

SECTION STC

STEERING CONTROL SYSTEM

A
B
C
D
E

F
STC

H
I
J
K
L
M
N
O
P

CONTENTS

HOW TO USE THIS MANUAL	3	Reference Value	18
HOW TO USE THIS SECTION	3	Fail-Safe	20
Information	3	Protection Function	20
PRECAUTION	4	DTC Inspection Priority Chart	20
PRECAUTIONS	4	DTC Index	21
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	4	WIRING DIAGRAM	22
Precaution Necessary for Steering Wheel Rotation After Battery Disconnect	4	EPS SYSTEM	22
Precautions for Removing Battery Terminal	5	Wiring Diagram	22
Precaution for Stop/Start System Service	6	BASIC INSPECTION	24
Service Notice and Precautions for EPS System.....	6	DIAGNOSIS AND REPAIR WORKFLOW	24
SYSTEM DESCRIPTION	7	Work Flow	24
COMPONENT PARTS	7	Diagnostic Work Sheet	25
Component Parts Location	7	DTC/CIRCUIT DIAGNOSIS	27
EPS Control Unit	10	C1601 BATTERY POWER SUPPLY	27
EPS Motor, Torque Sensor, Reduction Gear	10	DTC Description	27
SYSTEM	12	Diagnosis Procedure	27
EPS SYSTEM	12	C1604 TORQUE SENSOR	30
EPS SYSTEM : System Description	12	DTC Description	30
EPS SYSTEM : Circuit Diagram	14	Diagnosis Procedure	30
EPS SYSTEM : Fail-Safe	14	C1606 EPS MOTOR	31
EPS SYSTEM : Protection Function	15	DTC Description	31
WARNING/INDICATOR/CHIME LIST	15	Diagnosis Procedure	31
WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp	15	C1607, C1608 EPS CONTROL UNIT	32
DIAGNOSIS SYSTEM (EPS CONTROL UNIT)	16	DTC Description	32
CONSULT Function	16	Diagnosis Procedure	32
ECU DIAGNOSIS INFORMATION	18	C1609 VEHICLE SPEED SIGNAL	33
EPS CONTROL UNIT	18	DTC Description	33
		Diagnosis Procedure	33
		U1000 CAN COMM CIRCUIT	34
		DTC Description	34
		Diagnosis Procedure	34

U1010 CONTROL UNIT (CAN)	35	ELECTRIC POWER STEERING WARNING	
DTC Description	35	LAMP DOES NOT TURN OFF	44
Diagnosis Procedure	35	Description	44
U1970 AROUND VIEW MONITOR SYSTEM ...	36	Diagnosis Procedure	44
DTC Description	36	STEERING WHEEL TURNING FORCE IS	
Diagnosis Procedure	36	HEAVY OR LIGHT	45
U1971 SONAR SYSTEM	38	Description	45
DTC Description	38	Diagnosis Procedure	45
Diagnosis Procedure	38	UNBALANCE STEERING WHEEL TURNING	
POWER SUPPLY AND GROUND CIRCUIT	40	FORCE AND RETURN BETWEEN RIGHT	
Diagnosis Procedure	40	AND LEFT	47
ELECTRIC POWER STEERING WARNING		Description	47
LAMP	42	Diagnosis Procedure	47
Component Function Check	42	UNBALANCE STEERING WHEEL TURNING	
Diagnosis Procedure	42	FORCE (TORQUE VARIATION)	48
SYMPTOM DIAGNOSIS	43	Description	48
ELECTRIC POWER STEERING WARNING		Diagnosis Procedure	48
LAMP DOES NOT TURN ON	43	REMOVAL AND INSTALLATION	50
Description	43	EPS CONTROL UNIT	50
Diagnosis Procedure	43	Removal and Installation	50

HOW TO USE THIS SECTION

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HOW TO USE THIS MANUAL

HOW TO USE THIS SECTION

Information

INFOID:0000000010988223

- Both “VDC” and “ESP” are used in this manual. These indicate the same system.
- In this manual, “Idling Stop System” is referred to as “Stop / Start System”.

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F

STC

H

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J

K

L

M

N

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:0000000010688395

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 "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

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

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

WARNING:

Always observe the following items for preventing accidental activation.

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

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000010700569

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Before removing and installing any control units, first turn the ignition power source and accessory power source to the OFF, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.

NOTE:

Supply power using jumper cables if battery is discharged.

2. Open driver door.

3. Turn the ignition switch to the ON position.
(At this time, the steering lock will be released.)

4. Turn the ignition switch to OFF position with driver door open.

5. Wait for 3 minutes or longer with driver door open.

NOTE:

- Do not close driver door because the steering wheel locks when driver door is closed.

PRECAUTIONS

< PRECAUTION >

- The auto acc function is adapted to this vehicle. For this reason, even when the ignition switch is turned to OFF position, the accessory power source does not turn OFF and continues to be supplied for a certain amount of time.
- 6. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
- 7. Perform the necessary repair operation.
- 8. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the ignition switch from OFF position to ON position, then to LOCK position. (The steering wheel will lock when the ignition switch is turned to LOCK position.)
- 9. Perform self-diagnosis check of all control units using CONSULT.

Precautions for Removing Battery Terminal

INFOID:0000000010700568

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the intelligent key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.
- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing "How to disconnect 12V battery terminal" described below.

NOTE:

Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.

HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to Instruction 1 or Instruction 2 described below.

For vehicles parked by ignition switch OFF, refer to Instruction 2.

INSTRUCTION 1

1. Open the hood.
2. Turn key switch to the OFF position with the driver side door opened.
3. Get out of the vehicle and close the driver side door.
4. Wait at least 3 minutes. For vehicle with the engine listed below, remove the battery terminal after a lapse of the specified time.

D4D engine	: 20 minutes
HRA2DDT	: 12 minutes
K9K engine	: 4 minutes
M9R engine	: 4 minutes
R9M engine	: 4 minutes
V9X engine	: 4 minutes

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

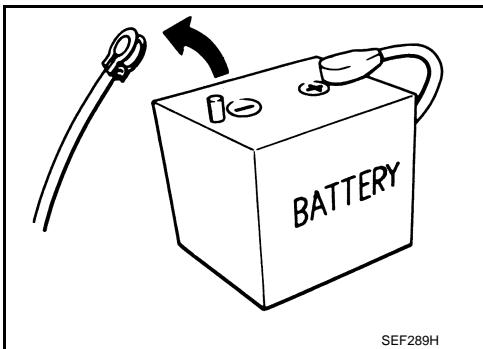
5. Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

INSTRUCTION 2 (FOR VEHICLES PARKED BY IGNITION SWITCH OFF)

1. Unlock the door with intelligent key or remote keyless entry.



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PRECAUTIONS

< PRECAUTION >

NOTE:

At this moment, ACC power is supplied.

2. Open the driver side door.
3. Open the hood.
4. Close the driver side door.
5. Wait at least 3 minutes.

CAUTION:

While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

6. Remove 12V battery terminal.

CAUTION:

After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

Precaution for Stop/Start System Service

INFOID:000000011043870

CAUTION:

When performing an inspection and its related work with the engine at idle, always turn the stop/start OFF switch ON or open the hood to release the stop/start system.

Service Notice and Precautions for EPS System

INFOID:000000010688398

- Check the following item when performing the trouble diagnosis.
 - Check any possible causes by interviewing the symptom and its condition from the customer if any malfunction, such as Electric power steering warning lamp is turned ON, occurs.
 - Check if air pressure and size of tires are proper, the specified part is used for the steering wheel, and control unit is genuine part.
 - Check if the connection of steering column assembly and steering gear assembly is proper (there is not looseness of mounting bolts, damage of rods, boots or sealants, and leakage of grease, etc.).
 - Check if the wheel alignment is adjusted properly.
 - Check if there is any damage or modification to suspension or body resulting in increased weight or altered ground clearance.
 - Check if installation conditions of each link and suspension are proper.
 - Check if the battery voltage is proper.
 - Check connection conditions of each connector are proper.
 - Before connecting or disconnecting the EPS control unit harness connector, turn ignition switch "OFF" and disconnect battery ground cable. Because battery voltage is applied to EPS control unit even if ignition switch is turned "OFF".
- During quick steering, rasping noise may be heard from around the steering wheel. This is not a malfunction. The noise is an operating noise of the EPS system under normal conditions. If the rasping noise occurs during slow steering, this may not be an operating noise of the system. In this case, it is necessary to find out the location of the noise and repair, if necessary.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

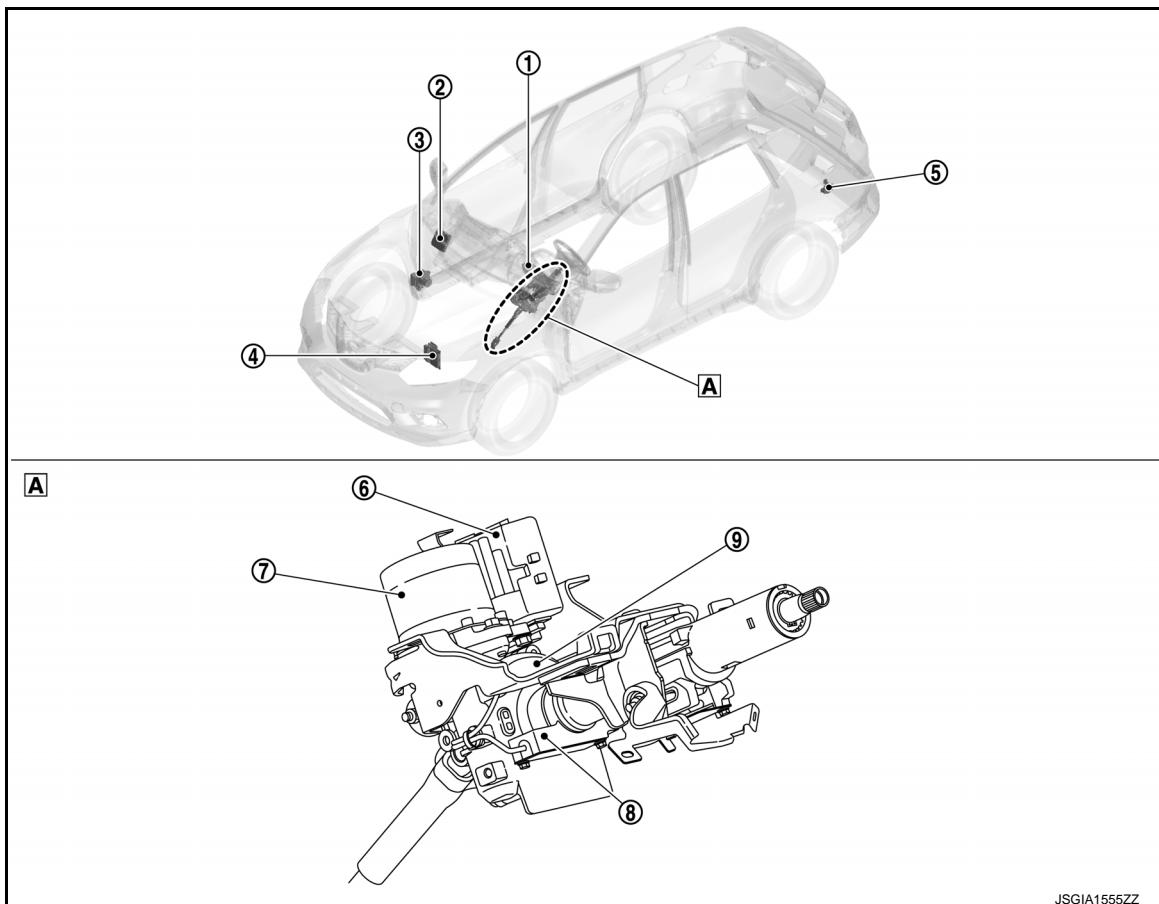
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000010688399

LHD models



JSGIA1555ZZ

A Steering column assembly

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

No.	Component	Function
①	Combination meter (Electric power steering warning lamp)	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> Vehicle speed signal (Meter) For detailed installation location, refer to MWI-7, "METER SYSTEM : Component Parts Location". Turns ON the electric power steering warning lamp according to the signal from EPS control unit via CAN communication. For electric power steering warning lamp, refer to STC-15, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp".
②	Around view monitor control unit ^{*1}	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> Park Assist status signal Park Assist malfunction signal Steering angle command signal Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> EPS torque signal Park Assist permit signal For detailed installation location, refer to AV-76, "Around View Monitor Control Unit".
③	ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> Vehicle speed signal (ABS) For detailed installation location, refer to BRC-25, "ABS Actuator and Electric Unit (Control Unit)".
④	ECM	<ul style="list-style-type: none"> Transmits mainly the following signals to EPS control unit via CAN communication. <ul style="list-style-type: none"> Engine status signal EPS assist request signal ^{*2} Stop/start status signal ^{*2} Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> EPS operation signal Stop/start inhibit signal^{*2} For detailed installation location, <ul style="list-style-type: none"> MR20DD: Refer to EC-28, "ENGINE CONTROL SYSTEM : Component Parts Location". QR25DE: Refer to EC-440, "Component Parts Location". R9M: Refer to EC-812, "Component Parts Location".
⑤	Sonar control unit ^{*1}	<ul style="list-style-type: none"> Transmits mainly the following signals to EPS control unit via CAN communication. <ul style="list-style-type: none"> Steering angle command signal For detailed installation location, <ul style="list-style-type: none"> Refer to SN-119, "Component Parts Location".
⑥	EPS control unit	STC-10, "EPS Control Unit"
⑦	EPS motor	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"
⑧	Torque sensor	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"
⑨	Reduction gear	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"

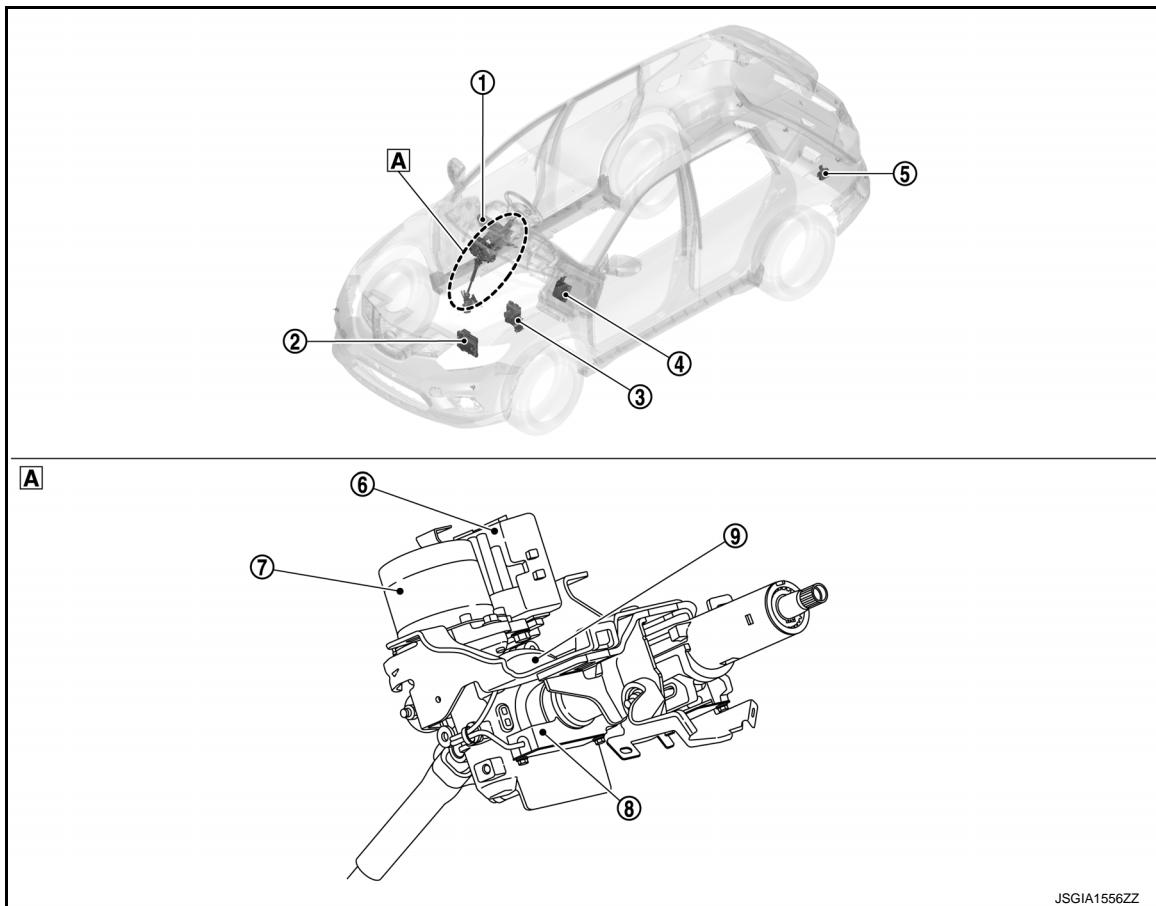
*1: Models around view monitor with park assist

*2: With stop/start system

RHD models

COMPONENT PARTS

< SYSTEM DESCRIPTION >



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A Steering column assembly

No.	Component	Function
①	Combination meter (Electric power steering warning lamp)	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> Vehicle speed signal (Meter) For detailed installation location, refer to MWI-7, "METER SYSTEM : Component Parts Location". Turns ON the electric power steering warning lamp according to the signal from EPS control unit via CAN communication. For electric power steering warning lamp, refer to STC-15, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp".
②	ECM	<ul style="list-style-type: none"> Transmits mainly the following signals to EPS control unit via CAN communication. <ul style="list-style-type: none"> Engine status signal EPS assist request signal *1 Stop/start status signal *1 Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> EPS operation signal Stop/start inhibit signal *1 For detailed installation location, R9M: Refer to EC-812, "Component Parts Location".
③	ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> Vehicle speed signal (ABS) For detailed installation location, Refer to BRC-25, "ABS Actuator and Electric Unit (Control Unit)".

COMPONENT PARTS

< SYSTEM DESCRIPTION >

No.	Component	Function
④	Around view monitor control unit ^{*2}	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Park Assist status signal - Park Assist malfunction signal - Steering angle command signal Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - EPS torque signal - Park Assist permit signal For detailed installation location, refer to AV-76, "Around View Monitor Control Unit".
⑤	Sonar control unit ^{*2}	<ul style="list-style-type: none"> Transmits mainly the following signals to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Steering angle command signal For detailed installation location, : Refer to SN-119, "Component Parts Location".
⑥	EPS control unit	STC-10, "EPS Control Unit"
⑦	EPS motor	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"
⑧	Torque sensor	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"
⑨	Reduction gear	STC-10, "EPS Motor, Torque Sensor, Reduction Gear"

*1: With stop/start system

*2: Models around view monitor with park assist

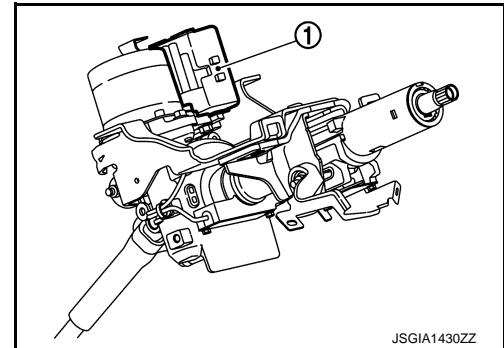
EPS Control Unit

INFOID:0000000010688400

NOTE:

The EPS control unit, EPS motor, torque sensor, and reduction gear are integrated with the steering column assy.

- EPS control unit ① is installed to steering column assembly.
- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according to the driving condition.
- EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control).
- When the stop/start system operation starts, the EPS control unit receives a stop/start status signal from ECM via CAN communication and disables the assist control. (Models with stop/start system)
- When the driver turns the steering wheel (torque application exceeding the specified torque) during stop/start system operation, the EPS control unit transmits an EPS torque signal to ECM via CAN communication and restarts the engine (disables stop/start system). (Models with stop/start system)
- EPS control unit receives a Park Assist status signal from the around view monitor control unit and performs around view monitor with park assist control.
- EPS control unit receives a Park Assist status signal to the around view monitor control unit to examine whether the EPS control unit can perform around view monitor with park assist control or not.
- Around view monitor with park assist control is cancelled when the driver operates the steering wheel during around view monitor with park assist control.
- Diagnoses can be performed with CONSULT.



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EPS Motor, Torque Sensor, Reduction Gear

INFOID:0000000010688401

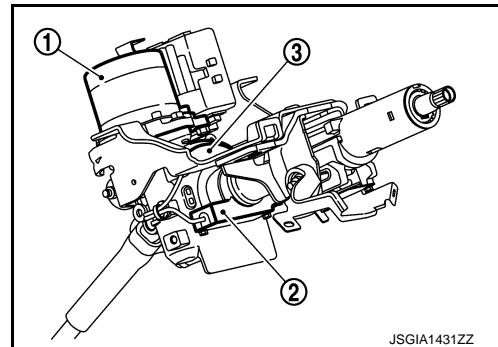
NOTE:

The EPS control unit, EPS motor, torque sensor, and reduction gear are integrated with the steering column assy.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

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



EPS MOTOR

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

A

TORQUE SENSOR

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

B

REDUCTION GEAR

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

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< SYSTEM DESCRIPTION >

SYSTEM

EPS SYSTEM

EPS SYSTEM : System Description

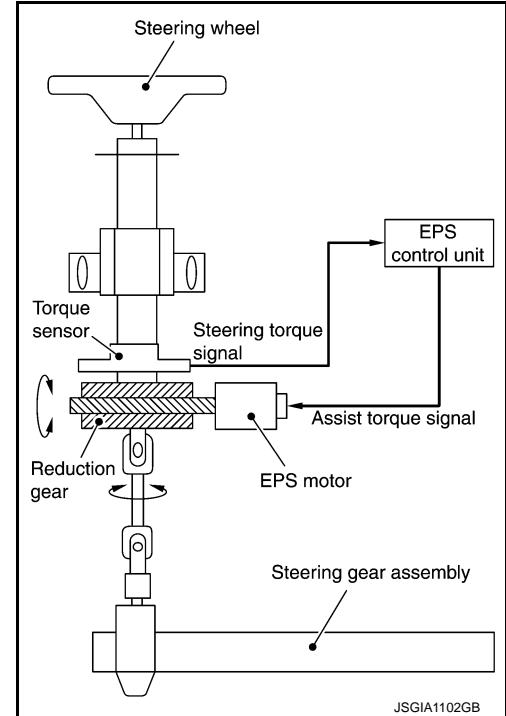
INFOID:000000010688402

DESCRIPTION

- EPS system consists mainly of EPS system, EPS motor, torque sensor, and reduction gear.
- EPS system calculates a control signal to transmit to the EPS motor based on information received from ECM, ABS actuator and electric unit (control unit), around view monitor control unit, and combination meter via CAN communication and information received from torque sensor.
- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according to the driving condition.
- When the driver turns the steering wheel (torque application exceeding the specified torque) during stop/start, the EPS control unit restarts the engine (disables stop/start system) and immediately brings the assist control in its ready-to-start state.
- If EPS becomes out of order, the power steering warning lamp blinks and the Stop/Start System brings about such conditions as follows (Models with stop/start system):
 - Stop/start mode is not enabled under non stop/start state.
 - The engine is restarted during stop/start, regardless of steering wheel operation. (Models with stop/start system)
- The around view monitor with park assist function assists garaging and parallel parking and allows automatic operation of the steering wheel when the system starts.
- When an error in the electrical system, the fail-safe function stops output signals to the EPS motor. Refer to [STC-14, "EPS SYSTEM : Fail-Safe"](#).
- EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control). Refer to [STC-20, "Protection Function"](#).

SYSTEM DIAGRAM

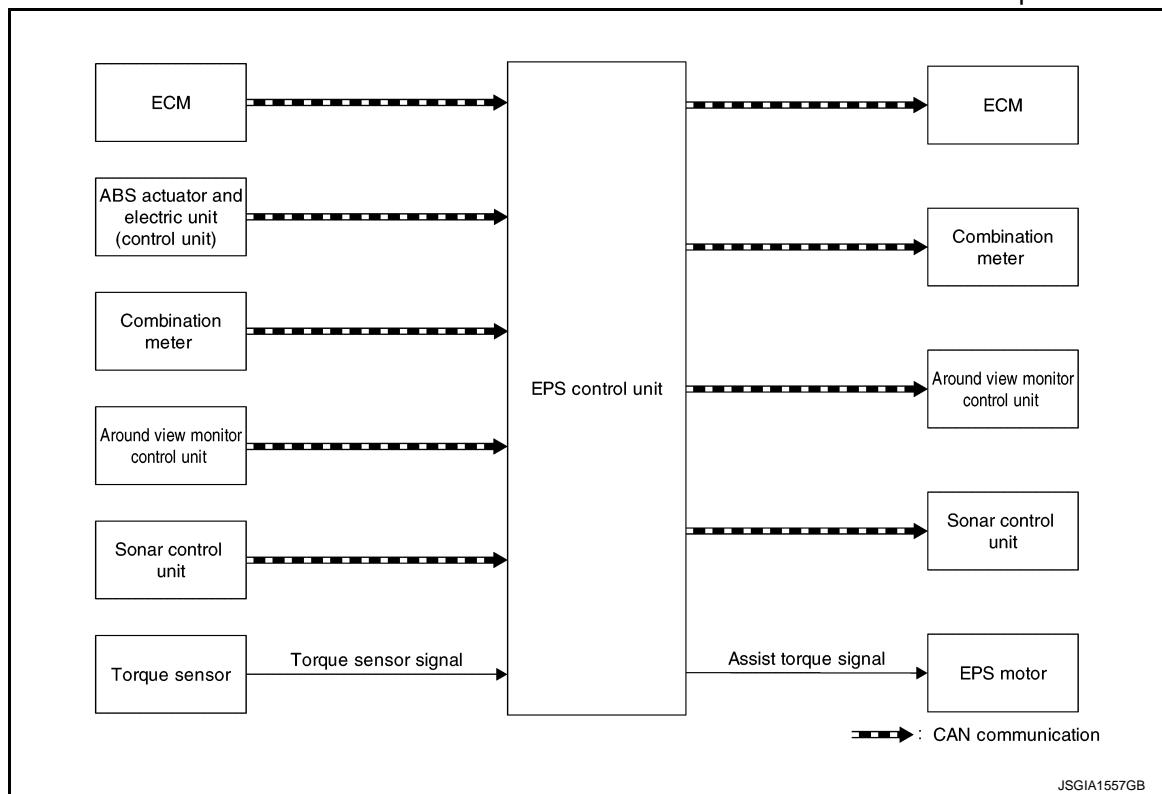
NOTE:



SYSTEM

< SYSTEM DESCRIPTION >

Around view monitor control unit and sonar control unit: Models around view monitor with park assist



INPUT/OUTPUT SIGNAL

Communicates the signal from each control unit via CAN communication.

Control unit	Signal status
ECM	<ul style="list-style-type: none"> Transmits mainly the following signals to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Engine status signal - EPS assist request signal ^{*1} - Stop/start status signal ^{*1} Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - EPS operation signal - Stop/start inhibit signal ^{*1}
ABS actuator and electric unit (control unit)	<ul style="list-style-type: none"> Transmits the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Vehicle speed signal (ABS)
Combination meter	<ul style="list-style-type: none"> Transmits the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Vehicle speed signal (Meter) Receives the following signal from EPS control unit via CAN communication. <ul style="list-style-type: none"> - Electric power steering warning lamp
Around view monitor control unit ^{*2}	<ul style="list-style-type: none"> Transmits mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Park Assist status signal - Park Assist malfunction signal - Steering angle command signal Receives mainly the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - EPS torque signal - Park Assist permit signal
Sonar control unit ^{*2}	<ul style="list-style-type: none"> Transmits the following signal to EPS control unit via CAN communication. <ul style="list-style-type: none"> - Steering angle command signal

*1: With stop/start system

*2: Models around view monitor with park assist

ELECTRIC POWER STEERING WARNING LAMP INDICATION

- Turn ON when there is a malfunction in EPS system. It indicates that fail-safe mode is engaged and enters a manual steering state (Control turning force steering wheel becomes heavy).

SYSTEM

< SYSTEM DESCRIPTION >

- Also turns ON when ignition switch is turned ON, for purpose of lamp check. Turns OFF after the engine starts, if system is normal.

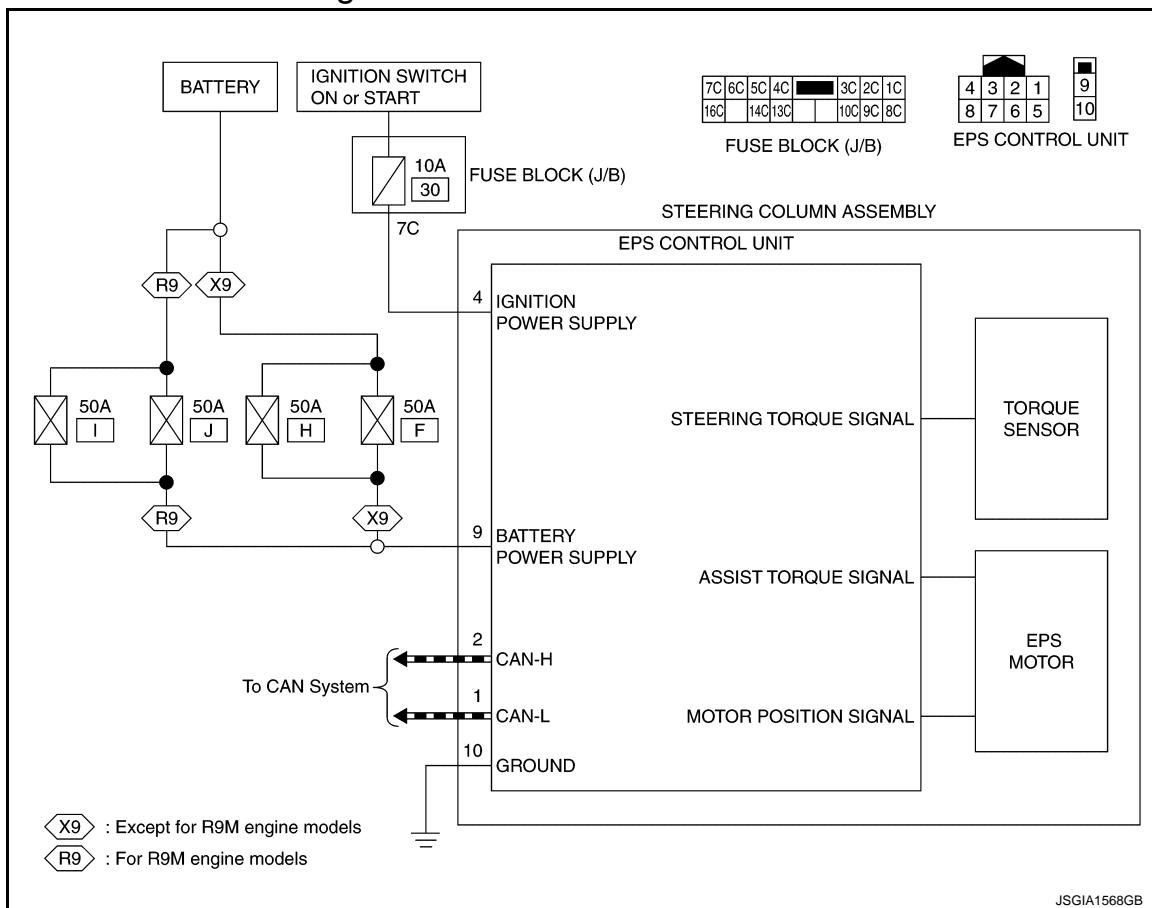
Condition	Electric power steering warning lamp
Ignition switch ON. (Lamp check)	ON
Engine running.	OFF
EPS system malfunction [Other diagnostic item]	ON

CAUTION:

Electric power steering warning lamp also turns ON due to data reception error, CAN communication error etc.

EPS SYSTEM : Circuit Diagram

INFOID:0000000010688403



EPS SYSTEM : Fail-Safe

INFOID:0000000010699143

- If any malfunction occurs in the system and control unit detects the malfunction, Electric power steering warning lamp on combination meter turns ON to indicate system malfunction.
- When Electric power steering warning lamp is ON, the system enters into a manual steering state. (Control turning force steering wheel becomes heavy.)

DTC	Fail-safe condition
C1601	Assist is reduced according to voltage, resulting in manual steering state.
C1604	
C1606	Manual steering state.
C1607	
C1608	
C1609	Constant steering assist level state

SYSTEM

< SYSTEM DESCRIPTION >

DTC	Fail-safe condition
U1000	Normal control NOTE: If the cause is in a different ECU, the state changes to fixed steering assist force.
U1010	Normal control
U1970	Around view monitor with park assist function stops (controlled by around view monitor).
U1971	Around view monitor with park assist function stops (controlled by sonar).

EPS SYSTEM : Protection Function

INFOID:0000000010699144

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

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp

INFOID:0000000010688406

Name	Design	Layout/Function
Electric power steering warning lamp		For layout, refer to MWI-10, "METER SYSTEM : Design" . For function, refer to MWI-35, "WARNING LAMPS/INDICATOR LAMPS : Electric Power Steering Warning Lamp" .

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STC

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DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

CONSULT Function

INFOID:000000010688407

FUNCTION

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

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

*: The following diagnosis information is erased by erasing.

- DTC
- Freeze frame data (FFD)

ECU IDENTIFICATION

Displays the part number stored in the control unit.

SELF-DIAG RESULTS MODE

Refer to [STC-21, "DTC Index"](#).

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

- The system is presently malfunctioning.

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

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

FREEZE FRAME DATA (FFD)

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

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

DATA MONITOR MODE

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

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

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

< SYSTEM DESCRIPTION >

Monitor item (Unit)	Remarks
ST TORQUE STATUS (On/Off)	Displays the operating state of steering wheel.
EPS ASSIST PERMIS (On/Off)	Displays assist permission status of EPS system.
STOP/START STATUS (INACT/AUTO ST/ACT/CANCEL)	Displays stop/start status.
IPA ON (Off1/Off2/Off3/On)	Displays the status of around view monitor with park assist.
IPA STATUS 1 (On/Off)	Displays the operating state of around view monitor with park assist.
STOP/START SYSTEM (On/Off)	Displays permission status of stop/start system.
IPA STATUS 2 (Off/On1/On2/On3)	Displays the operating state of around view monitor with park assist.
IPA STATUS 3 (NORMAL/MALF)	Displays the status of around view monitor with park assist.
IPA TARGET CURRENT (A)	Displays a command current value from around view monitor with park assist.
EPS CONTROL CURRENT (A)	Displays a current value of motor.

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

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

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

A

B

C

D

E

F

STC

H

I

J

K

L

M

N

O

P

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

ECU DIAGNOSIS INFORMATION

EPS CONTROL UNIT

Reference Value

INFOID:0000000010688408

VALUES ON THE DIAGNOSIS TOOL

CAUTION:

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

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Data monitor		
	Condition		Value/Status
BATTERY VOLT	Ignition switch: ON		10.5 V – 16 V
TORQUE SENSOR	Engine running	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
		Steering wheel: Right turn	Positive value (Nm)
		Steering wheel: Left turn	Negative value (Nm)
MOTOR CURRENT	Engine running	Steering wheel: Not steering (There is no steering force)	Approx. 0 A
		Steering wheel: Right or left turn	Displays consumption current of EPS motor (A) ^{*1}
MOTOR SIG	Engine running	Steering wheel: Not steering (There is no steering force)	Approx. 0 A
		Steering wheel: Right turn	Positive value (A)
		Steering wheel: Left turn	Negative value (A)
ASSIST TORQUE	Engine running	Steering wheel: Not steering (There is no steering force)	Approx. 0 Nm
		Steering wheel: Right turn	Positive value (Nm)
		Steering wheel: Left turn	Negative value (Nm)
C/U TEMP	Ignition switch ON or engine running		Displays temperature of inside of EPS control unit [°C (°F)]
ASSIST LEVEL	Engine running		100 % ^{*2}
VEHICLE SPEED	Vehicle stopped		0 km/h (0 mph)
	While driving		Approximately equal to the indication on speedometer ^{*3} (inside of ±10%)
WARNING LAMP	EPS warning lamp: ON		On
	EPS warning lamp: OFF		Off
ENGINE STATUS	Engine not running		Stop
	Engine running		Run
ST TORQUE STATUS	Engine running	Steering wheel: Not steering (There is no steering force)	Off
		Steering wheel: Right or left turn	On
EPS ASSIST PERMIS	Engine running	Status other than stop/start system	On
		In stop/start system operation	Off

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

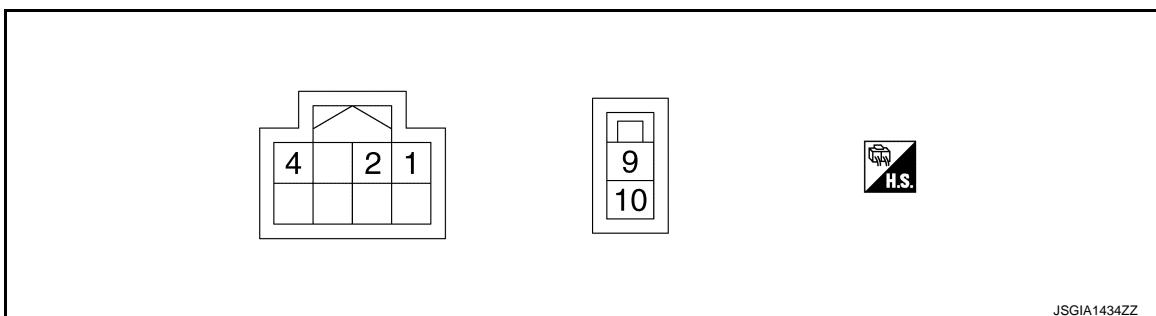
Monitor item	Data monitor		A B C D E F G H I J K L M N O P
	Condition	Value/Status	
STOP/START STATUS	When stop/start system is inactive	INACT	A
	When stop/start system is restarting	AUTO ST	B
	When stop/start system is active	ACT	C
	When stop/start system is interrupted	CANCEL	D
IPA ON	EPS system operating conditions are not satisfied	Off1	E
	EPS system or around view monitor with park assist is abnormal	Off2	F
	Assist torque is larger than a command value from around view monitor with park assist	Off3	G
	Normal condition	On	H
IPA STATUS 1	Around view monitor with park assist is in operation	On	I
	Around view monitor with park assist is not in operation	Off	J
STOP/START SYSTEM	When stop/start system is active	On	K
	When stop/start system is prohibited	Off	L
IPA STATUS 2	Around view monitor with park assist is not in operation	Off	M
	Around view monitor with park assist is in operation (steering wheel is not turned)	On1	N
	The following cases • Around view monitor with park assist in operation • Steering wheel is turned • Sonar is not operation	On2	O
	The following cases • Around view monitor with park assist in operation • Steering wheel is turned • Sonar is operation	On3	P
	Around view monitor with park assist is normal	NORMAL	
IPA STATUS 3	Around view monitor with park assist is abnormal	MALF	
IPA TARGET CURRENT	Around view monitor with park assist is in operation	0 – 70(A)	
EPS CONTROL CURRENT	EPS system is in operation	0 – 90 (A)	

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

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

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

TERMINAL LAYOUT



JSGIA1434ZZ

PHYSICAL VALUES

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

Terminal No. (Wire Color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
1 (P)	—	CAN-L	Input/Output	—	—
2 (L)	—	CAN-H	Input/Output	—	—
4 (SB)	Ground	Ignition power supply	Input	Ignition switch: ON	10.5 V – 16 V
				Ignition switch: OFF	Approx. 0 V
9 (R)	Ground	Battery power supply	Input	Always	10.5 V – 16 V
10 (B)	Ground	Ground	—	Always	Approx. 0 V

Fail-Safe

INFOID:0000000010688409

- If any malfunction occurs in the system and control unit detects the malfunction, Electric power steering warning lamp on combination meter turns ON to indicate system malfunction.
- When Electric power steering warning lamp is ON, the system enters into a manual steering state. (Control turning force steering wheel becomes heavy.)

DTC	Fail-safe condition
C1601	Assist is reduced according to voltage, resulting in manual steering state.
C1604	
C1606	
C1607	Manual steering state.
C1608	
C1609	Constant steering assist level state
U1000	Normal control
	NOTE: If the cause is in a different ECU, the state changes to fixed steering assist force.
U1010	Normal control
U1970	Around view monitor with park assist function stops (controlled by around view monitor).
U1971	Around view monitor with park assist function stops (controlled by sonar).

Protection Function

INFOID:0000000010688410

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

DTC Inspection Priority Chart

INFOID:0000000010688411

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"> • U1000 CAN COMM CIRCUIT • U1010 CONTROL UNIT (CAN)
2	<ul style="list-style-type: none"> • U1970 AROUND VIEW MONITOR SYSTEM • U1971 SONAR SYSTEM • C1609 CAN VHCL SPEED

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

Priority	Priority order item (DTC)
3	C1601 BATTERY VOLT
4	<ul style="list-style-type: none">• C1604 TORQUE SENSOR• C1606 EPS MOTOR• C1607 EEPROM• C1608 CONTROL UNIT

DTC Index

INFOID:000000010688412

DTC	Items	Electric power steering warning lamp	Reference
C1601	BATTERY VOLT	ON	STC-27, "DTC Description"
C1604	TORQUE SENSOR	ON	STC-30, "DTC Description"
C1606	EPS MOTOR	ON	STC-31, "DTC Description"
C1607	EEPROM	OFF	STC-32, "DTC Description"
C1608	CONTROL UNIT	ON / OFF*	STC-32, "DTC Description"
C1609	CAN VHCL SPEED	OFF	STC-33, "DTC Description"
U1000	CAN COMM CIRCUIT	OFF	STC-34, "DTC Description"
U1010	CONTROL UNIT (CAN)	OFF	STC-35, "DTC Description"
U1970	AROUND VIEW MONITOR	OFF	STC-36, "DTC Description"
U1971	SONAR	OFF	STC-38, "DTC Description"

*: Even if DTC is detected, electric power steering warning lamp does not turns ON when assist torque is generated.

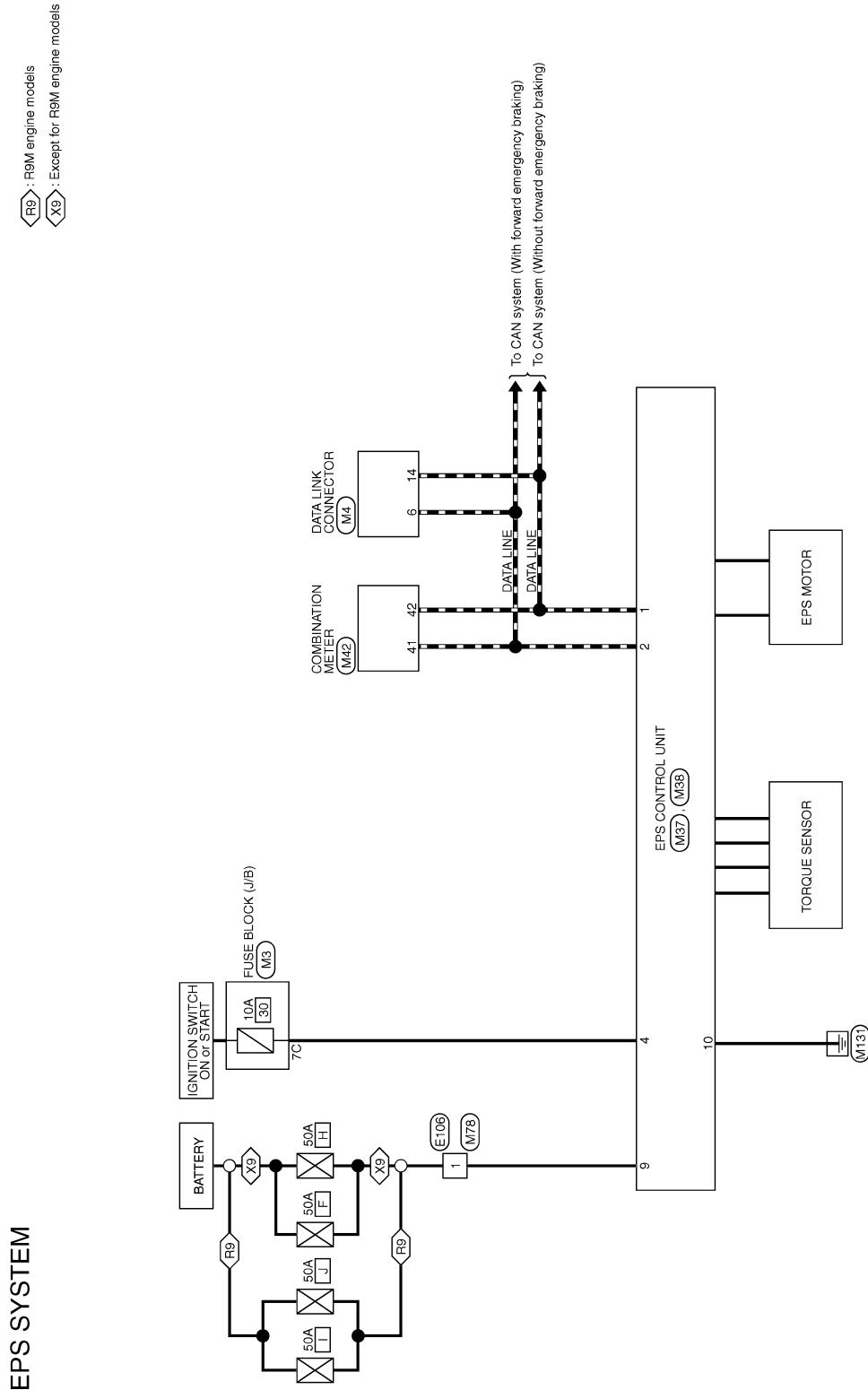
EPS SYSTEM

< WIRING DIAGRAM >

WIRING DIAGRAM EPS SYSTEM

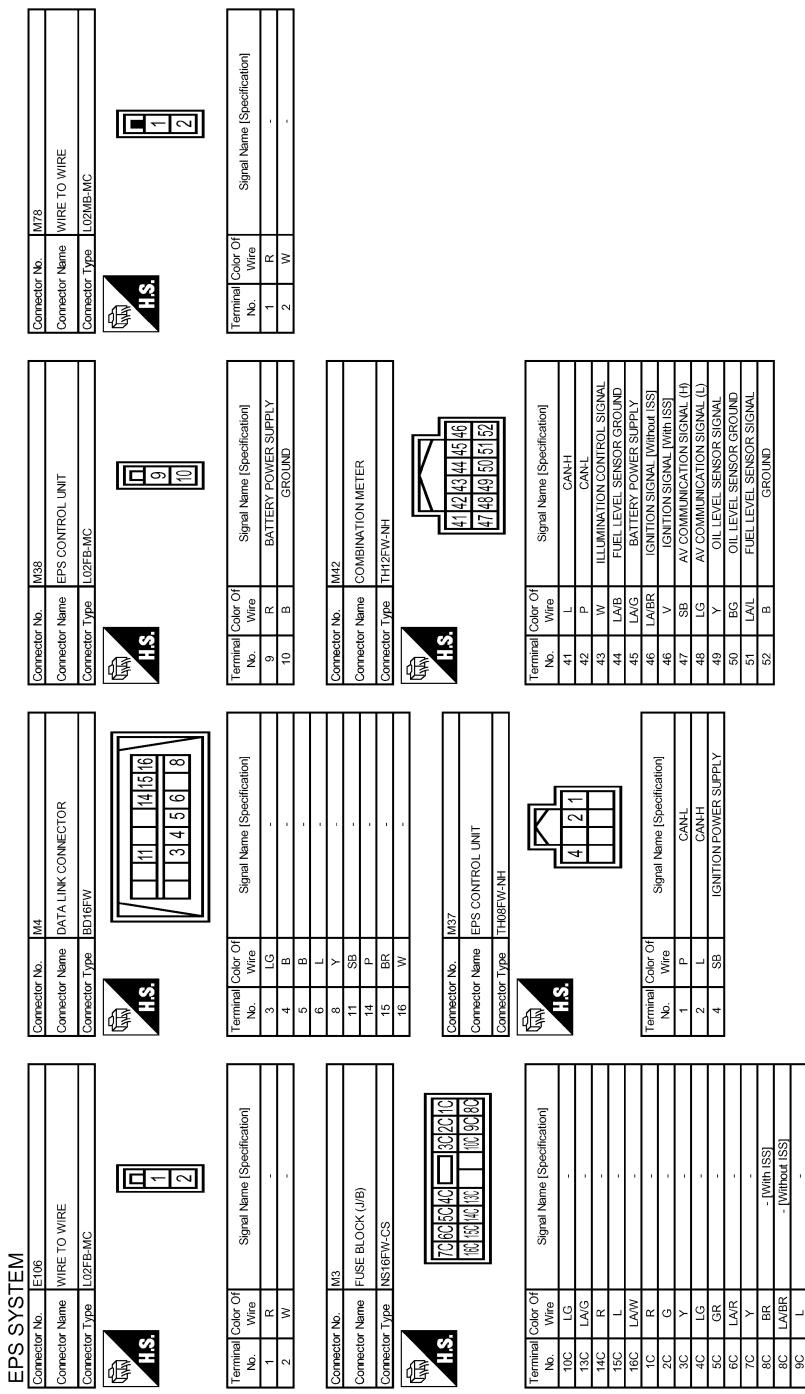
Wiring Diagram

INFOID:0000000010688413



EPS SYSTEM

< WIRING DIAGRAM >



JRGWC1219GB

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000010688414

DETAILED FLOW

1. INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-25, "Diagnostic Work Sheet"](#) and reproduce symptoms as well as fully understand it. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if necessary.

CAUTION:

Customers are not professional. Never guess easily like "maybe the customer means that..." or "maybe the customer mentions this symptom".

>> GO TO 2.

2. CHECK SYMPTOM

Reproduce the symptom that is indicated by the customer, based on the information from the customer obtained by interview. Also check that the symptom is not caused by protection function. Refer to [STC-20, "Protection Function"](#).

CAUTION:

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

>> GO TO 3.

3. PERFORM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis.

Is any DTC detected?

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

NO >> GO TO 6.

4. RECHECK SYMPTOM

With CONSULT

1. Erase self-diagnostic results.

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

NOTE:

If some DTCs are detected at the same time, determine the order for performing the diagnosis based on [STC-20, "DTC Inspection Priority Chart"](#).

Is any DTC detected?

YES >> GO TO 5.

NO >> Check harness and connectors based on the information obtained by interview. Refer to [GI-44, "Intermittent Incident"](#).

5. REPAIR OR REPLACE ERROR-DETECTED PARTS

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

>> GO TO 7.

6. IDENTIFY ERROR-DETECTED SYSTEM BY SYMPTOM DIAGNOSIS

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

Can the error-detected system be identified?

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

YES >> GO TO 7.

NO >> Check harness and connectors based on the information obtained by interview. Refer to [GI-44, "Intermittent Incident"](#).

7.FINAL CHECK

With CONSULT

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

Is the symptom reproduced?

YES >> GO TO 3.

NO >> INSPECTION END

Diagnostic Work Sheet

INFOID:000000010688415

Description

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

Interview sheet sample

Interview sheet						STC		
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"/> EPS warning lamp turns on.						
		<input type="checkbox"/> Noise <input type="checkbox"/> Vibration						
		<input type="checkbox"/> Others ()						
First occurrence		<input type="checkbox"/> Recently	<input type="checkbox"/> Others ()					
Frequency of occurrence		<input type="checkbox"/> Always	<input type="checkbox"/> Under a certain conditions of	<input type="checkbox"/> Sometimes (time(s)/day)				
Climate conditions		<input type="checkbox"/> Irrelevant						
	Weather	<input type="checkbox"/> Fine	<input type="checkbox"/> Cloud	<input type="checkbox"/> Rain	<input type="checkbox"/> Snow	<input type="checkbox"/> Others ()		
	Temperature	<input type="checkbox"/> Hot	<input type="checkbox"/> Warm	<input type="checkbox"/> Cool	<input type="checkbox"/> Cold	<input type="checkbox"/> Temperature Approx.	°C (°F)	
Relative humidity		<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low				
Road conditions		<input type="checkbox"/> Urban area	<input type="checkbox"/> Suburb area	<input type="checkbox"/> High way				
		<input type="checkbox"/> Mounting road (uphill or down hill) <input type="checkbox"/> Rough road						
Operation conditions, etc.		<input type="checkbox"/> Irrelevant <input type="checkbox"/> When engine starts <input type="checkbox"/> During idling <input type="checkbox"/> During driving <input type="checkbox"/> During acceleration <input type="checkbox"/> At constant speed driving <input type="checkbox"/> During deceleration <input type="checkbox"/> During cornering (right curve or left curve) <input type="checkbox"/> During steering						

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

Interview sheet

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

Memo

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

C1601 BATTERY POWER SUPPLY

DTC Description

INFOID:0000000010688416

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
C1601	BATTERY VOLT (Battery voltage)	When a power supply voltage to the EPS control unit is maintained at 16 V or more or at less than 9 V continuously for 0.5 second or more.

POSSIBLE CAUSE

- Harness or connector
- EPS control unit (steering column assembly)
- Fuse
- Power supply system
- Battery

FAIL-SAFE

EPS system enters into a manual steering state.

STC

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "C1601" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-27, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688417

1. CHECK EPS CONTROL UNIT GROUND CIRCUIT

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

EPS control unit	—	Continuity
Connector	Terminal	
M38	10	Ground Existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

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

2. Turn ignition switch ON.

CAUTION:

Never start the engine.

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

EPS control unit		—	Voltage
Connector	Terminal		
M37	4	Ground	10.5 – 16 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

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

1. Turn ignition switch OFF.
2. Check the 10A fuse (#30).
3. Check the harness for open or short between EPS control unit harness connector and the fuse block (J/B).

EPS control unit		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M37	4	M3	7C	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to [STC-22, "Wiring Diagram"](#).

NO >> Repair or replace error-detected parts.

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

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	10.5 – 16 V

2. Turn ignition switch ON.

CAUTION:

Never start the engine.

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	10.5 – 16 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

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

1. Turn ignition switch OFF.
2. Check the 50A fusible link (F). (Except for R9M engine models)
3. Check the 50A fusible link (H). (Except for R9M engine models)
4. Check the 50A fusible link (J). (For R9M engine models)
5. Check the 50A fusible link (I). (For R9M engine models)

C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

6. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (F). (Except for R9M engine models.)
7. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (H). (Except for R9M engine models.)
8. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (J). (For R9M engine models)
9. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (I). (For R9M engine models)

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to [PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).

NO >> Repair or replace error-detected parts.

6. CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

YES >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

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C1604 TORQUE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1604 TORQUE SENSOR

DTC Description

INFOID:0000000010688418

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
C1604	TORQUE SENSOR (Torque sensor)	When torque sensor output signal is malfunctioning.

POSSIBLE CAUSE

- Harness or connector
- Torque sensor
- EPS control unit (steering column assembly)

FAIL-SAFE

EPS system enters into a manual steering state.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "C1604" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-30, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688419

1. CHECK TERMINALS AND HARNESS CONNECTORS

Check EPS control unit (steering column assembly) pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC "C1604" detected?

YES >> Replace steering column assembly. Refer to [STC-13, "Removal and Installation"](#).

NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

< DTC/CIRCUIT DIAGNOSIS >

C1606 EPS MOTOR

DTC Description

INFOID:0000000010688420

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
C1606	EPS MOTOR (EPS motor)	When the motor driver malfunction of EPS control unit or EPS motor malfunction is detected.

POSSIBLE CAUSE

- Harness or connector
- EPS motor (steering column assembly)
- EPS control unit (steering column assembly)

FAIL-SAFE

EPS system enters into a manual steering state.

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.

STC

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "C1606" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-31, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688421

1. CHECK TERMINALS AND HARNESS CONNECTORS

Check EPS control unit (steering column assembly) pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC "C1606" detected?

YES >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

C1607, C1608 EPS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

C1607, C1608 EPS CONTROL UNIT

DTC Description

INFOID:0000000010688422

DTC DETECTION LOGIC

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

POSSIBLE CAUSE

EPS control unit (steering column assembly)

FAIL-SAFE

EPS system enters into a manual steering state.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "C1607" or "C1608" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-32, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688423

1. CHECK TERMINALS AND HARNESS CONNECTORS

Check EPS control unit (steering column assembly) pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC "C1607" or "C1608" detected?

YES >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

C1609 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

C1609 VEHICLE SPEED SIGNAL

DTC Description

INFOID:0000000010688424

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
C1609	CAN VHCL SPEED (CAN vehicle speed signal)	<ul style="list-style-type: none">A malfunction is detected in the vehicle speed signal received with CAN communication.

POSSIBLE CAUSE

- Harness or connector
(CAN communication line)
- EPS control unit (steering column assembly)
- ABS malfunction
- Vehicle speed signal error

FAIL-SAFE

EPS system enters into a constant steering assist level state.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "C1609" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-33, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688425

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

With CONSULT

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

Is any DTC detected?

YES >> Check the DTC. Refer to [BCR-84, "DTC Index"](#).

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC "C1609" detected?

YES >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

NO >> Check pin terminal and connection of each harness connector for malfunctioning conditions.

< DTC/CIRCUIT DIAGNOSIS >

U1000 CAN COMM CIRCUIT

DTC Description

INFOID:0000000010688426

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

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
U1000	CAN COMM CIRCUIT (CAN communication circuit)	EPS control unit is not transmitting/receiving CAN communication signal for 2 seconds or more.

POSSIBLE CAUSE

- CAN communication error

FAIL-SAFE

System continue normal control.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "U1000" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-34, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688427

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

< DTC/CIRCUIT DIAGNOSIS >

U1010 CONTROL UNIT (CAN)

DTC Description

INFOID:0000000010688428

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 2communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
U1010	CONTROL UNIT (CAN) (Control unit [CAN communication])	When detecting error during the initial diagnosis of CAN controller to EPS control unit.

POSSIBLE CAUSE

- EPS control unit (steering column assembly)

FAIL-SAFE

System continue normal control.

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "U1010" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-35, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688429

1. CHECK SELF-DIAGNOSIS RESULTS

Check that there is no malfunction in EPS control unit harness connector or disconnection.

Is the inspection result normal?

YES >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

NO >> Repair or replace error-detected parts.

U1970 AROUND VIEW MONITOR SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

U1970 AROUND VIEW MONITOR SYSTEM

DTC Description

INFOID:0000000010688430

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
U1970	AROUND VIEW MONITOR (Around view monitor)	CAN communication signal of around view monitor control unit is abnormal for 2 consecutive seconds or more.

POSSIBLE CAUSE

- Harness or connector
(CAN communication line)
- EPS control unit (steering column assembly)
- Around view monitor control unit

FAIL-SAFE

Around view monitor with park assist function stops (controlled by around view monitor).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "U1970" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-36, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010688431

1. CHECK AROUND VIEW MONITOR CONTROL UNIT

1. Turn ignition switch OFF.
2. Disconnect around view monitor control unit harness connector.
3. Check the around view monitor control unit pin terminals (CAN communication lines) for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Recheck terminals for damage or loose connection. Refer to [LAN-7, "Precautions for Harness Repair"](#).

2. PERFORM SELF-DIAGNOSIS (AROUND VIEW MONITOR CONTROL UNIT)

With CONSULT

1. Connect around view monitor control unit harness connector.
2. Connect EPS control unit harness connector.
3. Erase self-diagnostic results for "AVM".
4. Turn the ignition switch OFF, and then wait 10 seconds and more.
5. Turn the ignition switch ON.
6. Perform self-diagnosis for "AVM".

Is any DTC detected?

U1970 AROUND VIEW MONITOR SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

YES >> Check the DTC. Refer to [AV-120, "DTC Index"](#).
NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnostic results for "EPS/DAST 3".
2. Turn the ignition switch OFF, and then wait 10 seconds and more.
3. Turn the ignition switch ON.
4. Perform the self-diagnosis of all systems.

Is DTC "U1000", "U1970" or other DTC detected?

YES ("U1000")>>Refer to [LAN-17, "Trouble Diagnosis Flow Chart"](#).
YES ("U1970")>>Replace around view monitor control unit. Refer to [AV-268, "Removal and Installation"](#).
YES (Other DTC)>>Check the DTC.
NO >> INSPECTION END

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U1971 SONAR SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

U1971 SONAR SYSTEM

DTC Description

INFOID:0000000010698064

DTC DETECTION LOGIC

DTC	Display item (Trouble diagnosis content)	Malfunction detected condition
U1971	SONAR (Sonar)	CAN communication signal of sonar control unit is abnormal for 2 consecutive seconds or more.

POSSIBLE CAUSE

- Harness or connector
(CAN communication line)
- EPS control unit (steering column assembly)
- Sonar control unit

FAIL-SAFE

Around view monitor with park assist function stops (controlled by sonar).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is DTC "U1971" detected?

YES >> Proceed to diagnosis procedure. Refer to [STC-38, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-44, "Intermittent Incident"](#).

NO-2 >> INSPECTION END

Diagnosis Procedure

INFOID:0000000010698065

1. CHECK SONAR CONTROL UNIT

1. Turn ignition switch OFF.
2. Disconnect sonar control unit harness connector.
3. Check the sonar control unit pin terminals (CAN communication lines) for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Recheck terminals for damage or loose connection. Refer to [LAN-7, "Precautions for Harness Repair"](#).

2. PERFORM SELF-DIAGNOSIS (SONAR CONTROL UNIT)

With CONSULT

1. Connect sonar control unit harness connector.
2. Connect EPS control unit harness connector.
3. Erase self-diagnostic results for "SONAR".
4. Turn the ignition switch OFF, and then wait 10 seconds and more.
5. Turn the ignition switch ON.
6. Perform self-diagnosis for "SONAR".

Is any DTC detected?

U1971 SONAR SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

YES >> Check the DTC. Refer to [SN-143, "DTC Index"](#).
NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnostic results for "EPS/DAST 3".
2. Turn the ignition switch OFF, and then wait 10 seconds and more.
3. Turn the ignition switch ON.
4. Perform the self-diagnosis of all systems.

Is DTC "U1000", "U1971" or other DTC detected?

YES ("U1000")>>Refer to [LAN-17, "Trouble Diagnosis Flow Chart"](#).
YES ("U1971")>>Replace sonar control unit. Refer to [SN-237, "Removal and Installation"](#).
YES (Other DTC)>>Check the DTC.
NO >> INSPECTION END

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000010688432

1. CHECK IGNITION POWER SUPPLY FOR EPS CONTROL UNIT

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

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

4. Turn ignition switch ON.

CAUTION:

Never start the engine.

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

EPS control unit		—	Voltage
Connector	Terminal		
M37	4	Ground	10.5 – 16 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK IGNITION POWER SUPPLY CIRCUIT FOR EPS CONTROL UNIT

1. Turn ignition switch OFF.
2. Check the 10A fuse (#30).
3. Check continuity between EPS control unit harness connector and the fuse block (J/B).

EPS control unit		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M37	4	M3	7C	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit.

NO >> Repair or replace error-detected parts.

3. CHECK BATTERY POWER SUPPLY FOR EPS CONTROL UNIT

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	10.5 – 16 V

3. Turn ignition switch ON.

CAUTION:

Never start the engine.

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	9	Ground	10.5 – 16 V

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 5.
NO >> GO TO 4.

A

4. CHECK BATTERY POWER SUPPLY CIRCUIT FOR EPS CONTROL UNIT

1. Turn ignition switch OFF.
2. Check the 50A fusible link (F). (Except for R9M engine models)
3. Check the 50A fusible link (H). (Except for R9M engine models)
4. Check the 50A fusible link (J). (For R9M engine models)
5. Check the 50A fusible link (I). (For R9M engine models)
6. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (F). (Except for R9M engine models)
7. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (H). (Except for R9M engine models)
8. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (J). (For R9M engine models)
9. Check the harness for open or short between EPS control unit harness connector No.9 terminal and the 50A fusible link (I). (For R9M engine models)

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Is the inspection result normal?

STC

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

G

5. CHECK EPS CONTROL UNIT GROUND CIRCUIT

Check continuity between EPS control unit harness connector and ground.

EPS control unit		—	Continuity
Connector	Terminal		
M38	10	Ground	Existed

H

Is the inspection result normal?

I

J

K

YES >> GO TO 6.

L

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N

NO >> Repair or replace error-detected parts.

O

6. CHECK TERMINAL

P

1. Turn ignition switch OFF.
2. Check EPS control unit pin terminals for damage or loose connection with harness connector.
3. Check fuse block (J/B) pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

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ELECTRIC POWER STEERING WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

ELECTRIC POWER STEERING WARNING LAMP

Component Function Check

INFOID:0000000010688433

1. CHECK THE ILLUMINATION OF THE ELECTRIC POWER STEERING WARNING LAMP

Check that the electric power steering warning lamp turns ON when ignition switch turns ON. Then, 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-42, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010688434

1. PERFORM SELF-DIAGNOSIS

 **With CONSULT**

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-21, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC POWER STEERING WARNING LAMP SIGNAL

 **With CONSULT**

1. Select "DATA MONITOR" of "EPS/DAST 3" and select "WARNING LAMP".
2. Check that the item in "DATA MONITOR" is "On".
3. Start the engine.

CAUTION:

Never drive the vehicle.

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to [MWI-129, "COMBINATION METER : Diagnosis Procedure"](#).

NO >> Replace steering column assembly. Refer to [ST-13, "Removal and Installation"](#).

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN ON

Description

INFOID:000000010688435

Electric power steering warning lamp does not turn ON when turning ignition switch ON from OFF. (Check the illumination of the electric power steering warning lamp.)

Diagnosis Procedure

INFOID:000000010688436

1. CHECK ELECTRIC POWER STEERING WARNING LAMP

Perform the trouble diagnosis of electric power steering warning lamp. Refer to [STC-42, "Diagnosis Procedure".](#)

Is the inspection result normal?

YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.

NO >> Repair or replace the specific malfunctioning part.

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ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN OFF

< SYMPTOM DIAGNOSIS >

ELECTRIC POWER STEERING WARNING LAMP DOES NOT TURN OFF

Description

INFOID:0000000010688437

Electric power steering warning lamp does not turn OFF several seconds after engine started.

Diagnosis Procedure

INFOID:0000000010688438

1. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-21, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK ELECTRIC POWER STEERING WARNING LAMP

Perform the trouble diagnosis of electric power steering warning lamp. Refer to [STC-42, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the specific malfunctioning part.

3. CHECK EPS CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-27, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.

NO >> Repair or replace the specific malfunctioning part.

STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

Description

INFOID:0000000010688439

Steering wheel turning force is heavy or light.

Diagnosis Procedure

INFOID:0000000010688440

1. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-21, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK THE ILLUMINATION OF THE ELECTRIC POWER STEERING WARNING LAMP

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis of electric power steering warning lamp. Refer to [STC-42, "Diagnosis Procedure"](#).

3. CHECK EPS CONTROL UNIT SIGNAL (1)

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

2. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS/DAST 3".

Does the item in "DATA MONITOR" indicate "100%"?

YES >> GO TO 6.

NO >> GO TO 4.

4. CHECK EPS CONTROL UNIT SIGNAL (2)

With CONSULT

Select "BATTERY VOLT" in "DATA MONITOR" in "EPS/DAST 3".

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

YES >> GO TO 5.

NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-27, "Diagnosis Procedure"](#).

5. CHECK EPS CONTROL UNIT SIGNAL (3)

With CONSULT

1. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS/DAST 3".
2. Stop the EPS system until the item in "DATA MONITOR" becomes "100%".

NOTE:

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

3. Check that the symptom continues.

Does the symptom continue?

YES >> GO TO 6.

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

6. CHECK EPS CONTROL UNIT SIGNAL (4)

With CONSULT

1. Start the engine.

STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

CAUTION:

Never drive the vehicle.

2. Turn steering wheel from full left stop to full right stop.
3. Select "TORQUE SENSOR" in "DATA MONITOR" in "EPS/DAST 3".

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

Is the inspection result normal?

YES-1 (Models without Stop/Start System)>>GO TO 9.

YES-2 (Models with Stop/Start System)>>GO TO 8.

NO >> GO TO 7.

7. CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-31, "Diagnosis Procedure".](#)

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace the specific malfunctioning part.

8. CHECK STOP/START SYSTEM

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

2. Select "ST TORQUE STATUS" and "STOP/START SYSTEM" in "DATA MONITOR" in "EPS/DAST 3".
3. Operate stop/start system. Refer to [STC-18, "Reference Value".](#)

Monitor item	Condition	Display value
ST TORQUE STA-TUS	Steering wheel: Not steering (There is no steering force)	Off
STOP/START SYS-TEM	When stop/start system is active	On

4. Turn the steering wheel.

Monitor item	Condition	Display value
ST TORQUE STA-TUS	Steering wheel: Right or left turn	On
STOP/START SYS-TEM	When stop/start system is prohibited	Off

Is the inspection result normal?

YES >> GO TO 9.

NO >> Check the ECM. Refer to [EC-874, "CONSULT Function".](#)

9. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-9, "Inspection".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-26, "Inspection".](#)

UNBALANCE STEERING WHEEL TURNING FORCE AND RETURN BETWEEN RIGHT AND LEFT

< SYMPTOM DIAGNOSIS >

UNBALANCE STEERING WHEEL TURNING FORCE AND RETURN BETWEEN RIGHT AND LEFT

Description

INFOID:0000000010688441

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

Diagnosis Procedure

INFOID:0000000010688442

1. CHECK THE ILLUMINATION OF THE ELECTRIC POWER STEERING WARNING LAMP

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

Does the electric power steering warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-44, "Diagnosis Procedure"](#).

2. CHECK WHEEL ALIGNMENT

1. Check the wheel alignment. Refer to [FSU-8, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Adjustment of wheel alignment. Refer to [FSU-9, "Adjustment"](#).

3. CHECK EPS CONTROL UNIT SIGNAL

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

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

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

4. Perform the torque sensor inspection.

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-31, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace the specific malfunctioning part.

5. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-9, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-26, "Inspection"](#).

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

Description

INFOID:0000000010688443

Unbalance steering wheel turning force (torque variation).

Diagnosis Procedure

INFOID:0000000010688444

1. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Turn the ignition switch OFF to ON.
2. Perform "EPS/DAST 3" self-diagnosis.

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-21, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK THE ILLUMINATION OF THE ELECTRIC POWER STEERING WANING LAMP

Check the electric power steering warning lamp while the engine is started.

Does the electric power steering warning lamp turn OFF?

YES >> GO TO 3.

NO >> Refer to [STC-42, "Diagnosis Procedure"](#).

3. CHECK STEERING COLUMN AND STEERING GEAR

Check the steering column assembly and steering gear assembly.

- Steering column assembly. Refer to [ST-13, "Exploded View"](#).
- Steering gear assembly. Refer to the following.
 - LHD [ST-20, "LHD : Exploded View"](#).
 - RHD [ST-21, "RHD : Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the specific malfunctioning part.

4. CHECK EPS CONTROL UNIT SIGNAL (1)

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

2. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS/DAST 3".

Does the item in "DATA MONITOR" maintain "100%"?

YES >> GO TO 7.

NO >> GO TO 5.

5. CHECK EPS CONTROL UNIT SIGNAL (2)

With CONSULT

Select "BATTERY VOLT" in "DATA MONITOR" in "EPS/DAST 3".

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

YES >> GO TO 6.

NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-27, "Diagnosis Procedure"](#).

6. CHECK EPS CONTROL UNIT SIGNAL (3)

With CONSULT

1. Select "ASSIST LEVEL" in "DATA MONITOR" in "EPS/DAST 3".
2. Stop the EPS system until the item in "DATA MONITOR" becomes "100%".

NOTE:

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

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

3. Check that the symptom continues.

Dose the symptom continue?

YES >> GO TO 7.

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

7. CHECK EPS CONTROL UNIT SIGNAL (4)

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

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

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

4. Perform the torque sensor inspection.

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-31, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace the specific malfunctioning part.

9. CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-9, "Inspection"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-11, "Inspection"](#).

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

EPS CONTROL UNIT

Removal and Installation

INFOID:000000010839934

- The EPS control unit is an integral part of the steering column. If the replacement of the EPS control unit is necessary, replace the steering column. Refer to [ST-13, "Removal and Installation"](#).