

SECTION **STC**

STEERING CONTROL SYSTEM

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:000000012786997

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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 Air Bag Diagnosis Sensor Unit or other Air Bag 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 or batteries, and wait at least three minutes before performing any service.

Service Notice and Precautions for EPS System

INFOID:000000012786998

- Check the following item when performing the trouble diagnosis.
- Check any possible causes by interviewing the symptom and it's condition from the customer if any malfunction, such as EPS warning lamp is turned ON, occurs.
- Check if air pressure and size of tires are proper, the specified part is used for the steering wheel, and control unit is genuine part.
- Check if the connection of steering column assembly and steering gear assembly is proper (there is not looseness of mounting bolts, damage of rods, boots or sealants, and leakage of grease, etc.).
- Check if the wheel alignment is adjusted properly.
- Check if there is any damage or modification to suspension or body resulting in increased weight or altered ground clearance.
- Check if installation conditions of each link and suspension are proper.
- Check if the battery voltage is proper.
- Check connection conditions of each connector are proper.
- 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.

PREPARATION

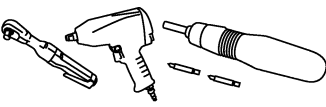
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PREPARATION

PREPARATION

Commercial Service Tools

INFOID:000000012786999

Tool name	Description
<p>Power tool</p>  <p>PIIB1407E</p>	<p>Loosening nuts, screws and bolts</p>

COMPONENT PARTS

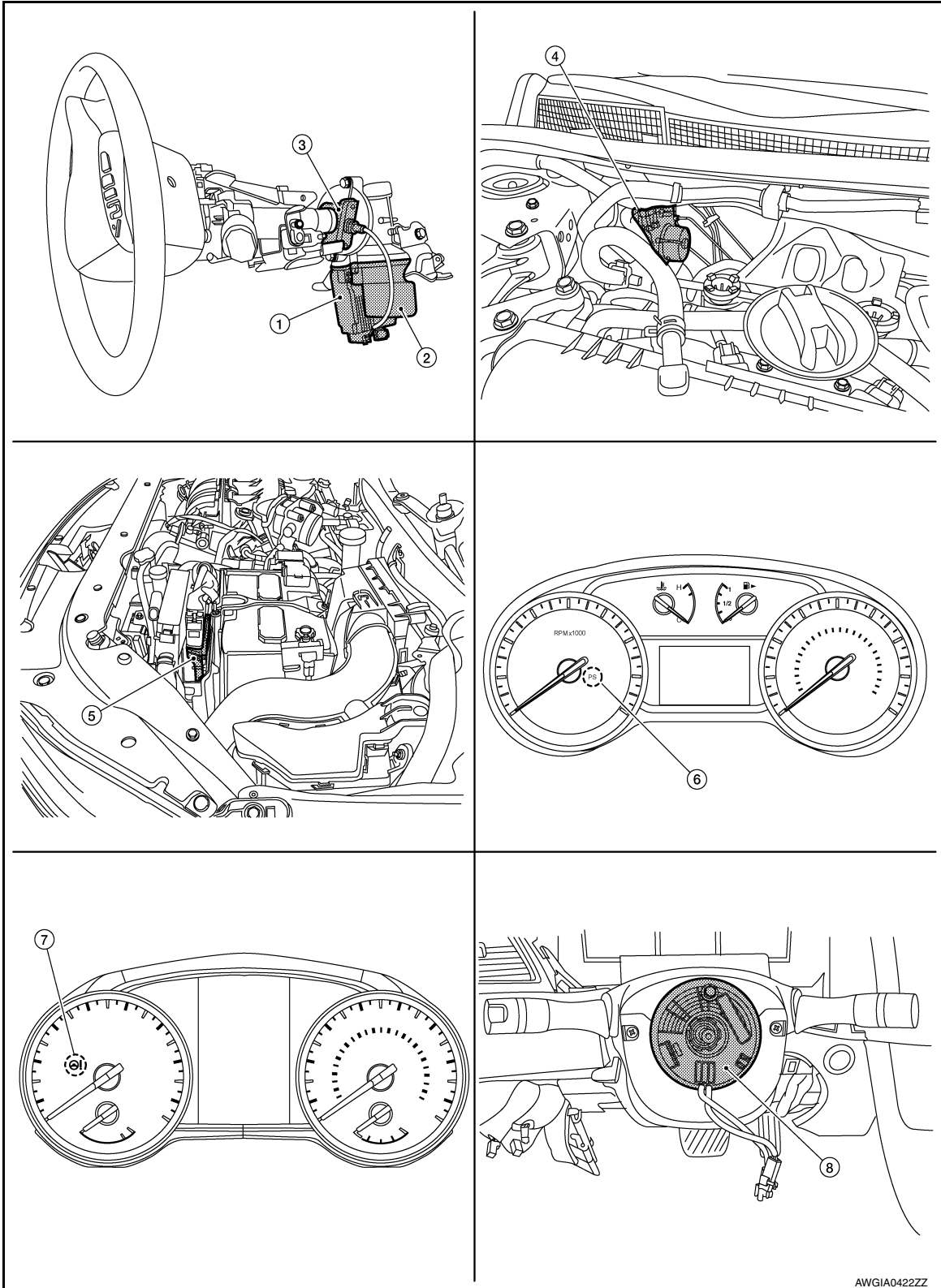
< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:000000012787000



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COMPONENT PARTS

< SYSTEM DESCRIPTION >

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|--|---|---|
| 1. EPS control unit (view with steering column removed from vehicle) | 2. EPS motor (view with steering column removed from vehicle) | 3. Torque sensor (view with steering column removed from vehicle) |
| 4. ABS actuator and electric unit (control unit) | 5. ECM | 6. EPS warning lamp (In combination meter type A) |
| 7. EPS warning lamp (In combination meter type B) | 8. Steering angle sensor (view with steering wheel removed) | |

Component Description

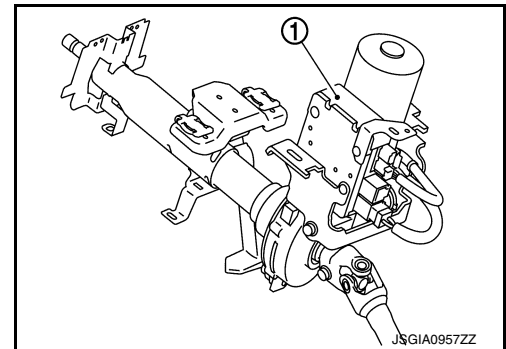
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Components parts	Reference
EPS control unit	STC-6. "EPS Control Unit"
EPS motor	STC-6. "EPS Motor, Torque Sensor, Reduction Gear"
Torque sensor	STC-6. "EPS Motor, Torque Sensor, Reduction Gear"
Reduction gear	STC-6. "EPS Motor, Torque Sensor, Reduction Gear"
EPS warning lamp	STC-9. "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp"
ECM	<ul style="list-style-type: none"> • Transmits mainly the following signals to EPS control unit via CAN communication. - Engine status signal
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. - Vehicle speed signal (ABS)
Combination meter	<ul style="list-style-type: none"> • Transmits mainly the following signal to EPS control unit via CAN communication. - Vehicle speed signal (METER) • Turns ON the EPS warning lamp according to the signal from EPS control unit via CAN communication.

EPS Control Unit

INFOID:0000000012787002

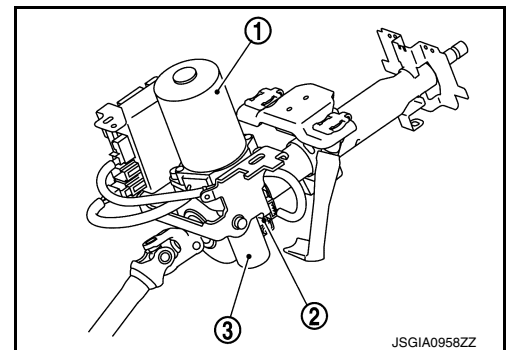
- EPS control unit (1) is installed to steering column assembly.
- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according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



EPS Motor, Torque Sensor, Reduction Gear

INFOID:0000000012787003

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



EPS MOTOR

COMPONENT PARTS

< SYSTEM DESCRIPTION >

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

TORQUE SENSOR

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

REDUCTION GEAR

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

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SYSTEM

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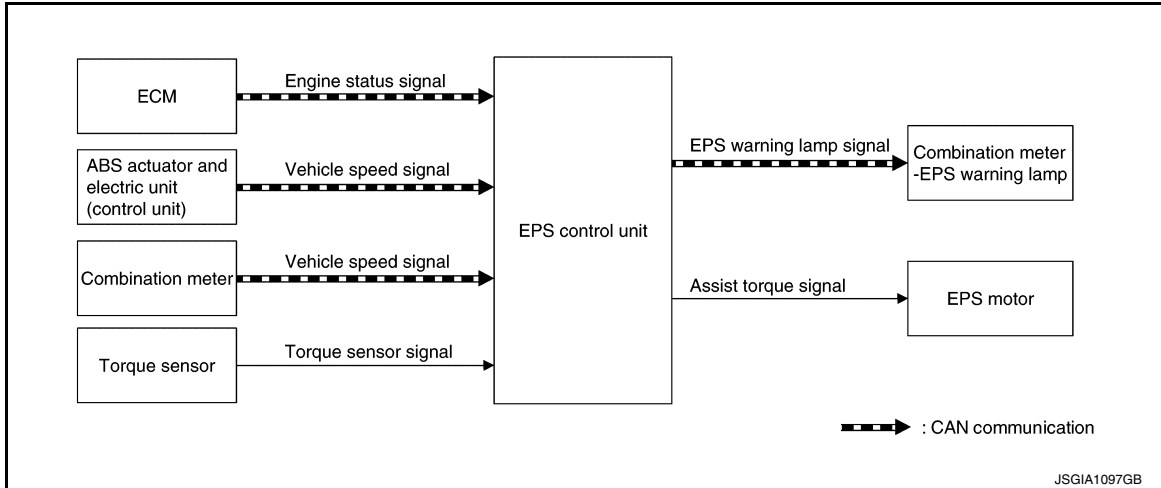
SYSTEM

EPS SYSTEM

EPS SYSTEM : System Description

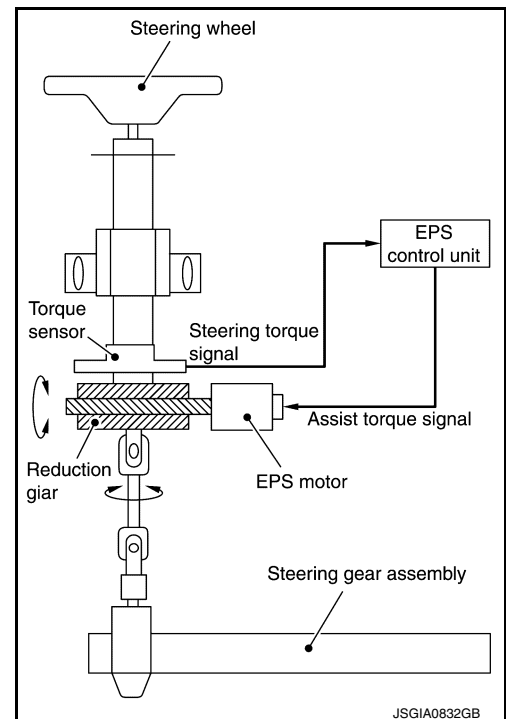
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SYSTEM DIAGRAM



DESCRIPTION

- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque signal to the EPS motor according to the driving condition.
- In case of a malfunction in the electrical system, the fail-safe function stops output signals to the EPS motor. Refer to [STC-9. "EPS SYSTEM : Fail-Safe"](#).
- EPS control unit decreases the output signal to EPS motor while extremely using the power steering function (e.g., full steering) consecutively for protecting EPS motor and EPS control unit (Overload protection control). Refer to [STC-13. "Protection Function"](#).
- Extensive steering at low speed will cause the EPS control unit and EPS motor to heat up, once temperature reaches critical point EPS control unit will reduce current to reduce heat up. System will recover as temperature lowers (reduced or no assistance).



EPS WARNING LAMP INDICATION

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

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

CAUTION:

SYSTEM

< SYSTEM DESCRIPTION >

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

EPS SYSTEM : Fail-Safe

INFOID:000000012787005

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

EPS SYSTEM : Protection Function

INFOID:000000012787006

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:000000012787007

Type A

Name	Design	Layout/Function
EPS warning lamp	PS	For layout, refer to STC-9, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp" .
		For function, refer to STC-9, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp" .

Type B

Name	Design	Layout/Function
EPS warning lamp		For layout, refer to STC-9, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp" .
		For function, refer to STC-9, "WARNING/INDICATOR/CHIME LIST : Warning Lamp/Indicator Lamp" .

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

CONSULT Function

INFOID:000000012787008

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 cleared 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-14, "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: 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

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 >

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

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EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

ECU DIAGNOSIS INFORMATION

EPS CONTROL UNIT

Reference Value

INFOID:0000000012787009

VALUES ON THE DIAGNOSIS TOOL

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

CAUTION:

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

Monitor item	Data monitor	
	Condition	Display value
BATTERY VOLT	Ignition switch: ON	
TORQUE SENSOR	Engine running	Steering wheel: Not steering (There is no steering force)
		Steering wheel: Right turn
		Steering wheel: Left turn
MOTOR CURRENT	Engine running	Steering wheel: Not steering (There is no steering force)
		Steering wheel: Right or left turn
MOTOR SIG	Engine running	Steering wheel: Not steering (There is no steering force)
		Steering wheel: Right turn
		Steering wheel: Left turn
ASSIST TORQUE	Engine running	
C/U TEMP	Ignition switch ON or engine running	
ASSIST LEVEL	Engine running	
VEHICLE SPEED	Vehicle stopped	
	While driving	
WARNING LAMP	EPS warning lamp: ON	
	EPS warning lamp: OFF	
ENGINE STATUS	Engine not running	
	Engine running	

*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: A fixed value is indicated regardless of steering turning.

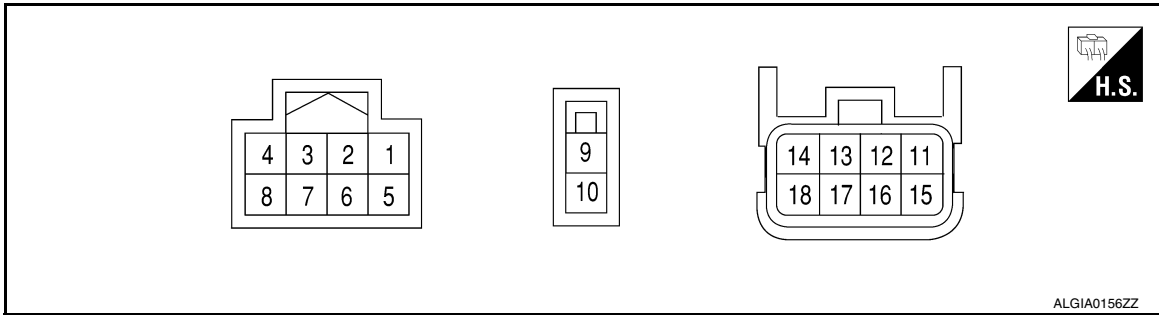
*3: Normally displays 100%. In case of an excessive stationary steering, the assist curvature gradually falls. However, it returns to 100% when left standing.

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

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire Color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/Output			
1 (P)	—	CAN-L	Input/Output	—		—
2 (L)	—	CAN-H	Input/Output	—		—
4 (LG)	Ground	Ignition power supply	Input	Ignition switch: ON		Battery voltage
				Ignition switch: OFF		0 V
9 (R)	Ground	Battery power supply	Input	Always		Battery voltage
10 (B)	Ground	Ground	—	Always		0 V
15 (R)	Ground	Torque sensor ground	—	Always		0 V
16 (Y)	Ground	Torque sensor main	Input	Ignition switch: ON	Steering wheel: Not steering (There is no steering force)	2.5 V
				Engine running	Steering wheel: steering	1.6 V – 3.4 V (The value is changed according to steering left or right)
17 (B)	Ground	Torque sensor sub	Input	Ignition switch: ON	Steering wheel: Not steering (There is no steering force)	2.5 V
				Engine running	Steering wheel: steering	1.6 V – 3.4 V (The value is changed according to steering left or right)
18 (W)	Ground	Torque sensor power supply	Output	Ignition switch: ON		5 V

Fail-Safe

INFOID:0000000012787010

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

Protection Function

INFOID:0000000012787011

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

EPS CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

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:000000012787012

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

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

DTC Index

INFOID:000000012787013

DTC	Items	EPS warning lamp	Reference
C1601	BATTERY VOLT	ON	STC-23. "DTC Logic"
C1604	TORQUE SENSOR	ON	STC-26. "DTC Logic"
C1606	EPS MOTOR	ON	STC-28. "DTC Logic"
C1607	EEPROM	OFF	STC-29. "DTC Logic"
C1608	CONTROL UNIT	ON / OFF*	STC-29. "DTC Logic"
C1609	CAN VHCL SPEED	ON	STC-30. "DTC Logic"
U1000	CAN COMM CIRCUIT	ON	STC-31. "DTC Logic"

*: Even if DTC is detected, EPS warning lamp does not turn ON when assist torque is generated.

POWER STEERING CONTROL SYSTEM

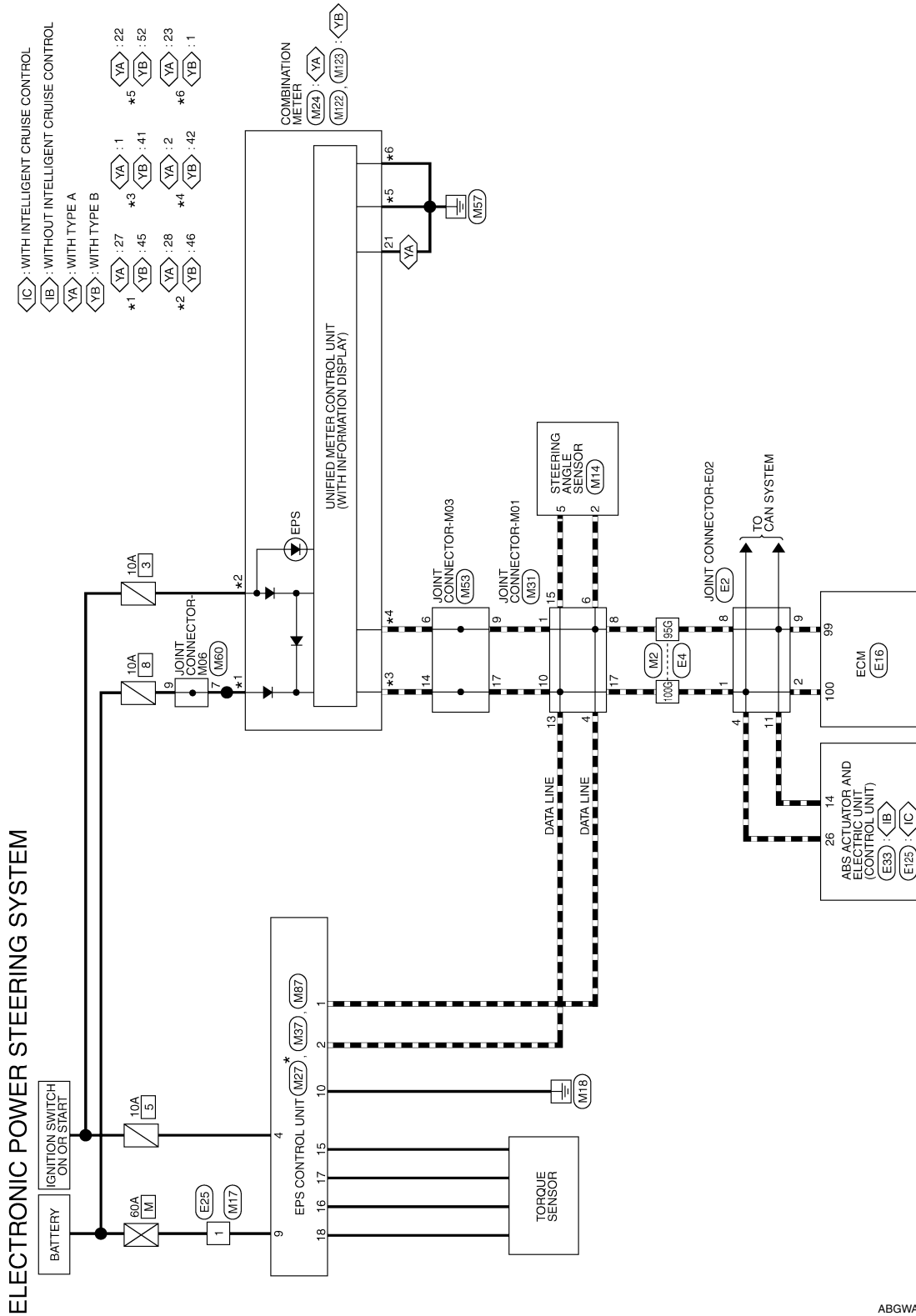
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WIRING DIAGRAM

POWER STEERING CONTROL SYSTEM

Wiring Diagram

INFOID:0000000012787014



* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

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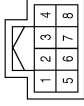
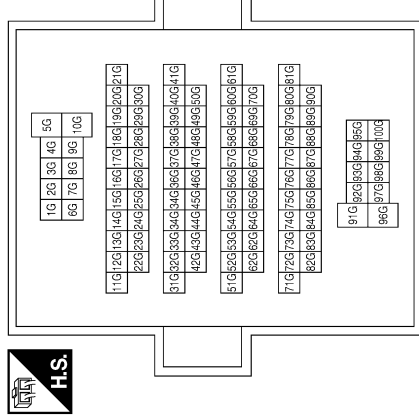
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POWER STEERING CONTROL SYSTEM

< WIRING DIAGRAM >

ELECTRONIC POWER STEERING SYSTEM CONNECTORS

Connector No.	M2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

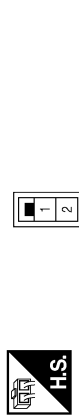


Terminal No.	Color of Wire	Signal Name
95G	P	-
100G	L	-

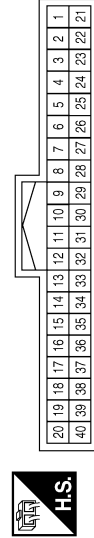
Connector No.	M14
Connector Name	STEERING ANGLE SENSOR
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
2	P	CAN-L
5	L	CAN-H

Connector No.	M17
Connector Name	WIRE TO WIRE
Connector Color	BLACK

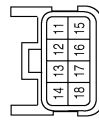


Connector No.	M24
Connector Name	COMBINATION METER (WITH TYPE A)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	R	-

Connector No.	M27
Connector Name	EPS CONTROL UNIT (TORQUE SENSOR)
Connector Color	GRAY



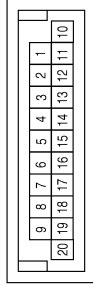
Terminal No.	Color of Wire	Signal Name
11	-	-
12	-	-
13	-	-
14	-	-
15	R	TSE (GND)
16	Y	TSM
17	B	TSS
18	W	TSV

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POWER STEERING CONTROL SYSTEM

< WIRING DIAGRAM >

Connector No.	M53
Connector Name	JOINT CONNECTOR-M03
Connector Color	BLUE



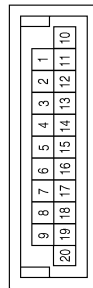
Terminal No.	Color of Wire	Signal Name
6	P	-
9	P	-
14	L	-
17	L	-

Connector No.	M37
Connector Name	EPS CONTROL UNIT
Connector Color	BLACK



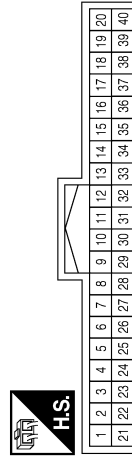
Terminal No.	Color of Wire	Signal Name
9	R	+B
10	B	GND

Connector No.	M31
Connector Name	JOINT CONNECTOR-M01
Connector Color	BLUE



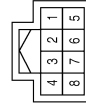
Terminal No.	Color of Wire	Signal Name
1	P	-
4	P	-
6	P	-
8	P	-
10	L	-
13	L	-
15	L	-
17	L	-

Connector No.	M122
Connector Name	COMBINATION METER (WITH TYPE B)
Connector Color	WHITE



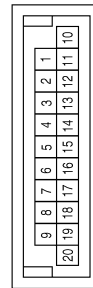
Terminal No.	Color of Wire	Signal Name
1	B	GND

Connector No.	M87
Connector Name	EPS CONTROL UNIT
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	P	CAN-L
2	L	CAN-H
3	-	-
4	LG	V IGN
5	-	-
6	-	-
7	-	-
8	-	-

Connector No.	M60
Connector Name	JOINT CONNECTOR-M06
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
7	W	-
9	W	-

ABGIA0181GB

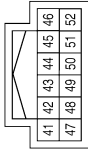
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POWER STEERING CONTROL SYSTEM

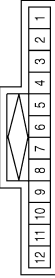
< WIRING DIAGRAM >

Connector No.	M123
Connector Name	COMBINATION METER (WITH TYPE B)
Connector Color	WHITE



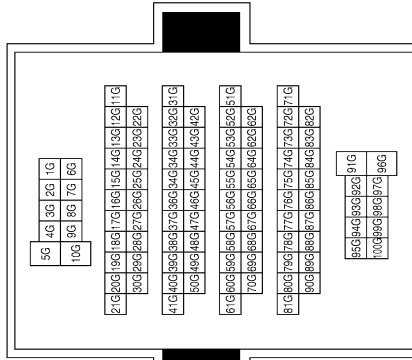
Terminal No.	Color of Wire	Signal Name
41	L	CAN-H
42	P	CAN-L
45	LG	BAT
46	GR	IGN
52	B	GND

Connector No.	E2
Connector Name	JOINT CONNECTOR-E02
Connector Color	BLUE



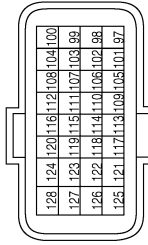
Terminal No.	Color of Wire	Signal Name
1	L	-
2	L	-
4	L	-
8	P	-
9	P	-
11	P	-

Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	95G	100G
Color of Wire	P	L
Signal Name	-	-

Connector No.	E16
Connector Name	ECM
Connector Color	GRAY



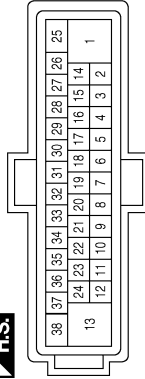
Terminal No.	99	100
Color of Wire	P	L
Signal Name	CAN-L	CAN-H

ABGIA0182GB

POWER STEERING CONTROL SYSTEM

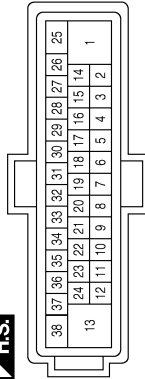
< WIRING DIAGRAM >

Connector No.	E125
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITH INTELLIGENT CRUISE CONTROL)
Connector Color	BLACK



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

Connector No.	E33
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (WITHOUT INTELLIGENT CRUISE CONTROL)
Connector Color	BLACK



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

Connector No.	E25
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	R	-

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ABGIA0183GB

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000012787015

DETAILED FLOW

1. INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing [STC-21, "Diagnostic Work Sheet"](#) and reproduce symptoms as well as fully understand it. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if necessary.

CAUTION:

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

>> GO TO 2.

2. CHECK SYMPTOM

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

CAUTION:

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

>> GO TO 3.

3. PERFORM SELF-DIAGNOSIS

 **With CONSULT**

Perform self-diagnosis.

Is any DTC detected?

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

NO >> GO TO 6.

4. RECHECK SYMPTOM

 **With CONSULT**

1. Erase self-diagnostic results.

2. Perform DTC confirmation procedures for the malfunctioning system.

NOTE:

If some DTCs are detected at the same time, determine the order for performing the diagnosis based on [STC-14, "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-41, "Intermittent Incident"](#).

5. REPAIR OR REPLACE MALFUNCTIONING PARTS

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

>> GO TO 7.

6. IDENTIFY MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

Estimate malfunctioning system based on symptom diagnosis and perform inspection.

Can the malfunctioning system be identified?

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

C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

C1601 BATTERY POWER SUPPLY

DTC Logic

INFOID:0000000012787017

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1601	BATTERY VOLT	When a power supply voltage to the EPS control unit is maintained at 17.5 V or more or at less than 9 V continuously for five second or more.	<ul style="list-style-type: none">• Harness or connector• EPS control unit• Fuse• Power supply system• Battery

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC C1601 detected?

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

Diagnosis Procedure

INFOID:0000000012787018

Regarding Wiring Diagram information, refer to [STC-15, "Wiring Diagram"](#).

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		
M37	10	Ground	Yes

4. Connect EPS control unit harness connector.

Is the inspection result normal?

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

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

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

C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

EPS control unit		—	Voltage
Connector	Terminal		
M87	4	Ground	Approx. 0 V

- Turn ignition switch ON.
CAUTION:
Never start the engine.
- Check voltage between EPS control unit harness connector and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M87	4	Ground	Battery voltage

Is the inspection result normal?

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

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

- Turn ignition switch OFF.
- Check the 10A fuse (#5).
- Check the harness for open or short between EPS control unit harness connector M87 terminal 4 and the 10A fuse (#5).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to [PCS-72, "Wiring Diagram"](#).
NO >> Repair or replace the malfunctioning parts.

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

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

EPS control unit		—	Voltage
Connector	Terminal		
M37	9	Ground	Battery voltage

- Turn ignition switch ON.
CAUTION:
Never start the engine.
- Check voltage between EPS control unit harness connector and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M37	9	Ground	Battery voltage

Is the inspection result normal?

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

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

- Turn ignition switch OFF.
- Check the 60A fusible link (#M).
- Check the harness for open or short between EPS control unit harness connector M37 terminal 9 and the 60A fusible link (#M).

Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to [PCS-72, "Wiring Diagram"](#).
NO >> Repair or replace the malfunctioning parts.

C1601 BATTERY POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

6. CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

YES >> EPS control unit is malfunctioning. Replace steering column assembly. Refer to [ST-13. "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning parts.

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C1604 TORQUE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1604 TORQUE SENSOR

DTC Logic

INFOID:000000012787019

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

Ⓟ With CONSULT

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

Is DTC "C1604" detected?

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

Diagnosis Procedure

INFOID:000000012787020

Regarding Wiring Diagram information, refer to [STC-15, "Wiring Diagram"](#).

1. CHECK TORQUE SENSOR POWER SUPPLY CIRCUIT

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

CAUTION:

Steering wheel is neutral position. (There is no steering force.)

EPS control unit		—	Voltage
Connector	Terminal		
M27	18	Ground	Approx. 5 V

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Perform the trouble diagnosis for battery power supply circuit. Refer to [STC-23, "Diagnosis Procedure"](#).

2. CHECK TORQUE SENSOR GROUND CIRCUIT

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

CAUTION:

Steering wheel is neutral position. (There is no steering force.)

C1604 TORQUE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

EPS control unit		—	Continuity
Connector	Terminal		
M27	15	Ground	Yes

Is the inspection result normal?

YES >> GO TO 3.

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

3. CHECK TORQUE SENSOR SIGNAL

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

CAUTION:

Steering wheel is neutral position. (There is no steering force.)

EPS control unit		—	Voltage
Connector	Terminal		
M27	17	Ground	Approx. 2.5 V
	16		

3. Start the engine.
4. Check voltage between EPS control unit harness connector terminal and ground.

CAUTION:

Steering wheel is right or left turn.

EPS control unit		—	Voltage
Connector	Terminal		
M27	17	Ground	Approx. 1.6 V – 3.4 V (The value is changed according to steering left or right)
	16		

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect EPS control unit harness connector.
3. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.

Is the inspection result normal?

YES >> Replace EPS control unit. Refer to [STC-40. "Removal and Installation"](#).

NO >> Repair or replace the malfunctioning parts.

C1606 EPS MOTOR

< DTC/CIRCUIT DIAGNOSIS >

C1606 EPS MOTOR

DTC Logic

INFOID:000000012787021

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC "C1606" detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-28, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000012787022

1.CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

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

2.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC C1606 detected?

- YES >> Replace EPS control unit. Refer to [STC-40, "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-41, "Intermittent Incident"](#).

C1607, C1608 EPS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

C1607, C1608 EPS CONTROL UNIT

DTC Logic

INFOID:000000012787023

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC C1607 or C1608 detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-29. "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000012787024

1. CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

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

2. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is DTC C1607 or C1608 detected?

- YES >> Replace EPS control unit. Refer to [STC-40. "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-41. "Intermittent Incident"](#).

C1609 VEHICLE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

C1609 VEHICLE SPEED SIGNAL

DTC Logic

INFOID:000000012787025

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC C1609 detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-30, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000012787026

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

With CONSULT

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

Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-14, "DTC Index"](#).
NO >> GO TO 2.

2. CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

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

3. PERFORM SELF-DIAGNOSIS

With CONSULT

Perform EPS self-diagnosis.

Is DTC C1609 detected?

- YES >> Replace EPS control unit. Refer to [STC-40, "Removal and Installation"](#).
NO >> Check intermittent incident. Refer to [GI-41, "Intermittent Incident"](#).

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1000 CAN COMM CIRCUIT

Description

INFOID:000000012787027

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

DTC Logic

INFOID:000000012787028

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC U1000 detected?

- YES >> Proceed to diagnosis procedure. Refer to [STC-31, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000012787029

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

EPS WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

EPS WARNING LAMP

Component Function Check

INFOID:000000012787030

1. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

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

Is the inspection result normal?

YES >> Inspection End.

NO >> Perform trouble diagnosis. Refer to [STC-32, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000012787031

1. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

YES >> Check the DTC. Refer to [STC-14, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK EPS WARNING LAMP SIGNAL

With CONSULT

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to [MWI-51, "COMBINATION METER : Diagnosis Procedure"](#) (Type A) or [MWI-126, "COMBINATION METER : Diagnosis Procedure"](#) (Type B).

NO >> Replace EPS control unit. Refer to [STC-40, "Removal and Installation"](#).

EPS WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

EPS WARNING LAMP DOES NOT TURN ON

Description

INFOID:0000000012787032

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

Diagnosis Procedure

INFOID:0000000012787033

1. CHECK EPS WARNING LAMP

Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-32, "Diagnosis Procedure"](#).

Is the inspection result normal?

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

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EPS WARNING LAMP DOES NOT TURN OFF

< SYMPTOM DIAGNOSIS >

EPS WARNING LAMP DOES NOT TURN OFF

Description

INFOID:000000012787034

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

Diagnosis Procedure

INFOID:000000012787035

1. PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-14, "DTC Index"](#).
NO >> GO TO 2.

2. CHECK EPS WARNING LAMP

Perform the trouble diagnosis of EPS warning lamp. Refer to [STC-32, "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-23, "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:000000012787036

Steering wheel turning force is heavy or light.

Diagnosis Procedure

INFOID:000000012787037

1.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-14, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

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

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Perform trouble diagnosis of EPS warning lamp. Refer to [STC-32, "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.

Dose the item in DATA MONITOR indicate 100%?

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

4.CHECK EPS CONTROL UNIT SIGNAL (2)

With CONSULT

Select BATTERY VOLT in DATA MONITOR in EPS.

Dose the item in DATA MONITOR indicate 10 V or more?

- YES >> GO TO 5.
NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-23, "Diagnosis Procedure"](#).

5.CHECK EPS CONTROL UNIT SIGNAL (3)

With CONSULT

1. Select ASSIST LEVEL in DATA MONITOR in EPS.
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.

Dose the symptom continue?

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

6.CHECK EPS CONTROL UNIT SIGNAL (4)

With CONSULT

1. Start the engine.

CAUTION:

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STC

STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

< SYMPTOM DIAGNOSIS >

Never drive the vehicle.

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

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

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-28. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair or replace the specific malfunctioning part.

8.CHECK STEERING WHEEL TURNING FORCE

Check the steering wheel turning force. Refer to [ST-5. "Inspection"](#).

Is the inspection result normal?

- YES >> Inspection End.
NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-8. "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:000000012787038

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

Diagnosis Procedure

INFOID:000000012787039

1. CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check the EPS warning lamp while engine is running.

Does the EPS warning lamp turn OFF?

YES >> GO TO 2.

NO >> Refer to [STC-34, "Diagnosis Procedure"](#).

2. CHECK WHEEL ALIGNMENT

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

2. Perform EPS self-diagnosis.

Is the inspection result normal?

YES >> GO TO 3.

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

3. CHECK EPS CONTROL UNIT SIGNAL

With CONSULT

1. Start the engine.

CAUTION:

Never drive the vehicle.

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

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

4. Perform the torque sensor inspection.

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK EPS MOTOR

Perform the trouble diagnosis of EPS motor. Refer to [STC-28, "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-5, "Inspection"](#).

Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-5, "Inspection"](#).

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

Description

INFOID:000000012787040

Unbalance steering wheel turning force (torque variation).

Diagnosis Procedure

INFOID:000000012787041

1.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

- YES >> Check the DTC. Refer to [STC-14, "DTC Index"](#).
NO >> GO TO 2.

2.CHECK THE ILLUMINATION OF THE EPS WARNING LAMP

Check the EPS warning lamp while the engine is started.

Does the EPS warning lamp turn OFF?

- YES >> GO TO 3.
NO >> Refer to [STC-32, "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 [ST-16, "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. Turn steering wheel from full left stop to full right stop.
3. Select ASSIST LEVEL in DATA MONITOR in EPS.

Dose the item in DATA MONITOR maintain 100%?

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

5.CHECK EPS CONTROL UNIT SIGNAL (2)

With CONSULT

Select BATTERY VOLT in DATA MONITOR in EPS.

Does the item in DATA MONITOR indicate 10 V or more?

- YES >> GO TO 6.
NO >> Perform trouble diagnosis of EPS control unit power supply and ground. Refer to [STC-23, "Diagnosis Procedure"](#).

6.CHECK EPS CONTROL UNIT SIGNAL (3)

With CONSULT

1. Select ASSIST LEVEL in DATA MONITOR in EPS.
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.

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

< SYMPTOM DIAGNOSIS >

Dose the symptom continue?

YES >> GO TO 7.

NO >> The assist torque decreases because of protection function. This is not malfunction. Inspection End.

7.CHECK EPS CONTROL UNIT SIGNAL (4)

With CONSULT

1. 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.

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-28, "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-5, "Inspection"](#).

Is the inspection result normal?

YES >> Inspection End.

NO >> Check the steering wheel turning force for mechanical malfunction. Refer to [ST-5, "Inspection"](#).

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EPS CONTROL UNIT

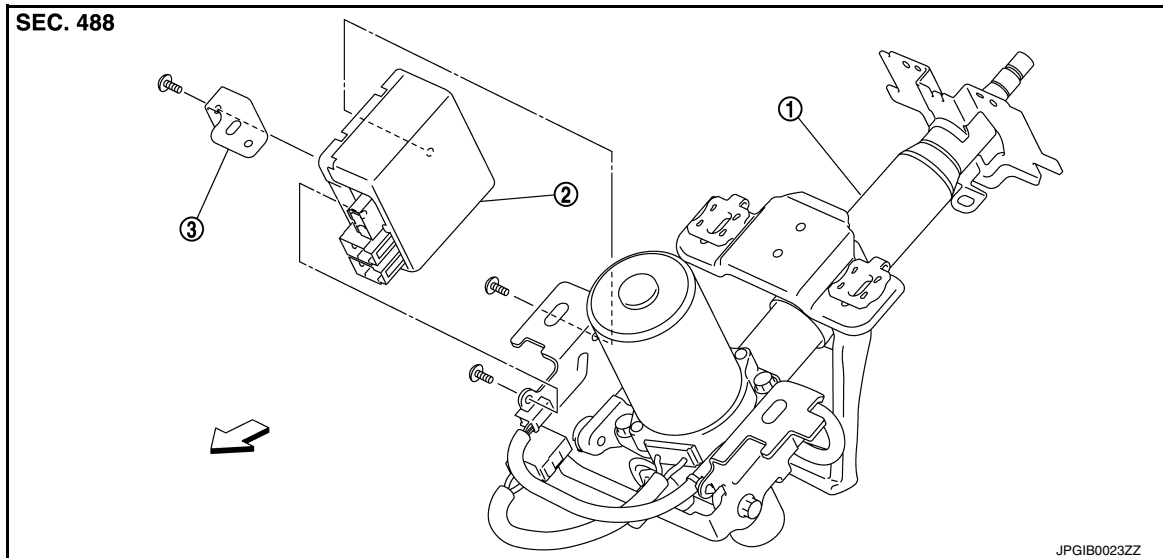
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

EPS CONTROL UNIT

Exploded View

INFOID:0000000012787042



1. Steering column assembly

2. EPS control unit

3. Bracket plate

⇐ Front

Removal and Installation

INFOID:0000000012787043

REMOVAL

CAUTION:

- Disconnect battery negative terminal before starting operations.
- Do not shock EPS control unit, e.g. drop or hit.
- Do not get EPS control unit wet with water or other liquid. Also, do not give EPS control unit a radical temperature change to avoid getting water drops.
- Do not disassemble or remodel EPS control unit, EPS motor, torque sensor, harness and harness connectors.

1. Remove steering column assembly. Refer to [ST-13, "Removal and Installation"](#).
2. Disconnect EPS motor harness connector.

CAUTION:

Hold and pull the harness connector housing, not pulling harness, when disconnecting harness connectors. Also, do not grip, collapse or apply excessive force to the harness connector.

3. Remove EPS control unit from steering column assembly.
4. Remove bracket plate from EPS control unit.

INSTALLATION

Installation is in the reverse order of removal.

- Check that harness is not damaged when installing EPS control unit. Also, check that EPS control unit is installed without pinching harness or trapping foreign materials.
- After installing steering column assembly, perform self-diagnosis with CONSULT to ensure correct operation. Refer to [STC-10, "CONSULT Function"](#).