

# SECTION **STC**

## STEERING CONTROL SYSTEM

### CONTENTS

|                                                                                                  |    |                                                                  |    |
|--------------------------------------------------------------------------------------------------|----|------------------------------------------------------------------|----|
| <b>PRECAUTION</b> .....                                                                          | 3  | <b>HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM</b> .....       | 14 |
| <b>PRECAUTIONS</b> .....                                                                         | 3  | Wiring Diagram .....                                             | 14 |
| Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ..... | 3  | <b>BASIC INSPECTION</b> .....                                    | 19 |
| Service Notice and Precautions for Hydraulic Pump Electric Power Steering System .....           | 3  | <b>DIAGNOSIS AND REPAIR WORK FLOW</b> .....                      | 19 |
| <b>SYSTEM DESCRIPTION</b> .....                                                                  | 4  | Work Flow .....                                                  | 19 |
| <b>COMPONENT PARTS</b> .....                                                                     | 4  | Diagnostic Work Sheet .....                                      | 20 |
| Component Parts Location .....                                                                   | 4  | <b>DTC/CIRCUIT DIAGNOSIS</b> .....                               | 22 |
| Power Steering Oil Pump Assembly .....                                                           | 5  | <b>C1143 STEERING ANGLE SENSOR</b> .....                         | 22 |
| <b>SYSTEM</b> .....                                                                              | 6  | DTC Logic .....                                                  | 22 |
| <b>HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM</b> .....                                       | 6  | Diagnosis Procedure .....                                        | 22 |
| HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : System Description .....                         | 6  | <b>C1601 BATTERY POWER SUPPLY</b> .....                          | 23 |
| HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Fail-safe .....                                  | 8  | DTC Logic .....                                                  | 23 |
| HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : Protection Function .....                        | 9  | Diagnosis Procedure .....                                        | 23 |
| <b>DIAGNOSIS SYSTEM (POWER STEERING CONTROL MODULE)</b> .....                                    | 10 | <b>C1606 EPS MOTOR</b> .....                                     | 26 |
| CONSULT Function .....                                                                           | 10 | DTC Logic .....                                                  | 26 |
| <b>ECU DIAGNOSIS INFORMATION</b> .....                                                           | 11 | Diagnosis Procedure .....                                        | 26 |
| <b>POWER STEERING CONTROL MODULE</b> .....                                                       | 11 | <b>C1607, C1608 POWER STEERING CONTROL MODULE</b> .....          | 27 |
| Reference Value .....                                                                            | 11 | DTC Logic .....                                                  | 27 |
| Fail-safe .....                                                                                  | 12 | Diagnosis Procedure .....                                        | 27 |
| Protection Function .....                                                                        | 12 | <b>C160A HEAT PROTECTION</b> .....                               | 28 |
| DTC Inspection Priority Chart .....                                                              | 13 | DTC Logic .....                                                  | 28 |
| DTC Index .....                                                                                  | 13 | <b>U1000 CAN COMM CIRCUIT</b> .....                              | 29 |
| <b>WIRING DIAGRAM</b> .....                                                                      | 14 | Description .....                                                | 29 |
|                                                                                                  |    | DTC Logic .....                                                  | 29 |
|                                                                                                  |    | Diagnosis Procedure .....                                        | 29 |
|                                                                                                  |    | <b>HYDRAULIC PUMP ELECTRIC POWER STEERING WARNING LAMP</b> ..... | 30 |
|                                                                                                  |    | Component Function Check .....                                   | 30 |
|                                                                                                  |    | Diagnosis Procedure .....                                        | 30 |
|                                                                                                  |    | <b>SYMPTOM DIAGNOSIS</b> .....                                   | 31 |

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|                                                                                            |           |
|--------------------------------------------------------------------------------------------|-----------|
| <b>HYDRAULIC PUMP ELECTRIC POWER<br/>STEERING WARNING LAMP DOES NOT<br/>TURN ON .....</b>  | <b>31</b> |
| Description .....                                                                          | 31        |
| Diagnosis Procedure .....                                                                  | 31        |
| <b>HYDRAULIC PUMP ELECTRIC POWER<br/>STEERING WARNING LAMP DOES NOT<br/>TURN OFF .....</b> | <b>32</b> |
| Description .....                                                                          | 32        |
| Diagnosis Procedure .....                                                                  | 32        |
| <b>STEERING WHEEL TURNING FORCE IS<br/>HEAVY OR LIGHT .....</b>                            | <b>33</b> |
| Diagnosis Procedure .....                                                                  | 33        |

|                                                                                               |           |
|-----------------------------------------------------------------------------------------------|-----------|
| <b>UNBALANCE STEERING WHEEL TURNING<br/>FORCE AND RETURN BETWEEN RIGHT<br/>AND LEFT .....</b> | <b>35</b> |
| Diagnosis Procedure .....                                                                     | 35        |
| <b>UNBALANCE STEERING WHEEL TURNING<br/>FORCE (TORQUE VARIATION) .....</b>                    | <b>36</b> |
| Diagnosis Procedure .....                                                                     | 36        |
| <b>REMOVAL AND INSTALLATION .....</b>                                                         | <b>38</b> |
| <b>POWER STEERING CONTROL MODULE .....</b>                                                    | <b>38</b> |
| Removal and Installation .....                                                                | 38        |

# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:0000000011507573

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:0000000011507574

- Check each tire for proper air pressure and size. Refer to [WT-74, "Tire Air Pressure"](#).
- Verify that the steering system components are genuine NISSAN parts and have been installed properly.
- Check the steering column for loose mounting bolts.
- Check the steering gear assembly for loose mounting 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-7, "Inspection"](#).
- 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-26, "Wheelarch Height \(Unladen\\*\)"](#).
- Check for proper battery voltage.
- Verify that all power steering pump assembly 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

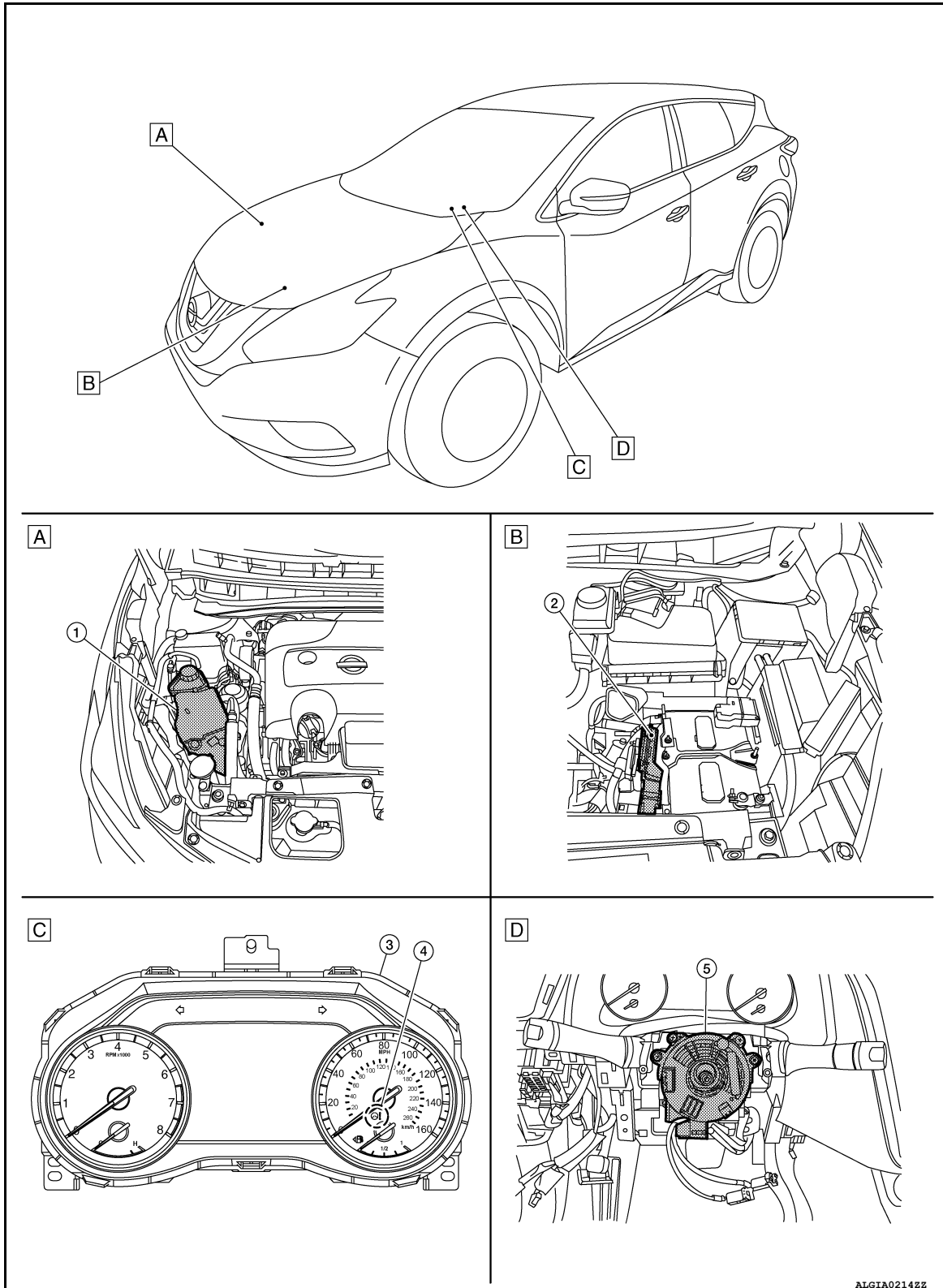
< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### COMPONENT PARTS

#### Component Parts Location

INFOID:0000000011532950



# COMPONENT PARTS

## < SYSTEM DESCRIPTION >

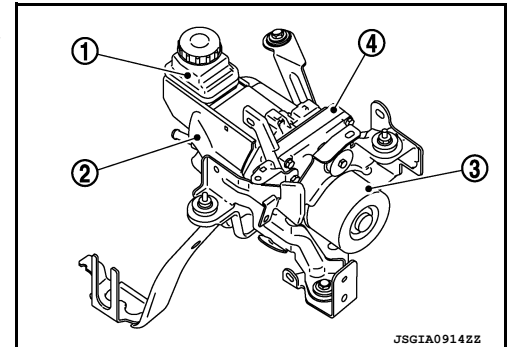
- A. Engine room right side      B. Engine room left side      C. Instrument panel  
D. View with heated steering wheel removed

| No. | Component                                                                         |                               | Function                                                                                                                                                                                                                                          |
|-----|-----------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Power steering oil pump assembly                                                  | Reservoir tank                | <a href="#">STC-5, "Power Steering Oil Pump Assembly"</a>                                                                                                                                                                                         |
|     |                                                                                   | Power steering oil pump       |                                                                                                                                                                                                                                                   |
|     |                                                                                   | Power steering motor          |                                                                                                                                                                                                                                                   |
|     |                                                                                   | Power steering control module |                                                                                                                                                                                                                                                   |
| 2.  | ECM                                                                               |                               | Transmits mainly the following signal to power steering control module via CAN communication:<br>• Engine status signal<br>Refer to <a href="#">EC-15, "ENGINE CONTROL SYSTEM : Component Parts Location"</a> for detailed installation location. |
| 3.  | Combination meter                                                                 |                               | Transmits mainly the following signal to power steering control module via CAN communication:<br>• Vehicle speed signal<br>Refer to <a href="#">MWI-5, "METER SYSTEM : Component Parts Location"</a> for detailed installation location.          |
|     |                                                                                   |                               | 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.                                                                             |
| 4.  | Hydraulic pump electric power steering system warning lamp (in combination meter) |                               | <a href="#">STC-6, "HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM : System Description"</a>                                                                                                                                                       |
| 5.  | Steering angle sensor                                                             |                               | Transmits mainly the following signal to power steering control module via CAN communication:<br>• Steering angle sensor signal                                                                                                                   |

## Power Steering Oil Pump Assembly

INFOID:000000011532951

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.

# SYSTEM

< SYSTEM DESCRIPTION >

## SYSTEM

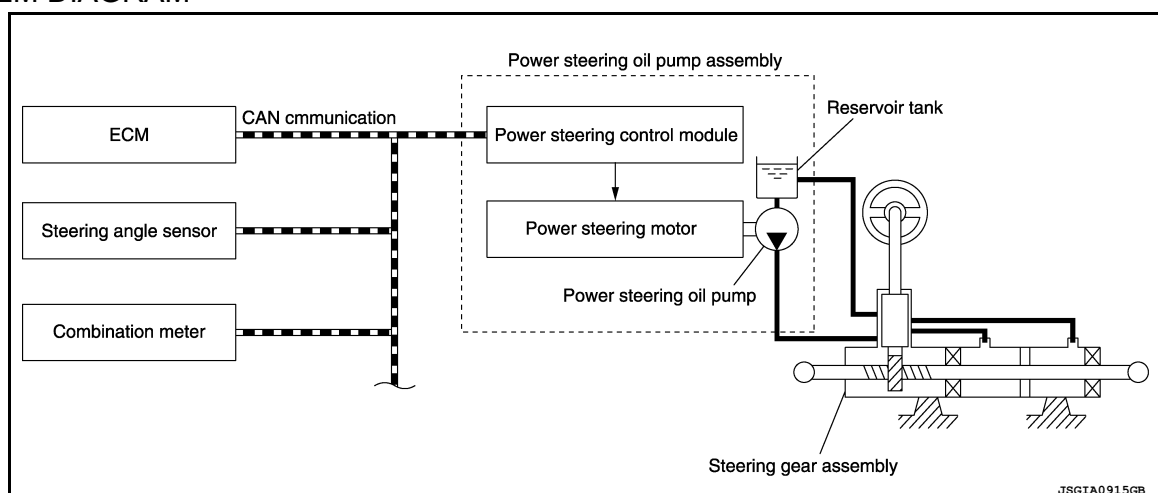
### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

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

INFOID:000000011532952

- 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 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.

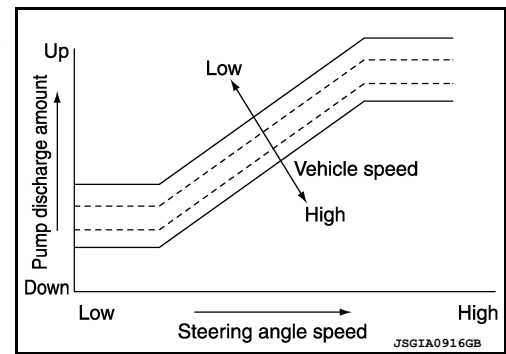
| Control unit          | Signal status                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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

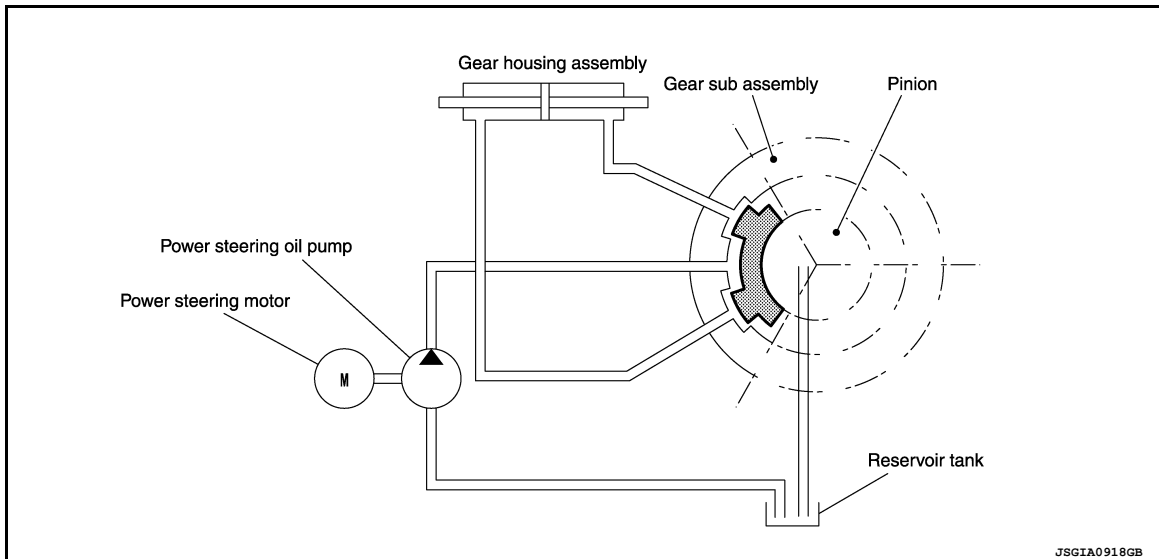
## < SYSTEM DESCRIPTION >

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.



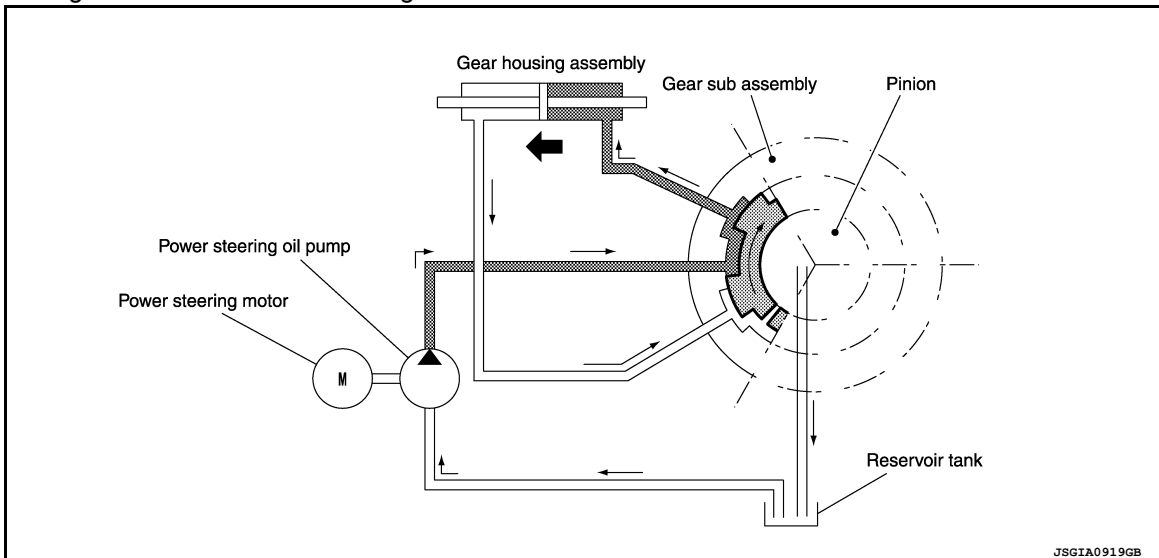
## OPERATION PRINCIPLE

When Steering Wheel is in the Neutral Position



Because the hydraulic routes open at the power steering pump, gear housing right side, gear housing left side, 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

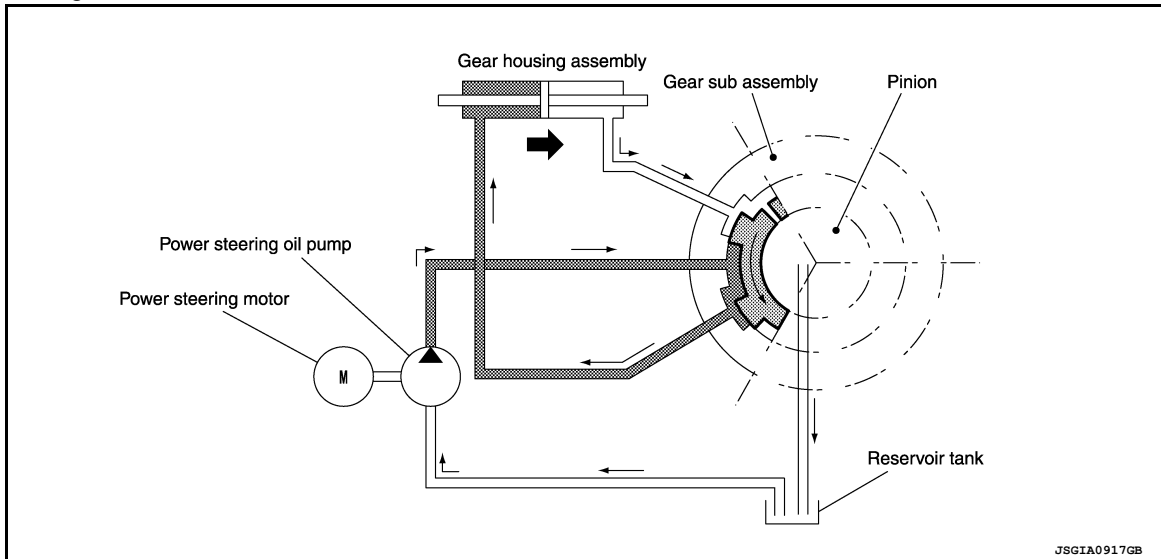


The hydraulic routes open from power steering pump to gear housing right side and from gear housing left side to reservoir tank, providing left directional assist force to the rack.

# SYSTEM

## < SYSTEM DESCRIPTION >

When Steering Wheel is Rotated to the Left



The hydraulic routes open from power steering pump to gear housing left side and from gear housing right side 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:0000000011532953

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 |

## SYSTEM

### < SYSTEM DESCRIPTION >

| DTC   | Fail-safe condition                                                                                                     |
|-------|-------------------------------------------------------------------------------------------------------------------------|
| C1608 | Manual steering state                                                                                                   |
| U1000 | Normal control<br><b>NOTE:</b><br>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:0000000011532954

- 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 hard. 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.) |

# DIAGNOSIS SYSTEM (POWER STEERING CONTROL MODULE)

< SYSTEM DESCRIPTION >

## DIAGNOSIS SYSTEM (POWER STEERING CONTROL MODULE)

### CONSULT Function

INFOID:000000011491678

#### 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 communications.       |
| STR ANG SPD (deg/s)            | Displays the steering angle speed based on the steering angle signal transmitted by CAN communications. |
| 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 communications.            |

# POWER STEERING CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

## ECU DIAGNOSIS INFORMATION

### POWER STEERING CONTROL MODULE

Reference Value

INFOID:0000000011491679

#### 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.

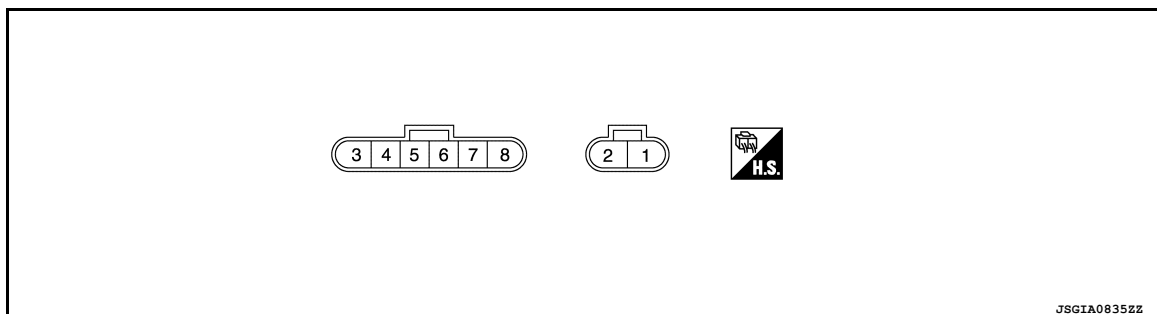
\*3: Usually, 100% is displayed. An excessive steering operation gradually lowers the percentage. When left standing, the percentage returns to 100%.

\*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.<br>(Wire Color) |        | Description           |              | Condition            | Value<br>(Approx.) |
|------------------------------|--------|-----------------------|--------------|----------------------|--------------------|
| +                            | —      | Signal name           | Input/Output |                      |                    |
| 1<br>(W)                     | Ground | Battery power supply  | Input        | Always               | Battery voltage    |
| 2<br>(B)                     | Ground | Ground                | —            | Always               | 0 V                |
| 5<br>(BR)                    | Ground | Ignition power supply | Input        | Ignition switch: ON  | Battery voltage    |
|                              |        |                       |              | Ignition switch: OFF | 0 V                |
| 7<br>(P)                     | —      | CAN low               | Input/Output | —                    | —                  |
| 8<br>(L)                     | —      | CAN high              | Input/Output | —                    | —                  |

## Fail-safe

INFOID:000000011491680

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                                                                                                   |
| C1606 | Manual steering state                                                                                                   |
| C1607 | Certain steering assist force                                                                                           |
| C1608 | Manual steering state                                                                                                   |
| U1000 | Normal control<br><b>NOTE:</b><br>If the cause is in a different ECU, the state changes to fixed steering assist force. |

## Protection Function

INFOID:000000011491681

- 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 hard. 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

# POWER STEERING CONTROL MODULE

## < ECU DIAGNOSIS INFORMATION >

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:0000000011491682

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

| Priority | Priority order item (DTC)                                                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------|
| 1        | <ul style="list-style-type: none"><li>• C1601 BATTERY VOLT</li><li>• C1606 EPS MOTOR</li><li>• C1608 CONTROL UNIT</li></ul> |
| 2        | <ul style="list-style-type: none"><li>• C1607 EEPROM</li></ul>                                                              |
| 3        | <ul style="list-style-type: none"><li>• C160A HEAT PROTECTION</li></ul>                                                     |
| 4        | <ul style="list-style-type: none"><li>• C1143 ST ANG SEN CIRCUIT</li><li>• U1000 CAN COMM CIRCUIT</li></ul>                 |

## DTC Index

INFOID:0000000011491683

STC

| DTC   | Items (CONSULT screen terms) | Reference                           |
|-------|------------------------------|-------------------------------------|
| C1143 | ST ANG SEN CIRCUIT           | <a href="#">STC-22, "DTC Logic"</a> |
| C1601 | BATTERY VOLT                 | <a href="#">STC-23, "DTC Logic"</a> |
| C1606 | EPS MOTOR                    | <a href="#">STC-26, "DTC Logic"</a> |
| C1607 | EEPROM                       | <a href="#">STC-27, "DTC Logic"</a> |
| C1608 | CONTROL UNIT                 | <a href="#">STC-27, "DTC Logic"</a> |
| C160A | HEAT PROTECTION              | <a href="#">STC-28, "DTC Logic"</a> |
| U1000 | CAN COMM CIRCUIT             | <a href="#">STC-29, "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

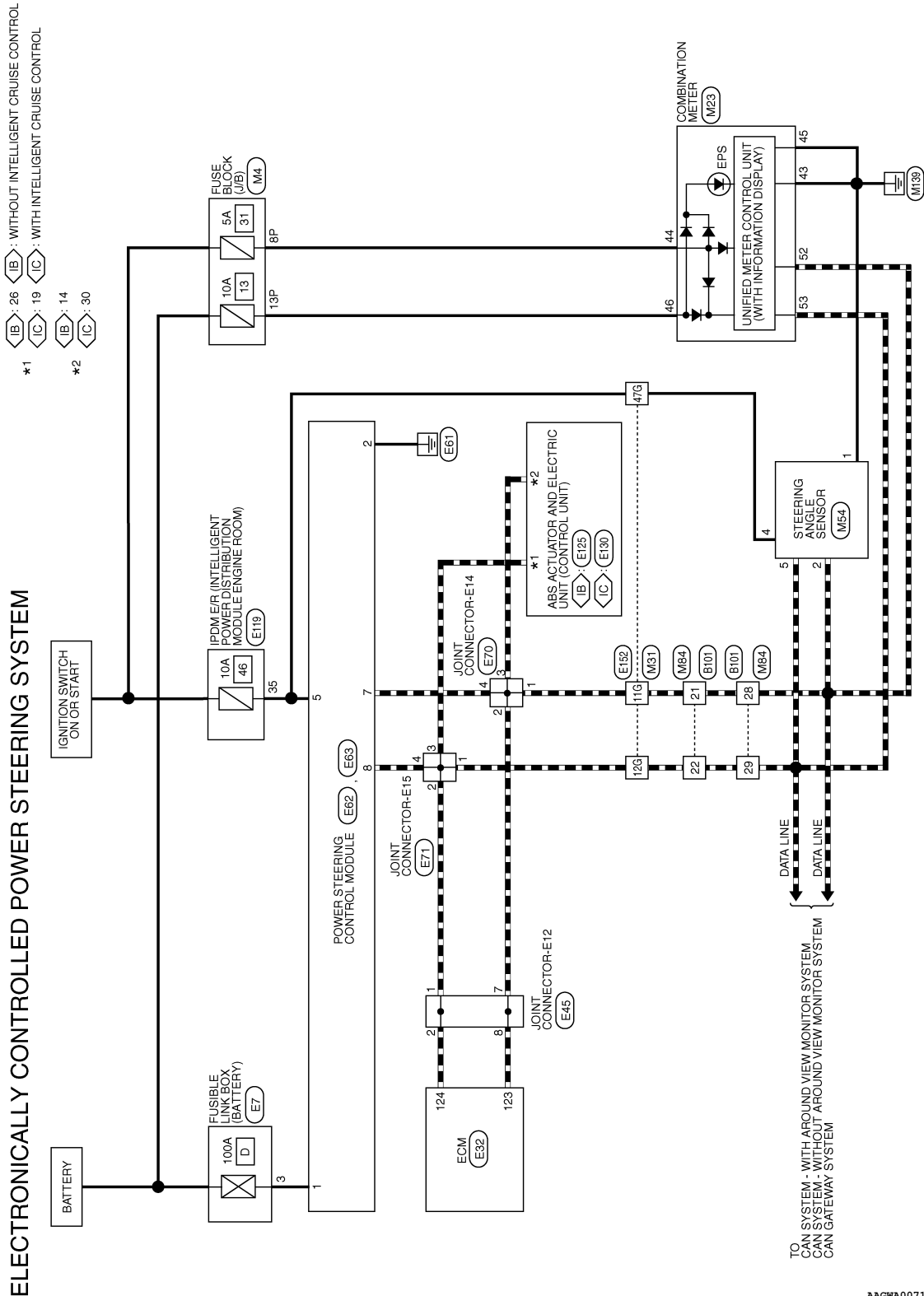
< WIRING DIAGRAM >

## WIRING DIAGRAM

### HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

#### Wiring Diagram

INFOID:0000000011491684



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# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >

## ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM CONNECTORS

|                 |                  |
|-----------------|------------------|
| Connector No.   | M4               |
| Connector Name  | FUSE BLOCK (J/B) |
| Connector Color | WHITE            |

|     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|
| 7P  | 8P  | 5P  | 4P  | 3P  | 2P  | 1P  |
| 16P | 15P | 14P | 13P | 12P | 11P | 10P |
| 9P  | 8P  | 7P  | 6P  | 5P  | 4P  | 3P  |



|                 |                   |
|-----------------|-------------------|
| Connector No.   | M23               |
| Connector Name  | COMBINATION METER |
| Connector Color | WHITE             |

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 |

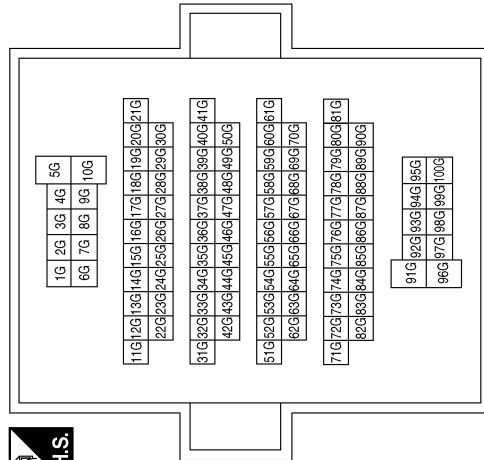


| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 46           | W             | POWER (BAT) |
| 52           | P             | CAN-L       |
| 53           | L             | CAN-H       |

| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 8P           | BG            | -           |
| 13P          | W             | -           |

| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 43           | B             | GND 1       |
| 44           | BG            | POWER (IGN) |
| 45           | B             | GND 2       |

|                 |              |
|-----------------|--------------|
| Connector No.   | M31          |
| Connector Name  | WIRE TO WIRE |
| Connector Color | WHITE        |



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|                 |                       |
|-----------------|-----------------------|
| Connector No.   | M54                   |
| Connector Name  | STEERING ANGLE SENSOR |
| Connector Color | WHITE                 |



|   |   |   |   |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |

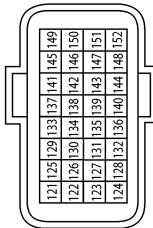
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 1            | GR            | -           |
| 2            | P             | -           |
| 4            | G             | -           |
| 5            | L             | -           |

A  
B  
C  
D  
E  
F  
STC  
H  
I  
J  
K  
L  
M  
N  
O  
P

# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >

|                 |       |
|-----------------|-------|
| Connector No.   | E32   |
| Connector Name  | ECM   |
| Connector Color | BLACK |



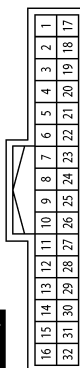
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 123          | P             | CAN-L       |
| 124          | L             | CAN-H       |

|                 |                            |
|-----------------|----------------------------|
| Connector No.   | E7                         |
| Connector Name  | FUSIBLE LINK BOX (BATTERY) |
| Connector Color | GRAY                       |



| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 3            | W             | -           |

|                 |              |
|-----------------|--------------|
| Connector No.   | M84          |
| Connector Name  | WIRE TO WIRE |
| Connector Color | WHITE        |



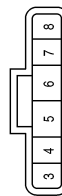
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 21           | P             | -           |
| 22           | L             | -           |
| 28           | P             | -           |
| 29           | L             | -           |

|                 |                               |
|-----------------|-------------------------------|
| Connector No.   | E63                           |
| Connector Name  | POWER STEERING CONTROL MODULE |
| Connector Color | BLACK                         |



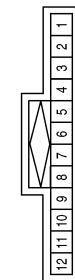
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 1            | W             | BATTERY (+) |
| 2            | B             | GROUND      |

|                 |                               |
|-----------------|-------------------------------|
| Connector No.   | E62                           |
| Connector Name  | POWER STEERING CONTROL MODULE |
| Connector Color | BLACK                         |



| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 3            | -             | -           |
| 4            | -             | -           |
| 5            | BR            | IGN KEY S/W |
| 6            | -             | -           |
| 7            | P             | CAN-L       |
| 8            | L             | CAN-H       |

|                 |                     |
|-----------------|---------------------|
| Connector No.   | E45                 |
| Connector Name  | JOINT CONNECTOR-E12 |
| Connector Color | BLUE                |



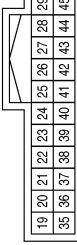
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 1            | L             | -           |
| 2            | L             | -           |
| 7            | P             | -           |
| 8            | P             | -           |

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# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >

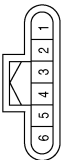
|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| Connector No.   | E119                                                         |
| Connector Name  | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Color | WHITE                                                        |

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
| 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |

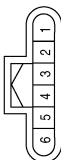
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 35           | BR            | ABS ECU     |

|                 |                     |
|-----------------|---------------------|
| Connector No.   | E71                 |
| Connector Name  | JOINT CONNECTOR-E15 |
| Connector Color | BLACK               |

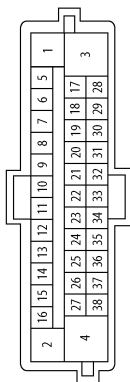
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 1            | L             | -           |
| 2            | L             | -           |
| 3            | L             | -           |
| 4            | L             | -           |

|                 |                     |
|-----------------|---------------------|
| Connector No.   | E70                 |
| Connector Name  | JOINT CONNECTOR-E14 |
| Connector Color | BLACK               |

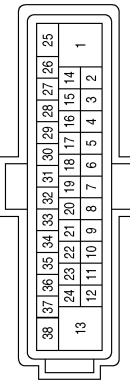
| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 1            | P             | -           |
| 2            | P             | -           |
| 3            | P             | -           |
| 4            | P             | -           |

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| Connector No.   | E130                                                                                   |
| Connector Name  | ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITH INTELLIGENT CRUISE CONTROL SYSTEM) |
| Connector Color | BLACK                                                                                  |

| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 19           | L             | CAN-H       |
| 30           | P             | CAN-L       |

|                 |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| Connector No.   | E125                                                                                      |
| Connector Name  | ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITHOUT INTELLIGENT CRUISE CONTROL SYSTEM) |
| Connector Color | BLACK                                                                                     |

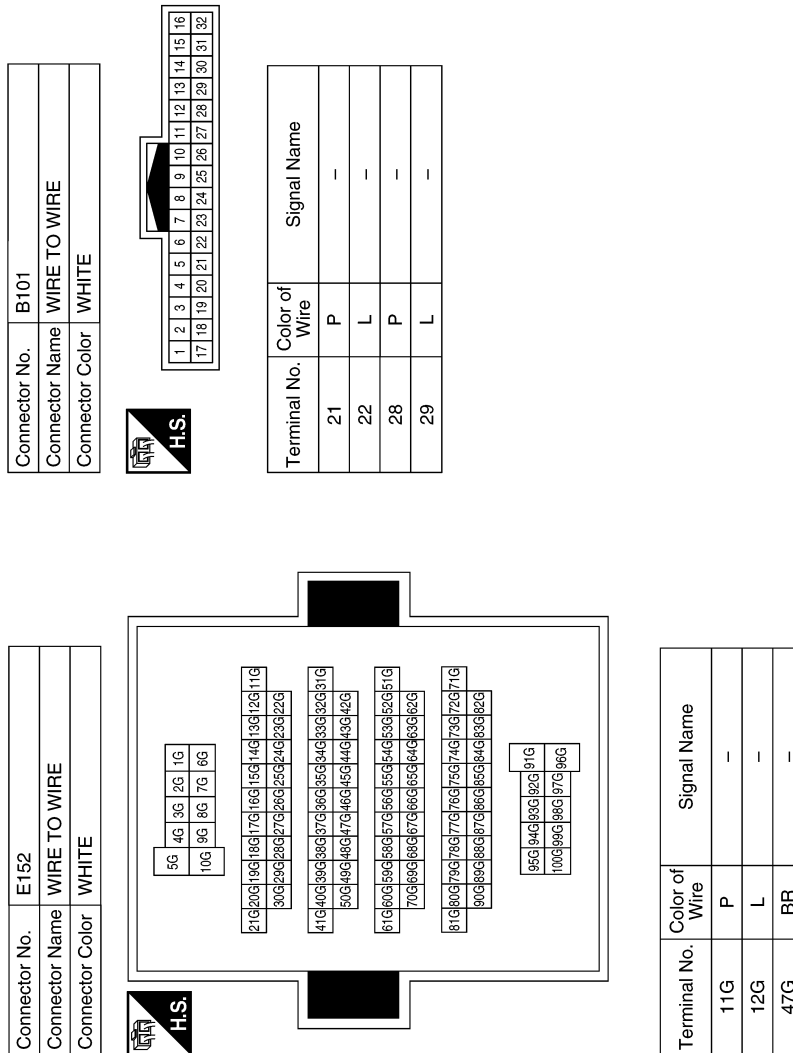



| Terminal No. | Color of Wire | Signal Name |
|--------------|---------------|-------------|
| 14           | P             | CAN-L       |
| 26           | L             | CAN-H       |

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# HYDRAULIC PUMP ELECTRIC POWER STEERING SYSTEM

< WIRING DIAGRAM >



# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

#### Work Flow

INFOID:0000000011491685

#### DETAILED FLOW

#### 1. INTERVIEW THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-20. "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 procedures 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 >

- YES >> GO TO 6.  
NO >> Check harness and connectors based on the information obtained by interview.

## 6. REPAIR OR REPLACE THE MALFUNCTIONING COMPONENTS

- Repair or replace the malfunctioning components.
- Reconnect part or connector after repairing or replacing.
- When DTC is detected, erase "Self Diagnostic Result" mode of "EPS".

>> GO TO 8.

## 7. IDENTIFY THE MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

Estimate the malfunctioning system based on symptom diagnosis and perform inspection.

Can the malfunctioning system be identified?

- YES >> GO TO 8.  
NO >> Check harness and connectors based on the information obtained by interview.

## 8. FINAL CHECK

### CONSULT

1. Check the reference value for power steering control module.
2. Recheck the symptom and check that symptom is not reproduced under the same conditions.

Is the symptom reproduced?

- YES >> GO TO 3.  
NO >> Inspection End.

## Diagnostic Work Sheet

INFOID:0000000011491686

### Description

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

### Interview sheet sample

| Interview sheet         |                                                                                                                                    |                                                                                                                                                                                                              |  |                           |           |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------|-----------|
| Customer name           | MR/MS                                                                                                                              | Registration number                                                                                                                                                                                          |  | Initial year registration |           |
|                         |                                                                                                                                    | Vehicle type                                                                                                                                                                                                 |  | VIN                       |           |
| Storage date            |                                                                                                                                    | Engine                                                                                                                                                                                                       |  | Mileage                   | km (Mile) |
| Symptom                 | <input type="checkbox"/> The steering wheel position (center) is in the wrong position.                                            |                                                                                                                                                                                                              |  |                           |           |
|                         | <input type="checkbox"/> Warning lamp turns ON.                                                                                    |                                                                                                                                                                                                              |  |                           |           |
|                         | <input type="checkbox"/> Noise <input type="checkbox"/> Vibration                                                                  |                                                                                                                                                                                                              |  |                           |           |
|                         | <input type="checkbox"/> Others ( )                                                                                                |                                                                                                                                                                                                              |  |                           |           |
| First occurrence        | <input type="checkbox"/> Recently <input type="checkbox"/> Others ( )                                                              |                                                                                                                                                                                                              |  |                           |           |
| Frequency of occurrence | <input type="checkbox"/> Always <input type="checkbox"/> Under certain conditions <input type="checkbox"/> Sometimes (time(s)/day) |                                                                                                                                                                                                              |  |                           |           |
| Climate conditions      | <input type="checkbox"/> Irrelevant                                                                                                |                                                                                                                                                                                                              |  |                           |           |
|                         | Weather                                                                                                                            | <input type="checkbox"/> Fine <input type="checkbox"/> Cloud <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Others ( )                                                 |  |                           |           |
|                         | Temperature                                                                                                                        | <input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Temperature [Approx. °C (°F)]                                |  |                           |           |
|                         | Relative humidity                                                                                                                  | <input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low                                                                                                                 |  |                           |           |
| Road conditions         |                                                                                                                                    | <input type="checkbox"/> Urban area <input type="checkbox"/> Suburb area <input type="checkbox"/> Highway<br><input type="checkbox"/> Mountain road (uphill or downhill) <input type="checkbox"/> Rough road |  |                           |           |

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

| Interview sheet            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           |     |
|----------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------|-----------|-----|
| Customer name              | MR/MS | Registration number                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Initial year registration |           | A   |
|                            |       | Vehicle type                                                                                                                                                                                                                                                                                                                                                                                                                           |  | VIN                       |           | B   |
| Storage date               |       | Engine                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Mileage                   | km (Mile) |     |
| Operation conditions, etc. |       | <input type="checkbox"/> Irrelevant<br><input type="checkbox"/> When engine starts <input type="checkbox"/> During idling<br><input type="checkbox"/> During driving <input type="checkbox"/> During acceleration <input type="checkbox"/> At constant speed driving<br><input type="checkbox"/> During deceleration <input type="checkbox"/> During cornering (right curve or left curve)<br><input type="checkbox"/> During steering |  |                           |           | C   |
| Other conditions           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | D   |
| Memo                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | E   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | F   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | STC |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | H   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | I   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | J   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | K   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | L   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | M   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | N   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | O   |
|                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |           | P   |

# C1143 STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### C1143 STEERING ANGLE SENSOR

#### DTC Logic

INFOID:0000000011491687

#### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms<br>(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

—

#### 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-22. "Diagnosis Procedure"](#).  
NO >> Inspection End.

#### Diagnosis Procedure

INFOID:0000000011491688

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

Check steering angle sensor circuit. Refer to [STC-22. "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 [ST-38. "Removal and Installation"](#).  
NO >> Repair or replace malfunctioning component.

# C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

## C1601 BATTERY POWER SUPPLY

### DTC Logic

INFOID:0000000011491689

### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms<br>(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-23. "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:0000000011491690

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<br>(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<br>(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        | E7                                 | 3        | 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-16, "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<br>(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<br>(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 E119.
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        | E119      | 35       | 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-29, "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-38, "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning component.

# C1606 EPS MOTOR

< DTC/CIRCUIT DIAGNOSIS >

## C1606 EPS MOTOR

### DTC Logic

INFOID:0000000011491691

### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms<br>(Trouble diagnosis content) | DTC detection condition |                             |
|---------|-----------------------------------------------------|-------------------------|-----------------------------|
| C1606   | EPS MOTOR                                           | Diagnosis condition     | When ignition switch is ON. |
|         |                                                     | 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-26, "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:0000000011491692

#### 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-38, "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:0000000011491693

### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms<br>(Trouble diagnosis content) | DTC detection condition |                             |
|---------|-----------------------------------------------------|-------------------------|-----------------------------|
|         |                                                     | Diagnosis condition     | When ignition switch is ON. |
| C1607   | EEPROM                                              | 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

—

### 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-27, "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:0000000011491694

#### 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-38, "Removal and Installation"](#).  
NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

# C160A HEAT PROTECTION

< DTC/CIRCUIT DIAGNOSIS >

## C160A HEAT PROTECTION

### DTC Logic

INFOID:0000000011491695

### DTC DETECTION LOGIC

| DTC No. | CONSULT screen terms<br>(Trouble diagnosis content) | DTC detection condition |                                                                                                                                                                 |
|---------|-----------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C160A   | HEAT PROTECTION                                     | Diagnosis condition     | When ignition switch is ON.                                                                                                                                     |
|         |                                                     | Signal (terminal)       | —                                                                                                                                                               |
|         |                                                     | Threshold               | 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) |
|         |                                                     | Diagnosis delay time    | —                                                                                                                                                               |

#### 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 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-19, "Work Flow"](#).  
NO >> Inspection End.

# U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## U1000 CAN COMM CIRCUIT

### Description

INFOID:0000000011491696

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:0000000011491697

### DTC DETECTION LOGIC

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

STC

### POSSIBLE CAUSE

- CAN communication 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 “U1000” detected?

- YES >> Go to [STC-29, "Diagnosis Procedure"](#).  
NO >> Inspection End.

### Diagnosis Procedure

INFOID:0000000011491698

Proceed to [LAN-21, "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:0000000011491699

#### 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-30, "Diagnosis Procedure"](#).

### Diagnosis Procedure

INFOID:0000000011491700

#### 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-59, "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-38, "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning component.

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

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

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

#### Description

INFOID:0000000011491701

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

#### Diagnosis Procedure

INFOID:0000000011491702

#### 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-30. "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.

STC

# 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:0000000011491703

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

### Diagnosis Procedure

INFOID:0000000011491704

#### 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-30, "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-23, "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:0000000011491705

#### 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-23. "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*<br>(Inside of ±10%) |

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

Is the check 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 [STC-10. "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-22, "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-71, "CONSULT Function"](#).

### 8. CHECK THE STEERING FORCE

Check the steering force. Refer to [STC-35, "Diagnosis Procedure"](#).

Is the check result normal?

YES >> Inspection End.

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

# 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:0000000011491706

#### 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-32, "Diagnosis Procedure"](#).

#### 2.CHECK WHEEL ALIGNMENT

Check the wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen\\*1\)"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Adjustment of wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen\\*1\)"](#).

#### 3.CHECK STEERING WHEEL TURNING FORCE

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

Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [STC-33, "Diagnosis Procedure"](#).

# UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

## UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

### Diagnosis Procedure

INFOID:000000011491707

#### 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-23. "Diagnosis Procedure"](#).

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

##### CONSULT

Select in "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*<br>(Inside of ±10%) |

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

Is the check 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 [STC-10, "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 check result normal?

YES >> GO TO 7.

NO >> Check the steering angle sensor. Refer to [STC-22, "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-71, "CONSULT Function"](#).

## 8.CHECK STEERING COLUMN AND STEERING GEAR

Check the steering column assembly and steering gear assembly.

- Steering column assembly: Refer to [ST-18, "Inspection"](#).
- Steering gear assembly: Refer to [ST-20, "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-33, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [STC-33, "Diagnosis Procedure"](#).

## POWER STEERING CONTROL MODULE

< REMOVAL AND INSTALLATION >

---

### REMOVAL AND INSTALLATION

#### POWER STEERING CONTROL MODULE

##### Removal and Installation

INFOID:0000000011491708

**CAUTION:**

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

The power steering control module is an integral part of the power steering oil pump assembly. If replacement of the power steering control module is necessary, replace the complete power steering oil pump assembly. Refer to [ST-38, "Removal and Installation"](#).