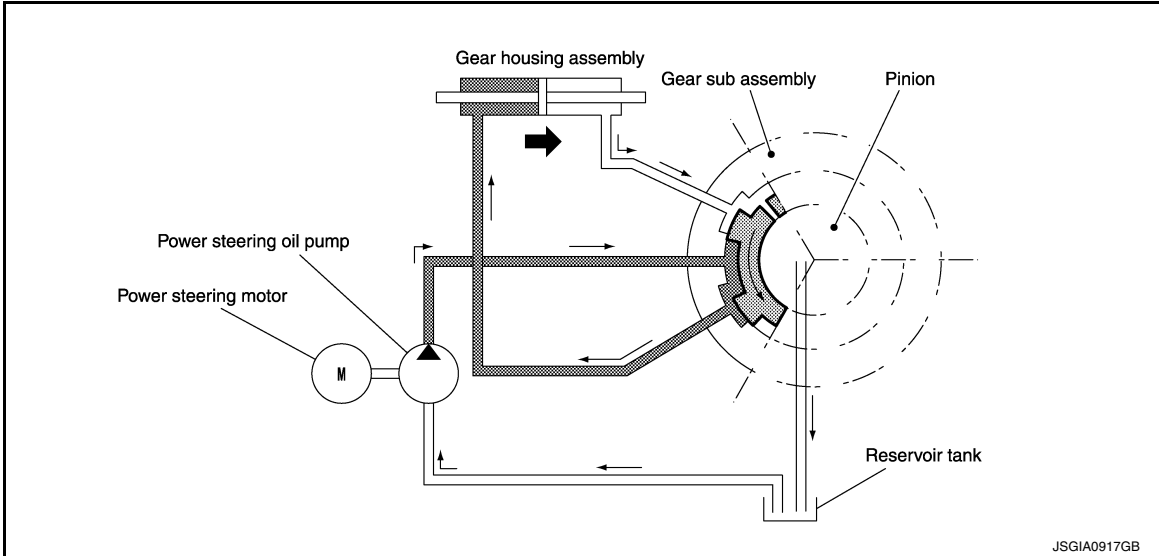
The hydraulic routes open from power steering pump to right side of gear housing and from left side of gear housing to reservoir tank, providing left directional assist force to the rack.

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# SYSTEM

## < SYSTEM DESCRIPTION >

When Steering Wheel is Rotated to the Left



The hydraulic routes open from power steering pump to left side of the gear housing and from the right side of the gear housing to reservoir tank, providing right directional assist force to the rack.

### CONDITIONS FOR HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP ON

- When the hydraulic pump electric power steering system is operating and steering assist force is being generated, the hydraulic pump electric power steering warning lamp is OFF.
- When the hydraulic pump electric power steering system is stopped by the fail-safe or protective function and steering assist force is not being generated, the hydraulic pump electric power steering warning lamp turns ON to inform the driver that the system is in the manual steering state.

#### NOTE:

When the hydraulic pump electric power steering system turns ON according to the protection system, the cause is internal high temperature state of the hydraulic pump electric power steering system. By stopping the engine, internal temperature of the system decreases. After starting the engine, the system returns to the normal state and the hydraulic pump electric power steering system warning lamp turns OFF. (The system is not malfunctioning.) For information about the protective function, refer to [STC-9. "HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Protection Function"](#).

- When the ignition switch is turned ON, this lamp turns ON for lamp check (system check). When the system is operating normally, the lamp turns OFF after the engine starts.

Condition	Hydraulic pump electric power steering warning lamp
Ignition switch ON (lamp check)	ON
After engine start (Steering assist force is generated.)	OFF
When steering assist is stopped	ON

### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Fail-safe INFOID:000000012188138

When an error occurs in the hydraulic pump electric power steering system, fail-safe brings the system to a halt (manual steering) or restricted (constant steering assist level) state. When the system is in a halt state, fail-safe turns ON the hydraulic pump electric power steering warning lamp to warn the driver that the hydraulic pump electric power steering system is in the manual steering state.

DTC	Fail-safe condition
C1143	Certain steering assist force
C1601	Manual steering state
C1602	Certain steering assist force
C1606	Manual steering state
C1607	Certain steering assist force
C1608	Manual steering state



# SYSTEM

## < SYSTEM DESCRIPTION >

DTC	Fail-safe condition
C1609	Certain steering assist force
U1000	Normal control <b>NOTE:</b> If the cause is in a different ECU, the state changes to fixed steering assist force.

## HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Protection Function

INFOID:000000012188139

- When the steering wheel is operated repeatedly or turned all the way for a long period during parking or low-speed driving, the function of the hydraulic pump electric power steering system becomes limited to prevent the system from overheating. If the steering wheel is operated furthermore, the hydraulic pump electric power steering system stops and the hydraulic pump electric power steering system warning lamp may be turned ON. In this case, the steering wheel operation temporarily becomes difficult. This is not a malfunction. When the engine is turned OFF (ignition switch OFF) and steering operation is stopped for a while, the temperature of the hydraulic pump electric power steering system decreases and the steering operation returns to normal after restarting the engine.
- Then, the hydraulic pump electric power steering system warning lamp turns OFF. If the system is OFF under the protection state, the hydraulic pump electric power steering system warning lamp turns ON to warn that the system is in the manual steering state. This is not a system malfunction. In addition, the following DTC remains to distinguish from a malfunction:

DTC	Vehicle condition
C160A	The system temporarily enters the manual steering state. (This is not a hydraulic pump electric power steering system malfunction.)

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# DIAGNOSIS SYSTEM (POWER STEERING CONTROL MODULE)

< SYSTEM DESCRIPTION >

## DIAGNOSIS SYSTEM (POWER STEERING CONTROL MODULE)

### CONSULT Function

INFOID:000000012188140

#### CAUTION:

After disconnecting the CONSULT vehicle interface (VI) from the data link connector, the ignition must be cycled OFF → ON (for at least 5 seconds) → OFF. If this step is not performed, the BCM may not go to "sleep mode", potentially causing a discharged battery and a no-start condition.

#### FUNCTION

CONSULT can display each diagnostic item using the diagnostic test modes shown as per the 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 power steering control module can be read.

#### ECU IDENTIFICATION

Displays the part number stored in the control unit.

#### SELF DIAGNOSTIC RESULT 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 from the past is detected, but the system is presently normal.

#### DATA MONITOR MODE

Monitor item (Unit)	Remarks
BATTERY VOLT (V)	Displays the power supply voltage for power steering control module.
STEERING ANGLE	Displays the steering angle based on the steering angle signal transmitted by CAN communication.
STR ANG SPD (deg/s)	Displays the steering angle speed based on the steering angle signal transmitted by CAN communication.
MOTOR CURRENT (A)	Displays the current value consumed by power steering control module.
MTR REV SPD COMM (rpm)	Displays the power steering motor speed command value.
MTR REV SPD (rpm)	Displays the power steering motor speed.
C/U TEMP (°C or °F)	Displays the temperature of the power steering control module.
C/U TEMP A (°C or °F)	Displays the temperature of the power steering control module.
MTR ASSIST (%)	Displays the current percentage of the allowable assist ratio power steering motor.
ESTM VHCL SPD (km/h or mph)	Displays the vehicle speed calculated by the power steering control module.
WARNING LAMP (On/Off)	Hydraulic pump electric power steering system warning lamp control status is displayed.
ENGINE STATUS (STOP/RUN/CRANK)	Engine speed is displayed from engine condition signal with CAN communication.
VHCL SPD JUDGE (OK/NG)	Displays the receiving status of the vehicle speed signal transmitted by CAN communication.

# POWER STEERING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

## ECU DIAGNOSIS INFORMATION

### POWER STEERING CONTROL MODULE

Reference Value

INFOID:0000000012188141

#### VALUES ON THE DIAGNOSIS TOOL

Monitor item	Data monitor		
	Condition	Display value	
BATTERY VOLT	Engine running	Battery voltage (V)	
STEERING ANGLE	The steering wheel is not steered.	Approx. 0.0 deg	
	The steering wheel is steered.	Displays steering angle (deg)	
STR ANG SPD	The steering wheel is not steered.	Approx. 0.0 deg/s	
	The steering wheel is steered.	Displays steering angle speed (deg/s)	
MOTOR CURRENT	Engine running	Steering wheel: Not steering (There is no steering force.)	MAX approx. 10 A <sup>*1</sup>
		Steering wheel: Right or left turn	Displays consumption current of power steering control module (A)
MTR REV SPD COMM	Engine running	Steering wheel: Not steering (There is no steering force.)	Shows an almost constant value (rpm)
		Steering wheel: Right or left turn	The value changes as a steering speed (rpm)
MTR REV SPD	Engine running	Steering wheel: Not steering (There is no steering force.)	Shows an almost constant value (rpm) <sup>*2</sup>
		Steering wheel: Right or left turn	The value changes as a steering speed (rpm) <sup>*2</sup>
C/U TEMP	Engine running	Displays temperature of inside power steering control module (°C or °F)	
C/U TEMP A	Engine running	Displays temperature of inside power steering control module (°C or °F)	
MTR ASSIST	Engine running	100% <sup>*3</sup>	
ESTM VHCL SPD	Vehicle stopped	0.00 km/h or mph	
	While driving	Approximately equal to the indication on speedometer <sup>*4</sup> (inside of ±10%)	
WARNING LAMP	Hydraulic pump electric power steering warning lamp: ON	On	
	Hydraulic pump electric power steering warning lamp: OFF	Off	
ENGINE STATUS	Engine not running	STOP	
	Engine running	RUN	
	Engine cranking	CRANK	
VHCL SPD JUDGE	Vehicle speed signal can be received via CAN communication.	OK	
	Vehicle speed signal cannot be received via CAN communication.	NG	

\*1: The value changes according to load of power steering motor.

\*2: This is in close agreement with a motor speed command value. Although a quick steering operation may cause disagreement, this is not a malfunction.

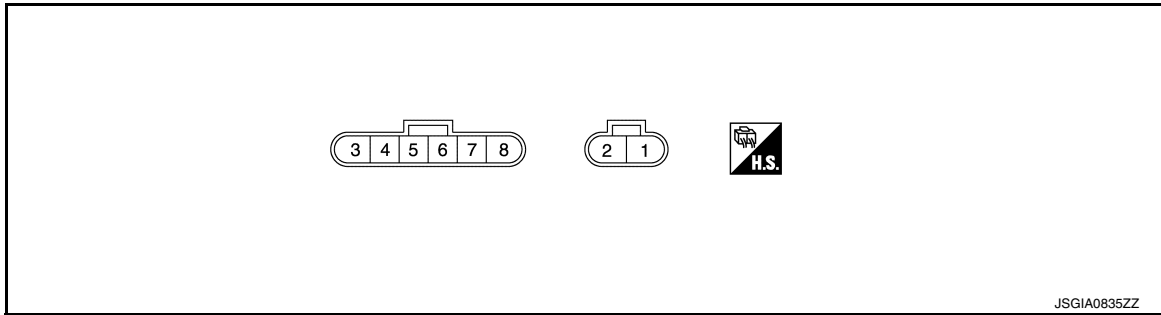
\*3: Usually, 100% is displayed. An excessive steering operation gradually lowers the percentage. When left standing, the percentage returns to 100%.

\*4: This may not agree with the speedometer indication immediately after the ignition switch is turned ON. This is not a malfunction.

# POWER STEERING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

## TERMINAL LAYOUT



## PHYSICAL VALUES

Terminal No. (Wire Color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
1 (W)	Ground	Battery power supply	Input	Always	Battery voltage
2 (B)	Ground	Ground	—	Always	0 V
5 (BR)	Ground	Ignition power supply	Input	Ignition switch: ON	Battery voltage
				Ignition switch: OFF	0 V
7 (P)	—	CAN low	Input/Output	—	—
8 (L)	—	CAN high	Input/Output	—	—

## Fail-safe

INFOID:000000012188142

When an error occurs in the hydraulic pump electric power steering system, fail-safe brings the system to a halt (manual steering) or restricted (constant steering assist level) state. When the system is in a halt state, fail-safe turns ON the hydraulic pump electric power steering warning lamp to warn the driver that the hydraulic pump electric power steering system is in the manual steering state.

DTC	Fail-safe condition
C1143	Certain steering assist force
C1601	Manual steering state
C1602	Manual steering state
C1606	Manual steering state
C1607	Certain steering assist force
C1608	Manual steering state
C1609	Certain steering assist force
U1000	Normal control <b>NOTE:</b> If the cause is in a different ECU, the state changes to fixed steering assist force.

## Protection Function

INFOID:000000012188143

- When the steering wheel is operated repeatedly or turned all the way for a long period during parking or low-speed driving, the function of the hydraulic pump electric power steering system becomes limited to prevent the system from overheating. If the steering wheel is operated furthermore, the hydraulic pump electric power steering system stops and the hydraulic pump electric power steering system warning lamp may be turned ON. In this case, the steering wheel operation temporarily becomes difficult. This is not a malfunction. When the engine is turned OFF (ignition switch OFF) and steering operation is stopped for a while, the temperature of the hydraulic pump electric power steering system decreases and the steering operation returns to normal after restarting the engine.

# POWER STEERING CONTROL MODULE

## < ECU DIAGNOSIS INFORMATION >

- Then, the hydraulic pump electric power steering system warning lamp turns OFF. If the system is OFF under the protection state, the hydraulic pump electric power steering system warning lamp turns ON to warn that the system is in the manual steering state. This is not a system malfunction. In addition, the following DTC remains to distinguish from a malfunction:

DTC	Vehicle condition
C160A	The system temporarily enters the manual steering state. (This is not a hydraulic pump electric power steering system malfunction.)

## DTC Inspection Priority Chart

INFOID:000000012188144

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

Priority	Priority order item (DTC)
1	• C1602 NO TUNING SET
2	• C1601 BATTERY VOLT • C1606 EPS MOTOR • C1608 CONTROL UNIT
3	• C1607 EEPROM
4	• C160A HEAT PROTECTION • U1000 CAN COMM CIRCUIT
5	• C1143 ST ANG SEN CIRCUIT • U1000 CAN COMM CIRCUIT • C1609 CAN VHCL SPEED

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## DTC Index

INFOID:000000012188145

DTC	Items (CONSULT screen terms)	Reference
C1143	ST ANG SEN CIRCUIT	<a href="#">STC-20, "DTC Logic"</a>
C1601	BATTERY VOLT	<a href="#">STC-21, "DTC Logic"</a>
C1602	NO TUNING SET	<a href="#">STC-24, "DTC Logic"</a>
C1606	EPS MOTOR	<a href="#">STC-25, "DTC Logic"</a>
C1607	EEPROM	<a href="#">STC-26, "DTC Logic"</a>
C1608	CONTROL UNIT	<a href="#">STC-26, "DTC Logic"</a>
C1609	CAN VHCL SPEED	<a href="#">STC-27, "DTC Logic"</a>
C160A	HEAT PROTECTION	<a href="#">STC-29, "DTC Logic"</a>
U1000	CAN COMM CIRCUIT	<a href="#">STC-30, "DTC Logic"</a>

### NOTE:

If two or more DTCs are detected, refer to [STC-13, "DTC Inspection Priority Chart"](#).

# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

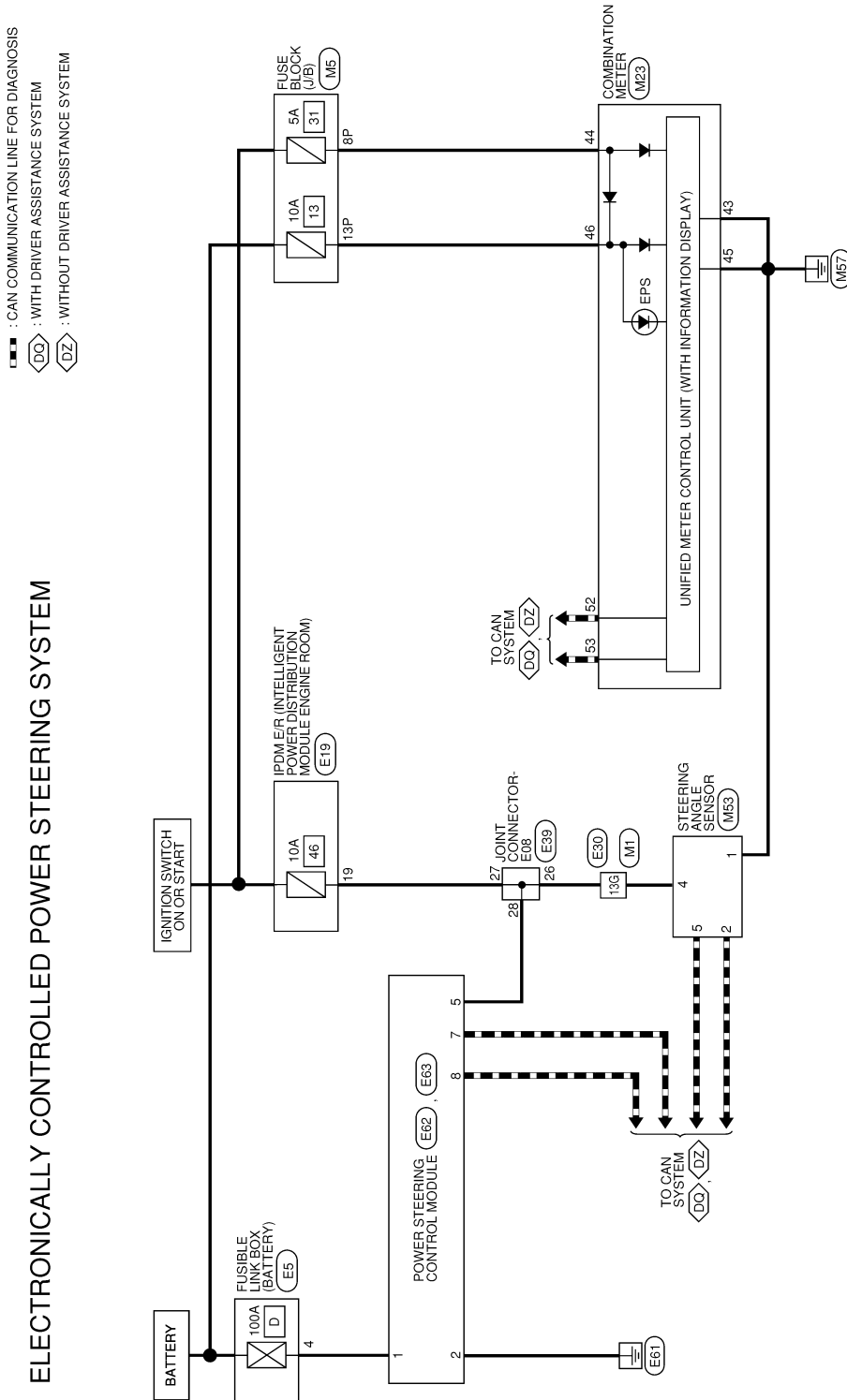
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## WIRING DIAGRAM

### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

Wiring Diagram

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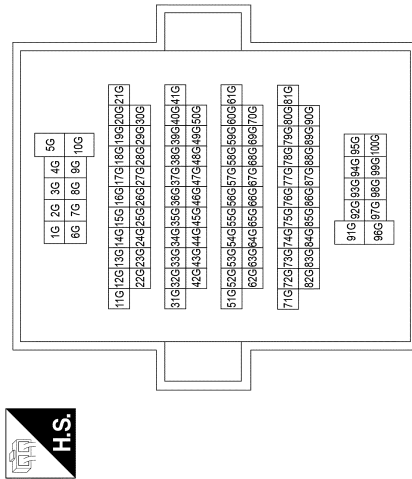
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# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >

## ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM CONNECTORS

Connector No.	M1
Connector Name	WIRES TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE



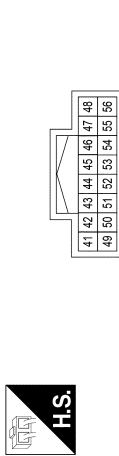
Terminal No.	13G	Color of Wire	G	Signal Name	-
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Connector No.	M5
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS
Connector Color	WHITE



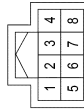
Terminal No.	8P	Color of Wire	BR	Signal Name	-
13P	G	-	-	-	-

Connector No.	M23
Connector Name	COMBINATION METER
Connector Type	TH16FW-NH
Connector Color	WHITE



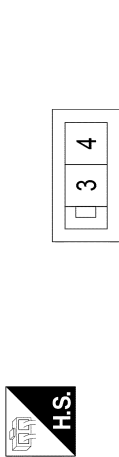
Terminal No.	43	Color of Wire	B	Signal Name	GND1
44	BR	POWER (IGN)			
45	B	GND2			
46	G	POWER (BAT)			
52	P	CAN-L			
53	L	CAN-H			

Connector No.	M53
Connector Name	STEERING ANGLE SENSOR
Connector Type	TH08FW-NH
Connector Color	WHITE



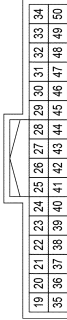
Terminal No.	1	Color of Wire	B	Signal Name	GND
2	P	CAN-L			
4	G	IGN			
5	L	CAN-H			

Connector No.	E5
Connector Name	FUSIBLE LINK BOX (BATTERY)
Connector Type	L02FGY-MC
Connector Color	GRAY



Terminal No.	4	Color of Wire	W	Signal Name	-
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Connector No.	E19
Connector Name	IPDM E/R INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH32FW-NH
Connector Color	WHITE



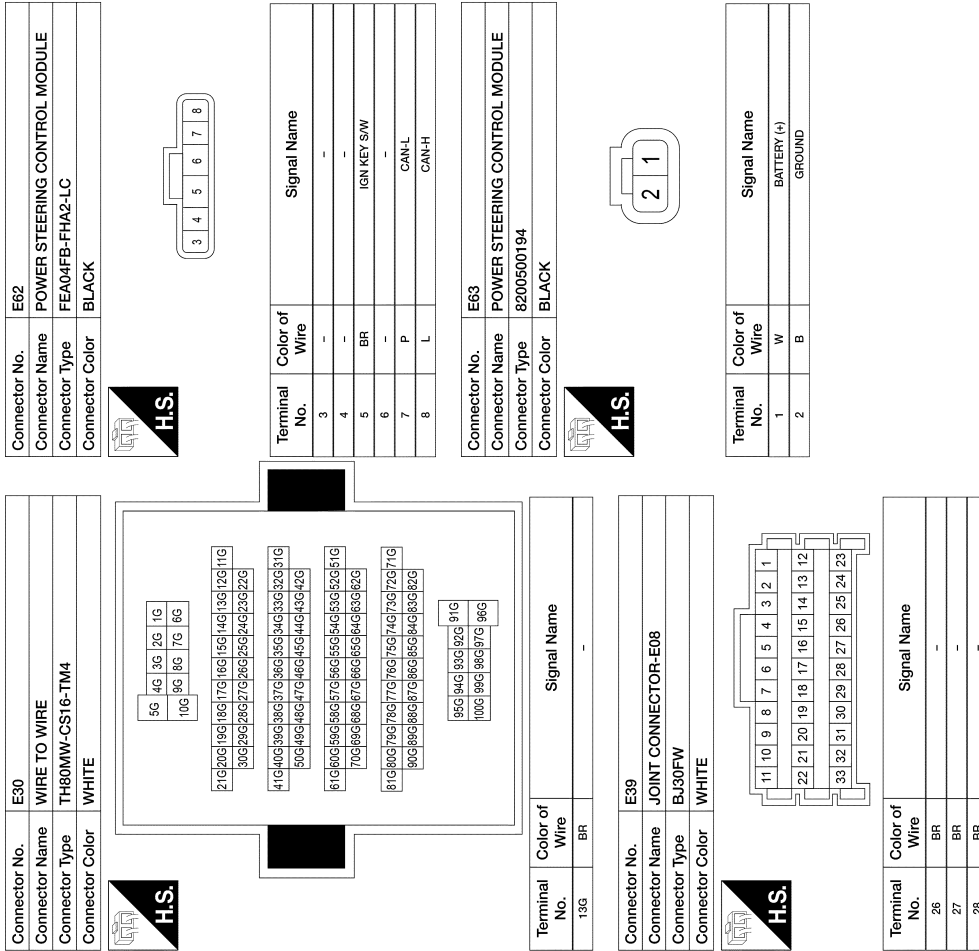
Terminal No.	19	Color of Wire	BR	Signal Name	SUB ECU
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# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >



AAGIA0222GB



# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000012188147

DETAILED FLOW

#### 1. INTERVIEW THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-18. "Diagnostic Work Sheet"](#) and reproduce symptoms to understand them fully. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer if necessary.

**CAUTION:**

**Customers are not professionals. Never make assumptions like "maybe the customer means that..." or "maybe the customer mentioned 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. CHECK VEHICLE CONDITION

 CONSULT

1. Turn ignition switch ON.
2. Check "C/U TEMP" and "C/U TEMP A" in "Data Monitor" mode of "EPS".

Monitor item	Values
C/U TEMP	90°C (194°F) or less
C/U TEMP A	90°C (194°F) or less

Is the inspection result normal?

YES >> GO TO 4.

NO >> Wait with the ignition switch OFF until the data monitor indication becomes 90°C (194°F) or less. GO TO 4 after the temperature drops to 90°C (194°F) or less.

#### 4. PERFORM SELF-DIAGNOSIS

 CONSULT

Perform "Self Diagnostic Result" mode of "EPS".

Is any DTC detected?

YES >> Record or print DTC and freeze frame data (FFD). GO TO 5.

NO >> GO TO 7.

#### 5. RECHECK SYMPTOM

 CONSULT

1. Erase "Self Diagnostic Result" mode of "EPS".
2. Perform DTC confirmation procedure for the malfunctioning 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?



# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Interview sheet					
Customer name	MR/MS	Registration number		Initial year registration	
		Vehicle type		VIN	
Storage date		Engine		Mileage	mile (km)
Operation conditions, etc.	<input type="checkbox"/> Irrelevant <input type="checkbox"/> When engine starts <input type="checkbox"/> During idling <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				
Other conditions					
Memo					

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# C1143 STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### C1143 STEERING ANGLE SENSOR

#### DTC Logic

INFOID:000000012188149

#### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	When ignition switch is ON.
C1143	ST ANG SEN CIRCUIT	Signal (terminal)	—
		Threshold	—
		Diagnosis delay time	—

#### POSSIBLE CAUSE

- Harness or connectors
- Steering angle sensor
- Power steering control module

#### FAIL-SAFE

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#### 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

###### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "Self Diagnostic Result" mode of "EPS".

###### Is DTC "C1143" detected?

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

#### Diagnosis Procedure

INFOID:000000012188150

##### 1. CHECK STEERING ANGLE SENSOR CIRCUIT

Check steering angle sensor circuit. Refer to [STC-20. "Diagnosis Procedure"](#).

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

- YES >> GO TO 2.  
NO >> Repair or replace malfunctioning component.

##### 2. CHECK TERMINALS AND HARNESS CONNECTORS

Check the power steering control module pin terminals for damage or loose connection with harness connector.

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

- YES >> Power steering control module is malfunctioning. Replace power steering oil pump assembly. Refer to [STC-39. "Removal and Installation"](#).  
NO >> Repair or replace malfunctioning component.

# C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

## C1601 BATTERY POWER SUPPLY

### DTC Logic

INFOID:000000012188151

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	When ignition switch is ON.
C1601	BATTERY VOLT	Signal (terminal)	Power steering control module supply voltage (terminals 1 and 5)
		Threshold	Less than 8.8 V or more than 16.5 V
		Diagnosis delay time	0.5 seconds or more

### POSSIBLE CAUSE

- Harness or connectors
- Power steering control module
- Fuse
- Battery power supply circuit
- Battery

### FAIL-SAFE

—

### 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

##### Ⓜ CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "Self Diagnostic Result" mode of "EPS".

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

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

### Diagnosis Procedure

INFOID:000000012188152

Regarding Wiring Diagram information, refer to [STC-14. "Wiring Diagram"](#).

#### 1. CHECK POWER STEERING CONTROL MODULE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect power steering control module harness connector.
3. Check continuity between power steering control module harness connector terminal and ground.

Power steering control module		—	Continuity
Connector	Terminal		
E63	2	Ground	Yes

##### Is the inspection result normal?

- YES >> GO TO 2.

# C1601 BATTERY POWER SUPPLY

## < DTC/CIRCUIT DIAGNOSIS >

NO >> Repair open circuit or short to ground or short to power in harness or connectors, and repair or replace the malfunctioning component.

### 2. CHECK POWER STEERING CONTROL MODULE POWER SUPPLY CIRCUIT (1)

1. Check voltage between power steering control module harness connector terminal and ground.

Power steering control module		—	Voltage (Approx.)
Connector	Terminal		
E63	1	Ground	Battery voltage

2. Turn ignition switch ON.

**CAUTION:**

**Never start the engine.**

3. Check voltage between power steering control module harness connector terminal and ground.

Power steering control module		—	Voltage (Approx.)
Connector	Terminal		
E63	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

### 3. CHECK POWER STEERING CONTROL MODULE POWER SUPPLY CIRCUIT (2)

1. Turn ignition switch OFF.

2. Check the 100A fusible link (D).

3. Disconnect battery terminal with fusible link harness connector.

4. Check continuity between power steering control module harness connector terminal and battery terminal with fusible link harness connector terminal.

Power steering control module		Battery terminal with fusible link		Continuity
Connector	Terminal	Connector	Terminal	
E63	1	E5	4	Yes

5. Check continuity between power steering control module harness connector terminal and ground.

Power steering control module		—	Continuity
Connector	Terminal		
E63	1	Ground	No

Is the inspection result normal?

YES >> Perform the trouble diagnosis for battery power supply circuit. Refer to [PG-15, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

NO >> Repair or replace the malfunctioning component.

### 4. CHECK POWER STEERING CONTROL MODULE POWER SUPPLY CIRCUIT (3)

1. Check voltage between power steering control module harness connector terminal and ground.

Power steering control module		—	Voltage (Approx.)
Connector	Terminal		
E62	5	Ground	0 V

2. Turn ignition switch ON.

**CAUTION:**

**Never start the engine.**

3. Check voltage between power steering control module harness connector terminal and ground.

# C1601 BATTERY POWER SUPPLY

## < DTC/CIRCUIT DIAGNOSIS >

Power steering control module		—	Voltage (Approx.)
Connector	Terminal		
E62	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. CHECK POWER STEERING CONTROL MODULE POWER SUPPLY CIRCUIT (4)

1. Turn ignition switch OFF.
2. Check the 10A fuse No. 46 in the IPDM E/R.
3. Disconnect IPDM E/R harness connector E19.
4. Check continuity between power steering control module harness connector terminal and IPDM E/R harness connector terminal.

Power steering control module		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E62	5	E19	19	Yes

5. Check continuity between power steering control module harness connector terminal and ground.

Power steering control module		—	Continuity
Connector	Terminal		
E62	5	Ground	No

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to [PG-40, "Wiring Diagram - IGNITION POWER SUPPLY -"](#).

NO >> Repair or replace the malfunctioning component.

### 6. CHECK TERMINALS AND HARNESS CONNECTORS

Check the power steering control module pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Power steering control module is malfunctioning. Replace steering oil pump assembly. Refer to [STC-39, "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning component.

# C1602 NO TUNING SET

< DTC/CIRCUIT DIAGNOSIS >

## C1602 NO TUNING SET

### DTC Logic

INFOID:000000012338988

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	Electronic control module error
C1602	NO TUNING SET	Signal (terminal)	-
		Threshold	-
		Diagnosis delay time	-

### POSSIBLE CAUSE

- Harness or connectors
- Power steering control module

### FAIL-SAFE

—

### 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

##### ⓅCONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "Self Diagnostic Result" mode of "EPS".

##### Is DTC "C1602" detected?

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

### Diagnosis Procedure

INFOID:000000012338989

#### 1.PERFORM SELF-DIAGNOSIS

##### ⓅCONSULT

1. Turn the ignition switch OFF to ON.
2. Erase "Self Diagnostic Result" mode of "EPS".
3. Turn the ignition switch OFF and wait for at least 10 seconds.
4. Perform "Self Diagnostic Result" mode of "EPS".

##### Is DTC "C1602" detected?

- YES >> Power steering control module is malfunctioning. Replace power steering oil pump assembly.  
Refer to [STC-39. "Removal and Installation"](#).  
NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.



# C1606 EPS MOTOR

< DTC/CIRCUIT DIAGNOSIS >

## C1606 EPS MOTOR

### DTC Logic

INFOID:000000012188153

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	When ignition switch is ON.
C1606	EPS MOTOR	Signal (terminal)	—
		Threshold	—
		Diagnosis delay time	—

### POSSIBLE CAUSE

- Harness or connectors
- Power steering control motor
- Power steering control module

### FAIL-SAFE

—

### 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

##### ⓂCONSULT

1. Turn the ignition switch OFF to ON.
2. Perform “Self Diagnostic Result” mode of “EPS”.

##### Is DTC “C1606” detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-25, "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:000000012188154

#### 1. PERFORM SELF-DIAGNOSIS

##### ⓂCONSULT

1. Turn the ignition switch OFF to ON.
2. Erase “Self Diagnostic Result” mode of “EPS”.
3. Turn the ignition switch OFF and wait for at least 10 seconds.
4. Perform “Self Diagnostic Result” mode of “EPS”.

##### Is DTC “C1606” detected?

- YES >> Power steering motor is malfunctioning. Replace power steering oil pump assembly. Refer to [STC-39, "Removal and Installation"](#).  
NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

# C1607, C1608 POWER STEERING CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

## C1607, C1608 POWER STEERING CONTROL MODULE

### DTC Logic

INFOID:000000012188155

#### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	When ignition switch is ON.
C1607	EEPROM	Diagnosis condition	When ignition switch is ON.
		Signal (terminal)	—
		Threshold	—
		Diagnosis delay time	—
C1608	CONTROL UNIT	Diagnosis condition	When ignition switch is ON.
		Signal (terminal)	—
		Threshold	—
		Diagnosis delay time	—

#### POSSIBLE CAUSE

- Power steering control module

#### FAIL-SAFE

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#### 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

###### ⓐ CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform “Self Diagnostic Result” mode of “EPS”.

Is DTC “C1607” or “C1608” detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-26, "Diagnosis Procedure"](#).  
NO >> Inspection End.

#### Diagnosis Procedure

INFOID:000000012188156

##### 1. PERFORM SELF-DIAGNOSIS

###### ⓐ CONSULT

1. Turn the ignition switch OFF to ON.
2. Erase “Self Diagnostic Result” mode of “EPS”.
3. Turn the ignition switch OFF and wait for at least 10 seconds.
4. Perform “Self Diagnostic Result” mode of “EPS”.

Is DTC “C1607” or “C1608” detected?

- YES >> Power steering control module is malfunctioning. Replace power steering oil pump assembly.  
Refer to [STC-39, "Removal and Installation"](#).  
NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

# C1609 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

## C1609 VEHICLE SPEED SIGNAL

### DTC Logic

INFOID:0000000012337414

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
C1609	CAN VHCL SPEED	Diagnosis condition	<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>
		Signal (terminal)	Vehicle speed signal
		Threshold	ABS actuator and electric unit (control unit) input signal error is detected
		Diagnosis delay time	2 seconds or more

### POSSIBLE CAUSE

- Harness or connectors
- EPS control unit
- ABS malfunction
- Vehicle speed signal error

### FAIL-SAFE

—

### 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

##### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform “Self Diagnostic Result” mode of “EPS”.

##### Is DTC “C1609” detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-27. "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:0000000012337415

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

##### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform “Self Diagnostic Result” mode of “ABS”.

##### Is any DTC detected?

- YES >> Check the DTC.  
NO >> GO TO 2.

#### 2. PERFORM SELF-DIAGNOSIS

##### CONSULT

Perform “Self Diagnostic Result” mode of “EPS”.

##### Is DTC “C1609” detected?

- YES >> Replace EPS control unit. Refer to [STC-39. "Removal and Installation"](#).

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## **C1609 VEHICLE SPEED SIGNAL**

### **< DTC/CIRCUIT DIAGNOSIS >**

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NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any item are damaged, repair or replace malfunctioning component.

# C160A HEAT PROTECTION

< DTC/CIRCUIT DIAGNOSIS >

## C160A HEAT PROTECTION

### DTC Logic

INFOID:000000012188157

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
		Diagnosis condition	Signal (terminal)
C160A	HEAT PROTECTION	When ignition switch is ON.	—
		—	—
		When the steering wheel is operated excessively and the interior temperature of the power steering system reaches 118°C (244.4°F) or more (protection function)	—
		—	—

#### NOTE:

Although the hydraulic pump electric power steering system warning lamp turns ON, this is not a system malfunction. The state returns to normal after stopping steering operation and waiting until the system interior temperature drops to 90°C (194°F) or less.

#### POSSIBLE CAUSE

- The protection function of the hydraulic pump electric power steering system

#### FAIL-SAFE

—

### 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

##### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform “Self Diagnostic Result” mode of “EPS”.

##### Is DTC “C160A” detected?

- YES >> Go to [STC-17, "Work Flow"](#).  
NO >> Inspection End.

# U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## U1000 CAN COMM CIRCUIT

### Description

INFOID:000000012188158

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 communicates data but selectively reads required data only.

### DTC Logic

INFOID:000000012188159

### DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1000	CAN COMM CIRCUIT	Diagnosis condition	When ignition switch is ON.
		Signal (terminal)	—
		Threshold	—
		Diagnosis delay time	—

### POSSIBLE CAUSE

- CAN communication error

### FAIL-SAFE

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### 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

##### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "Self Diagnostic Result" mode of "EPS".

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

- YES >> Go to [STC-30, "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:000000012188160

Proceed to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

# HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

## HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

### Component Function Check

INFOID:000000012188161

#### 1. CHECK THE ILLUMINATION OF THE HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

Check that the hydraulic pump electric power steering warning lamp turns ON when ignition switch turns ON. Then, hydraulic pump electric power steering warning lamp turns OFF after the engine is started.

Is the inspection result normal?

YES >> Inspection End.

NO >> Perform trouble diagnosis. Refer to [STC-31, "Diagnosis Procedure"](#).

### Diagnosis Procedure

INFOID:000000012188162

#### 1. PERFORM SELF DIAGNOSIS

##### CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "Self Diagnostic Result" mode of "EPS".

Is any DTC detected?

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

NO >> GO TO 2.

#### 2. CHECK HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP SIGNAL

##### CONSULT

1. Turn the ignition switch ON.
2. Select "WARNING LAMP" in "Data Monitor" mode of "EPS".
3. Check that the item in "Data Monitor" mode is "On".

**CAUTION:**

**Engine should not be running for step 3.**

4. Start the engine.

**CAUTION:**

**Never drive the vehicle during the test.**

5. Check that the item in "Data Monitor" mode is "Off".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to [MWI-50, "COMBINATION METER : Diagnosis Procedure"](#).

NO >> GO TO 3.

#### 3. CHECK TERMINALS AND HARNESS CONNECTORS

Check the power steering control module pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Power steering control module is malfunctioning. Replace power steering oil pump assembly. Refer to [STC-39, "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning component.

# HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

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## SYMPTOM DIAGNOSIS

### HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN ON

#### Description

INFOID:0000000012188163

The hydraulic pump electric power steering warning lamp does not illuminate when the ignition switch is turned ON (lamp check).

#### Diagnosis Procedure

INFOID:0000000012188164

#### **1**.CHECK THE HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

Perform trouble diagnosis for the hydraulic pump electric power steering warning lamp system. Refer to [STC-31. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Check that the pin terminals and the connection of each connector are normal.
- NO >> Repair or replace the malfunctioning components.



# HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN OFF

< SYMPTOM DIAGNOSIS >

## HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN OFF

### Description

INFOID:000000012188165

Hydraulic pump electric power steering warning lamp does not turn OFF several seconds after engine is started.

### Diagnosis Procedure

INFOID:000000012188166

#### 1.PERFORM SELF DIAGNOSIS

##### CONSULT

Perform "Self Diagnostic Result" mode of "EPS".

Is any DTC detected?

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

NO >> GO TO 2.

#### 2.CHECK HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

Perform the trouble diagnosis of hydraulic pump electric power steering warning lamp. Refer to [STC-31, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the malfunctioning components.

#### 3.POWER STEERING CONTROL MODULE POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis of power steering control module power supply and ground. Refer to [STC-21, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check that the pin terminals and the connection of each connector are normal.

NO >> Repair or replace the malfunctioning components.

# STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

## STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

### Diagnosis Procedure

INFOID:000000012188167

#### 1.PERFORM SELF DIAGNOSIS

##### CONSULT

Perform "Self Diagnostic Result" mode of "EPS".

Is a malfunctioning system displayed?

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

#### 2.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (1)

##### CONSULT

1. Start the engine.

##### CAUTION:

**Never drive the vehicle.**

2. Turn the steering wheel until it stops.  
3. Select "MTR ASSIST" in "Data Monitor" mode of "EPS".

Is the display value "100%"?

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

#### 3.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (2)

##### CONSULT

1. Select "C/U TEMP" and "C/U TEMP A" in "Data Monitor" mode of "EPS".  
2. Stop the system until the "Data Monitor" mode display value drops to 90°C (194°F) or less.  
3. Check whether symptom continues.

Does symptom continue?

- YES >> GO TO 4.  
NO >> This occurs because the protection function lowers the assist force. It is not a system malfunction.  
Inspection End.

#### 4.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (3)

##### CONSULT

1. Turn the steering wheel to the straight-ahead position. (There is no steering force.)  
2. Select "BATTERY VOLT" in "Data Monitor" mode of "EPS".

Is the display value 10.5 V or more?

- YES >> GO TO 5.  
NO >> Check the battery power system. Refer to [STC-21, "Diagnosis Procedure"](#).

#### 5.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (4)

##### CONSULT

Select "ESTM VHCL SPD" in "Data Monitor" mode of "EPS".

Monitor item	Test condition	Display value
ESTM VHCL SPD	When stopped	0.00 km/h or mph
	While driving	Approximately equal to the indication on speedometer* (Inside ±10%)

\*: This may not agree with the speedometer indication immediately after the ignition switch is turned ON. This is not a malfunction.

Is the inspection result normal?

- YES >> GO TO 6.  
NO >> Check the combination meter and ABS actuator and electric unit (control unit). Refer to [MWI-20, "CONSULT Function \(METER/M&A\)"](#) and [BRC-212, "CONSULT Function"](#).

# STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

## 6. CHECK THE POWER STEERING CONTROL MODULE SIGNAL (5)

### CONSULT

Select "STR ANG SPD" in "Data Monitor" mode of "EPS".

Monitor item	Test condition	Display value
STR ANG SPD	The steering wheel is not steered.	Approx. 0.0 deg/s
	The steering wheel is steered.	Displays steering angle speed (deg/s)

Is the check result normal?

YES >> GO TO 7.

NO >> Check the steering angle sensor. Refer to [STC-20, "Diagnosis Procedure"](#).

## 7. CHECK THE POWER STEERING CONTROL MODULE SIGNAL (6)

### CONSULT

Select "ENGINE STATUS" in "Data Monitor" mode of "EPS".

Is the display value "RUN"?

YES >> GO TO 8.

NO >> Check the ECM. Refer to [EC-73, "CONSULT Function"](#).

## 8. CHECK THE STEERING FORCE

Check the steering force. Refer to [STC-36, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Inspection End.

NO >> It is possible that there is a mechanical malfunction. Check the steering system.

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

< SYMPTOM DIAGNOSIS >

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

### Diagnosis Procedure

INFOID:000000012188168

#### 1. CHECK THE ILLUMINATION OF THE HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP

Check the hydraulic pump electric power steering warning lamp while engine is running.

Does the hydraulic pump electric power steering warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-33, "Diagnosis Procedure"](#).

#### 2. CHECK WHEEL ALIGNMENT

Check the wheel alignment. Refer to [FSU-7, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Adjustment of wheel alignment. Refer to [FSU-7, "Inspection"](#).

#### 3. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [STC-37, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [STC-34, "Diagnosis Procedure"](#).

# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

## UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

### Diagnosis Procedure

INFOID:000000012188169

#### 1.PERFORM SELF-DIAGNOSIS

##### CONSULT

Perform "Self Diagnostic Result" mode of "EPS".

Is a malfunctioning system displayed?

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

NO >> GO TO 2.

#### 2.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (1)

##### CONSULT

1. Start the engine.

##### CAUTION:

**Never drive the vehicle.**

2. Turn the steering wheel until it stops.

3. Select "MTR ASSIST" in "Data Monitor" mode of "EPS".

Is the display value "100%"?

YES >> GO TO 4.

NO >> GO TO 3.

#### 3.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (2)

##### CONSULT

1. Select "C/U TEMP" and "C/U TEMP A" in "Data Monitor" mode of "EPS".

2. Stop the system until the "Data Monitor" mode display value drops to 90°C (194°F) or less.

3. Check whether symptom continues.

Does symptom continue?

YES >> GO TO 4.

NO >> This occurs because the protection function lowers the assist force. It is not a system malfunction.  
Inspection End.

#### 4.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (3)

##### CONSULT

1. Turn the steering wheel to the straight-ahead position. (There is no steering force.)

2. Select "BATTERY VOLT" in "Data Monitor" mode of "EPS".

Is the display value 10.5 V or more?

YES >> GO TO 5.

NO >> Check the battery power system. Refer to [STC-21. "Diagnosis Procedure"](#).

#### 5.CHECK THE POWER STEERING CONTROL MODULE SIGNAL (4)

##### CONSULT

Select "ESTM VHCL SPD" in "Data Monitor" mode of "EPS".

Monitor item	Test condition	Display value
ESTM VHCL SPD	When stopped	0.00 km/h or mph
	While driving	Approximately equal to the indication on speedometer* (Inside ±10%)

\*: This may not agree with the speedometer indication immediately after the ignition switch is turned ON. This is not a malfunction.

Is the inspection result normal?

YES >> GO TO 6.

# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

## < SYMPTOM DIAGNOSIS >

NO >> Check the combination meter and ABS actuator and electric unit (control unit). Refer to [MWI-20, "CONSULT Function \(METER/M&A\)"](#) and [BRC-212, "CONSULT Function"](#).

### 6. CHECK THE POWER STEERING CONTROL MODULE SIGNAL (5)

#### CONSULT

Select "STR ANG SPD" in "Data Monitor" mode of "EPS".

Monitor item	Test condition	Display value
STR ANG SPD	The steering wheel is not turning.	Approx. 0.0 deg/s
	The steering wheel is being turned.	Displays steering angle speed (deg/s)

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Check the steering angle sensor. Refer to [STC-20, "Diagnosis Procedure"](#).

### 7. CHECK THE POWER STEERING CONTROL MODULE SIGNAL (6)

#### CONSULT

Select "ENGINE STATUS" in "Data Monitor" mode of "EPS".

#### Is the display value "RUN"?

YES >> GO TO 8.

NO >> Check the ECM. Refer to [EC-73, "CONSULT Function"](#).

### 8. CHECK STEERING COLUMN AND STEERING GEAR

Check the steering column assembly and steering gear assembly.

- Steering column assembly: Refer to [ST-17, "Inspection"](#).
- Steering gear assembly: Refer to [ST-19, "Inspection"](#).

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace malfunctioning component.

### 9. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [STC-34, "Diagnosis Procedure"](#).

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [STC-34, "Diagnosis Procedure"](#).

# POWER STEERING CONTROL MODULE

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### POWER STEERING CONTROL MODULE

#### Removal and Installation

INFOID:000000012188170

**CAUTION:**

**Disconnect battery negative cable before removing the power steering oil pump.**

The power steering control module is an integral part of the power steering oil pump. If replacement of the power steering control module is necessary, replace the complete power steering oil pump. Refer to [ST-43, "Removal and Installation"](#).

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