SECTION STC
STEERING CONTROL SYSTEM

CONTENTS

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001182268

DETAIED FLOW

1. COLLECT THE INFORMATION FROM THE CUSTOMER

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the diagnosis worksheet.

>> GO TO 2.

2. PERFORM THE SELF-DIAGNOSIS

Check the DTC display with the self-diagnosis function. Refer to STC-7, "CONSULT-III Function (EPS)".

Is there any DTC displayed?

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

3. PERFORM THE SYSTEM DIAGNOSIS

Perform the diagnosis applicable to the displayed DTC. Refer to STC-23, "DTC No. Index".

>> GO TO 6.

4. CHECK THE WARNING LAMP FOR ILLUMINATION

Check that the warning lamp illuminate.

Is ON/OFF timing normal?

YES >> GO TO 5.
NO >> GO TO 2.

5. PERFORM THE DIAGNOSIS BY SYMPTOM

Perform the diagnosis applicable to the symptom.

>> GO TO 6.

6. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the specified malfunctioning parts.

>> GO TO 7.

7. FINAL CHECK

Perform the self-diagnosis again, and check that the malfunction is repaired completely. After checking, erase the self-diagnosis memory. Refer to STC-7, "CONSULT-III Function (EPS)".

Is no other DTC present and the repair completed?

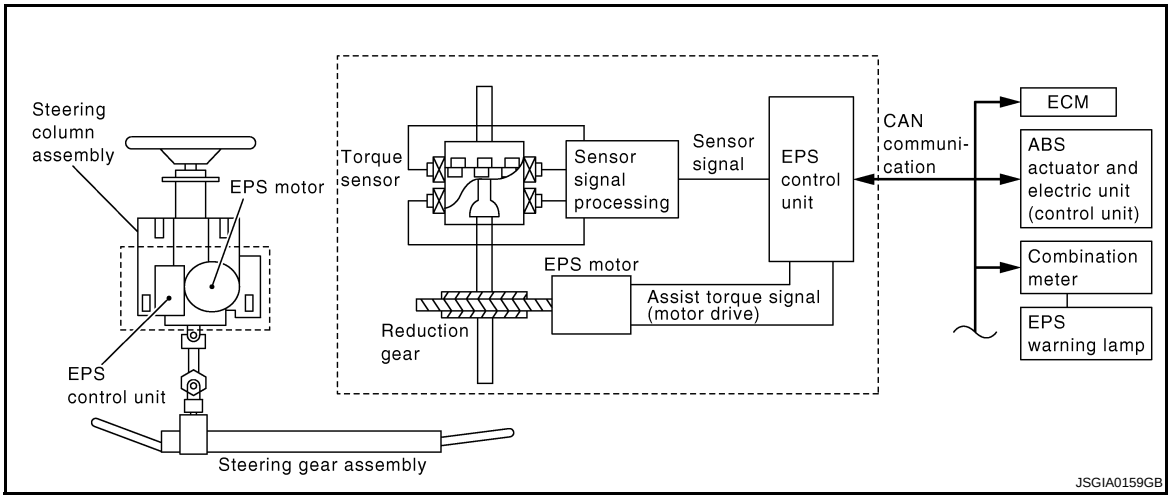
YES >> INSPECTION END
NO >> GO TO 3.

FUNCTION DIAGNOSIS

EPS SYSTEM

System Diagram

INFOID:0000000001182269



System Description

INFOID:0000000001182270

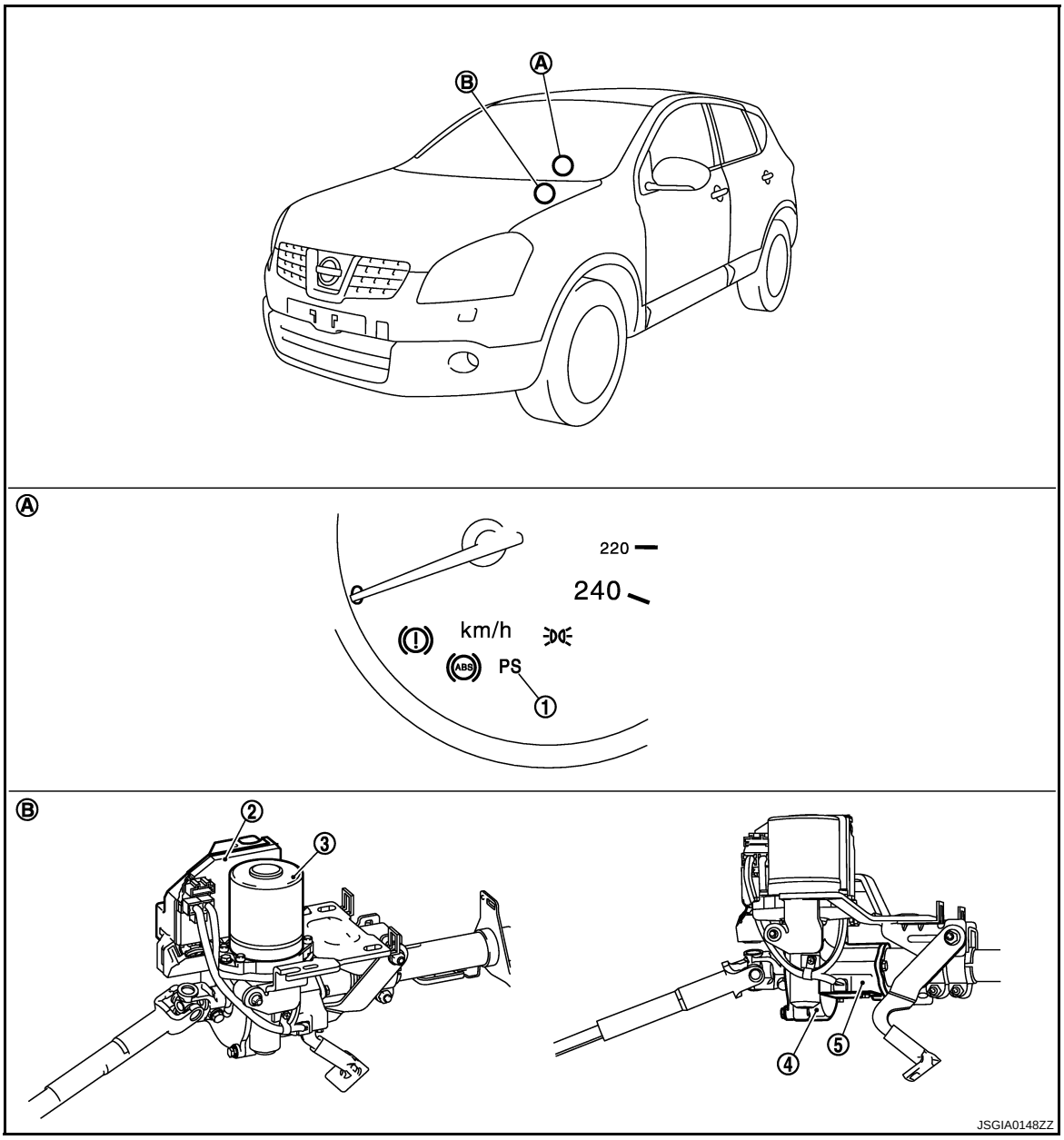
- EPS control unit performs an arithmetical operation on data, such as steering wheel turning force (sensor signal) from the torque sensor, vehicle speed signal, etc. Then it generates an optimum assist torque to the EPS motor according to the driving condition.
- EPS control unit decreases the output to EPS motor while extremely using the power steering function (e.g., full steering) for protecting EPS motor and EPS control unit (Protect overload status). While activating protect overload status, the assist torque gradually decreases, and the steering wheel turning force becomes heavy. The normal assist torque reactivates by not steering.
- In case of an error in the electrical system, the fail-safe function stops output signals to the EPS motor. Then the previous state is changed to the manual steering state.
- Self-diagnosis can be done with CONSULT-III.
- EPS control unit will decrease assistance under 2 conditions.

- Extensive steering at low speed will cause the ECU and MOTOR to heat up, once temperature reaches critical point ECU will reduce current to reduce heat up. System will recover as temperature lowers (reduced or no assistance).
- Holding steering on rack-end (full lock) for 1 second will cause the system to engage rack-end protection. This reduces assistance down to 40% in order to prevent heat up. Assistance is immediately returned to 100% when steering released or turned away from rack-end.

Component Parts Location

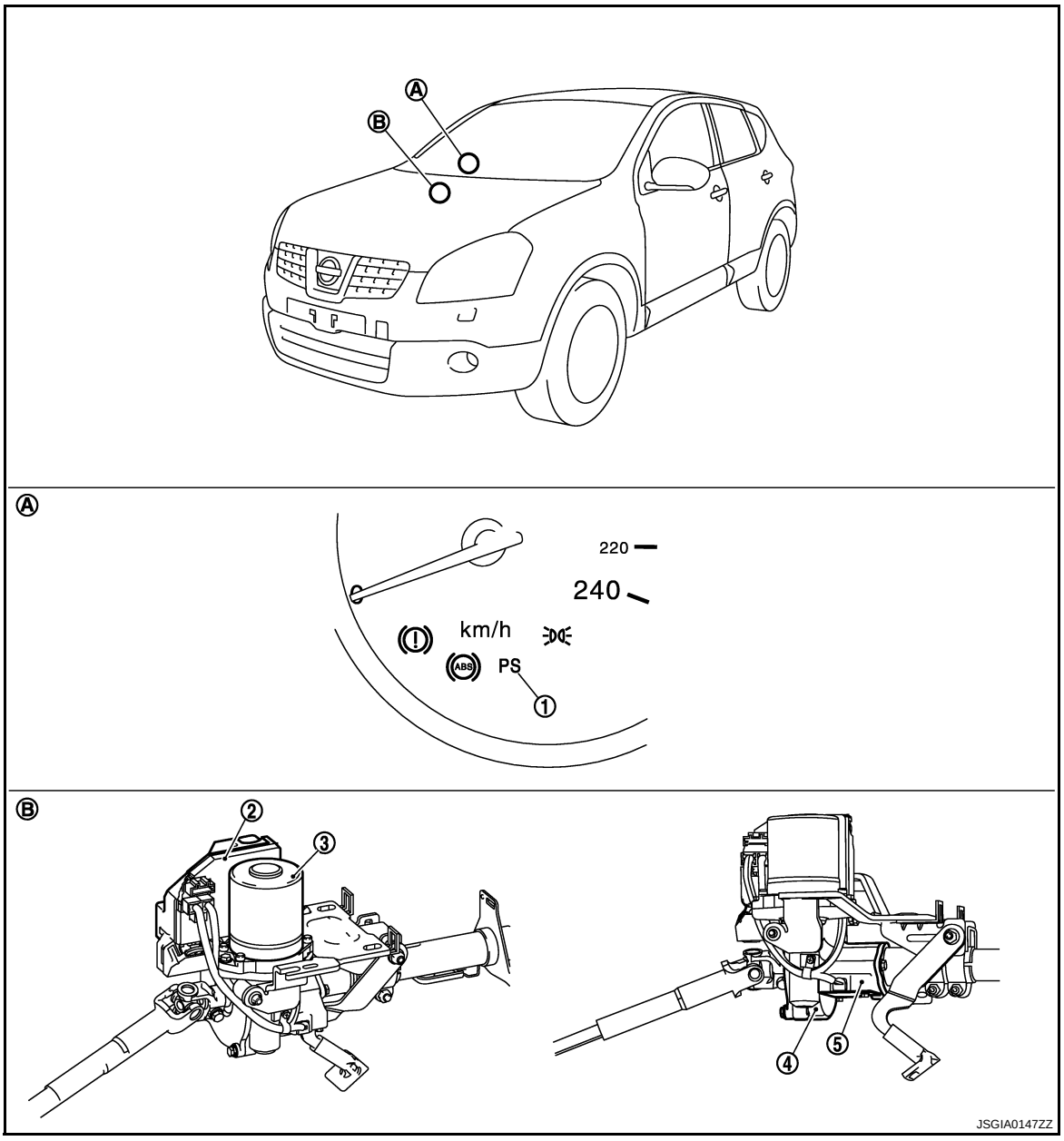
INFOID:0000000001182271

LHD models



1. EPS warning lamp
2. EPS control unit
3. EPS motor
4. Torque sensor
5. Reduction gear
A. Combination meter
B. Steering column assembly

RHD models



1. EPS warning lamp
2. EPS control unit
3. EPS motor
4. Torque sensor
5. Reduction gear
A. Combination meter
B. Steering column assembly

Component Description

INFOID:0000000001182272

Components parts	Reference
EPS control unit	STC-13, "Description"
EPS motor	STC-11, "Description"
Torque sensor	STC-10, "Description"
Reduction gear	Reduction gear increases the assist torque provided from EPS motor with worm gears, and outputs to the column shaft.
EPS warning lamp	Turn on when a malfunction occurs in the EPS system, and tells the driver the malfunction.

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

CONSULT-III Function (EPS)

INFOID:0000000001182273

FUNCTION

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

Diagnostic test mode	Function
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the EPS control unit can be read.
ECU part number	EPS control unit part number can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.

SELF-DIAG RESULTS MODE

Display Item List

Refer to STC-23, "DTC No. Index".

DATA MONITOR MODE

Display Item List

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 SIG (A)	Displays the current commanded value to EPS motor.
MOTOR CURRENT (A)	Displays the current value consumed by EPS motor.
ASSIST TORQUE (Nm)	Displays assist torque being output by the electric power steering.
C/U TEMP (°C)	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.
VEHICLE SPEED (km/h) or (MPH)	Vehicle speed is displayed from vehicle speed signal with CAN communication.
WARNING LAMP (On/Off)	EPS warning lamp control status is displayed.
ENGINE STATUS (STOP/RUN)	Engine speed is displayed from engine status signal with CAN communication.
MOTOR TEMP (°C)	Displays the temperature of EPS motor.
VHCL SPD CALC (km/h) or (MPH)	Displays vehicle speeds used for controlling EPS.

COMPONENT DIAGNOSIS

C1601 BATTERY POWER SUPPLY

Description

INFOID:0000000001182274

Power is supplied from the battery to EPS control unit.

DTC Logic

INFOID:0000000001182275

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1601	BATTERY VOLT	When the power supply malfunction supplied to EPS control unit is detected.	• Harness or connector • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
BATTERY VOLT

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-8, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182276

1.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.
4. Reconnect connector and then perform self-diagnosis.

Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.
NO >> Poor connection of connector terminal. Repair or replace connector.

2.CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EPS control unit harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. Check voltage between EPS control unit harness connector terminals and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M38	1	Ground	Battery voltage
M37	10		

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	1	Ground	Battery voltage
M37	10		Approx. 0 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning components.

3.CHECK EPS CONTROL UNIT GROUND CIRCUIT

1. Check continuity between EPS control unit harness connector terminal and ground.

EPS control unit		—	Continuity
Connector	Terminal		
M38	2	Ground	Existed

2. Connect EPS control unit harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK DTC

Start engine.

Does EPS warning lamp turn OFF?

YES >> EPS control unit is malfunction. Replace steering column assembly.
NO >> Perform self-diagnosis, repair or replace damaged parts.

Special Repair Requirement

INFOID:0000000001182277

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

C1604 TORQUE SENSOR

Description

INFOID:0000000001182278

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

DTC Logic

INFOID:0000000001182279

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1604	TORQUE SENSOR	Malfunction of the torque sensor in steering column assembly is detected.	• Harness or connector • Torque sensor • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
TORQUE SENSOR

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-10, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182280

1.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.
4. Reconnect connectors and then perform the self-diagnosis.

Is the “TORQUE SENSOR” [C1604] displayed?

YES >> Torque sensor is malfunction. Replace steering column assembly.
NO >> Poor connection of connector terminal. Repair or replace connector.

Special Repair Requirement

INFOID:0000000001182281

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

C1606 EPS MOTOR

Description

INFOID:0000000001182282

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

DTC Logic

INFOID:0000000001182283

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.	• Harness or connector • EPS motor • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
EPS MOTOR

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-11, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182284

1.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.
4. Reconnect connectors and then perform the self-diagnosis.

Is the “EPS MOTOR” [C1606] displayed?

YES >> EPS motor malfunctions. Replace steering column assembly.
NO >> Poor connection of connector terminal. Repair or replace connector.

Special Repair Requirement

INFOID:0000000001182285

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

C1607 EEPROM

Description

INFOID:0000000001182286

EPS control unit incorporates a memory function.

DTC Logic

INFOID:0000000001182287

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.	• Harness or connector • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
EEPROM

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-12, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182288

1.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.
4. Reconnect connectors and then perform the self-diagnosis.

Is the “EEPROM” [C1607] displayed?

YES >> EEPROM malfunctions. Replace steering column assembly. Refer to ST-10, "Exploded View".
NO >> Poor connection of connector terminal. Repair or replace connector.

Special Repair Requirement

INFOID:0000000001182289

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

C1608 CONTROL UNIT

Description

INFOID:0000000001182290

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 to the EPS motor according to the driving condition.

DTC Logic

INFOID:0000000001182291

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1608	CONTROL UNIT	When the internal malfunction is detected in EPS control unit.	• Harness or connector • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
CONTROL UNIT

Is above displayed on the self-diagnosis dislay?

YES >> Proceed to diagnosis procedure. Refer to STC-13, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182292

1.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.
4. Reconnect connectors and then perform self-diagnosis.

Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.
NO >> Poor connection of connector terminal. Repair or replace connector.

2.EPS CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EPS control unit harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. Check voltage between EPS control unit harness connector terminals and ground.

EPS control unit		—	Voltage
Connector	Terminal		
E38	1	Ground	Battery voltage
E37	10		

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

EPS control unit		—	Voltage
Connector	Terminal		
E38	1	Ground	Battery voltage
E37	10		Approx. 0 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning components.

3.CHECK EPS CONTROL UNIT GROUND CIRCUIT

1. Check continuity between EPS control unit harness connector terminal and ground.

EPS control unit		—	Continuity
Connector	Terminal		
E38	2	Ground	Existed

2. Connect EPS control unit harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK DTC

Start engine.

Does EPS warning lamp turn OFF?

YES >> EPS control unit is malfunction. Replace steering column assembly.
NO >> Perform self-diagnosis, repair or replace damaged parts.

Special Repair Requirement

INFOID:0000000001182293

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

U1200 VEHICLE SPEED SIGNAL (ABS)

Description

INFOID:0000000001182294

EPS control unit receives the vehicle speed signal from ABS actuator and electric unit (control unit) with CAN communication line.

DTC Logic

INFOID:0000000001182295

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1200	CAN VHCL SPEED (ABS)	Abnormal vehicle speed signals received with CAN communication are detected.	• Harness or connector • CAN communication line • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
CAN VHCL SPEED (ABS)

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-15, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182296

1.CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SYSTEM

Perform ABS actuator and electric unit (control unit) self-diagnosis. Repair or replace items indicated, then perform ABS actuator and electric unit (control unit) self-diagnosis again. Refer to BRC-17, "CONSULT-III Function (ABS)" (With ABS models), BRC-95, "CONSULT-III Function (ABS)" (With ESP models).

Is any item indicated on the self-diagnosis display?

YES >> Repair or replace malfunctioning components.
NO >> GO TO 2.

2.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.
4. Reconnect connectors and then perform the self-diagnosis.

Is any item indicated on the self-diagnosis display?

YES >> EPS control unit malfunctions. Replace steering column assembly. Refer to ST-10, "Exploded View".
NO >> Poor connection of connector terminal. Repair or replace connector.

Special Repair Requirement

INFOID:0000000001182297

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

U14FF VEHICLE SPEED SIGNAL (METER)

Description

INFOID:0000000001182298

EPS control unit receives the vehicle speed signal from combination meter with CAN communication line.

DTC Logic

INFOID:0000000001182299

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U14FF	CAN VHCL SPEED (METER)	Abnormal vehicle speed signals received with CAN communication are detected.	• Harness or connector • CAN communication line • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
CAN VHCL SPEED (METER)

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-16, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182300

1.CHECK COMBINATION METER SYSTEM

Perform combination meter self-diagnosis. Repair or replace items indicated, then perform combination meter self-diagnosis again. Refer to MWI-27, "CONSULT-III Function (METER/M&A)".

Is any item indicated on the self-diagnosis display?

YES >> Repair or replace malfunctioning components.
NO >> GO TO 2.

2.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.
4. Reconnect connectors and then perform the self-diagnosis.

Is any item indicated on the self-diagnosis display?

YES >> EPS control unit malfunctions. Replace steering column assembly. Refer to ST-10, "Exploded View".
NO >> Poor connection of connector terminal. Repair or replace connector.

Special Repair Requirement

INFOID:0000000001182301

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000001182302

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 transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001182303

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	When EPS control unit is not transmitting or receiving CAN communication signal for 2 seconds or more.	• Harness or connector • CAN communication line • EPS control unit

DTC CONFIRMATION PROCEDURE

1.CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
CAN COMM CIRCUIT

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to STC-17, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001182304

1.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.
4. Reconnect connector and perform self-diagnosis.

Is above displayed on the self-diagnosis display?

YES >> Go to LAN-13, "Trouble Diagnosis Flow Chart".
NO >> INSPECTION END

Special Repair Requirement

INFOID:0000000001182305

1.ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the EPS control unit. Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description". (With ESP models)

>> END

ECU DIAGNOSIS

EPS CONTROL UNIT

Reference Value

INFOID:0000000001182306

VALUES ON THE DIAGNOSIS TOOL

CAUTION:

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

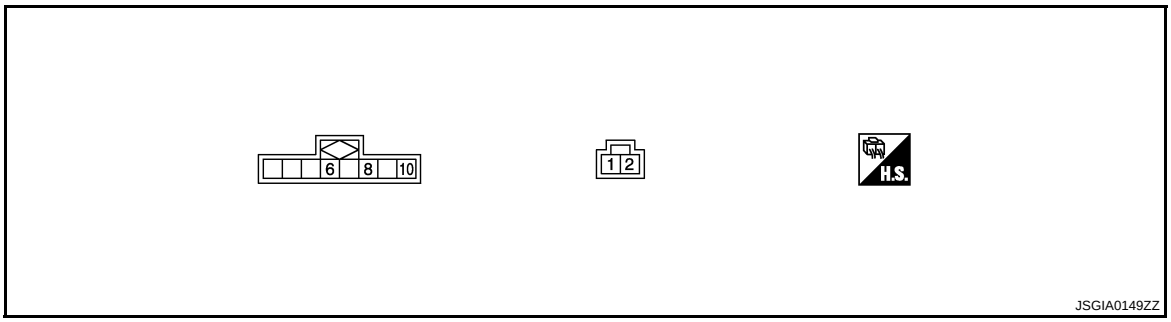
Monitor item (Unit)	Content	Condition		Display value
BATTERY VOLT (V)	Power supply voltage for EPS control unit	Ignition switch: ON		Battery voltage
TORQUE SENSOR (Nm)	Steering wheel turning force	Engine running	Steering wheel: Not steering (There is no steering force)	0.0 Nm
			Steering wheel: Right turn	Positive value (Nm)
			Steering wheel: Left turn	Negative value (Nm)
MOTOR SIG (A)	Command current to EPS motor	Engine running	Steering wheel: Not steering (There is no steering force)	0.0 A
			Steering wheel: Right turn	Negative value (A)
			Steering wheel: Left turn	Positive value (A)
MOTOR CURRENT (A)	Consumption current of EPS motor	Engine running	Steering wheel: Not steering (There is no steering force)	0.0 A
			Steering wheel: Steering	0 – 105.0 A*1 (The value is changed according to steering left or right)
ASSIST TORQUE (Nm)	Displays assist torque being output by the EPS.	Engine running	Steering wheel: Not steering (There is no steering force)	0.0 Nm
			Steering wheel: Right turn	Negative value (Nm)
			Steering wheel: Left turn	Positive value (Nm)
ASSIST LEVEL (%)	Assist available level	Engine running		100 % *2
VEHICLE SPEED (km/h) or (mph)	Vehicle speed	Vehicle stopped		0 km/h (0 mph)
		While driving		Approximately equal to the indication on speed-ometer (inside of ±10%)*3
WARNING LAMP (On/Off)	EPS warning lamp condition	EPS warning lamp: ON		On
		EPS warning lamp: OFF		Off
ENGINE STATUS (RUN/STOP)	Engine status	Engine stopped (Engine speed: Less than 400 rpm)		STOP
		Engine running (Engine speed: 400 rpm or more)		RUN

*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.

TERMINAL LAYOUT



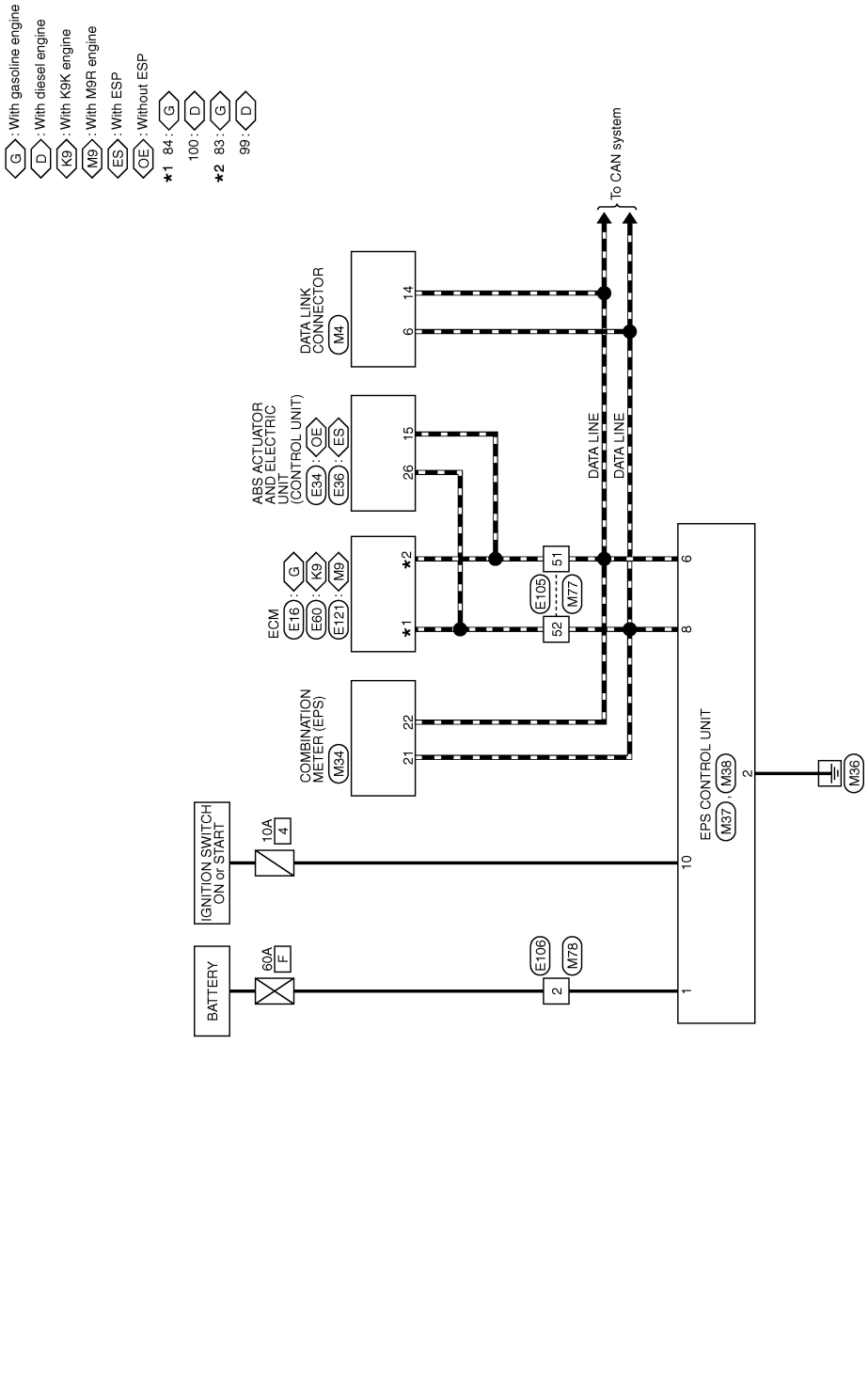
PHYSICAL VALUES

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

Wiring Diagram - ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM -

INFOID:0000000001182307

ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM



2007/04/27

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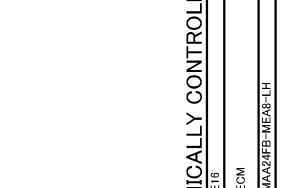
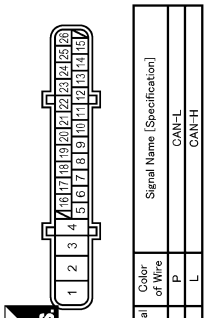
ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

Connector No.	E16
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH



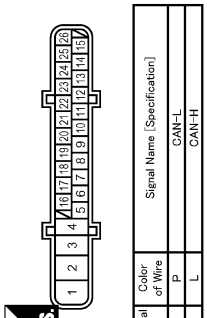
Terminal No.	Color of Wire	Signal Name [Specification]
83	P	CAN-L1
84	L	CAN-H1

Connector No.	E34
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
Connector Type	BAA22FB-AHZ4-LH



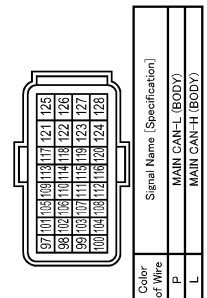
Terminal No.	Color of Wire	Signal Name [Specification]
15	P	CAN-L
26	L	CAN-H

Connector No.	E36
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
Connector Type	BAA22FB-AHZ4-LH



Terminal No.	Color of Wire	Signal Name [Specification]
15	P	CAN-L
26	L	CAN-H

Connector No.	E60
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH



Terminal No.	Color of Wire	Signal Name [Specification]
99	P	MAIN CAN-L (BODY)
100	L	MAIN CAN-H (BODY)

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-NS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
51	P	–
52	L	–

Connector No.	E106
Connector Name	WIRE TO WIRE
Connector Type	L02MB-MC

Terminal No.	Color of Wire	Signal Name [Specification]
2	W	–

Connector No.	E121
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
99	P	MAIN CAN-L(BODY)
100	L	MAIN CAN-H(BODY)

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

Terminal No.	Color of Wire	Signal Name [Specification]
6	L	–
14	P	–

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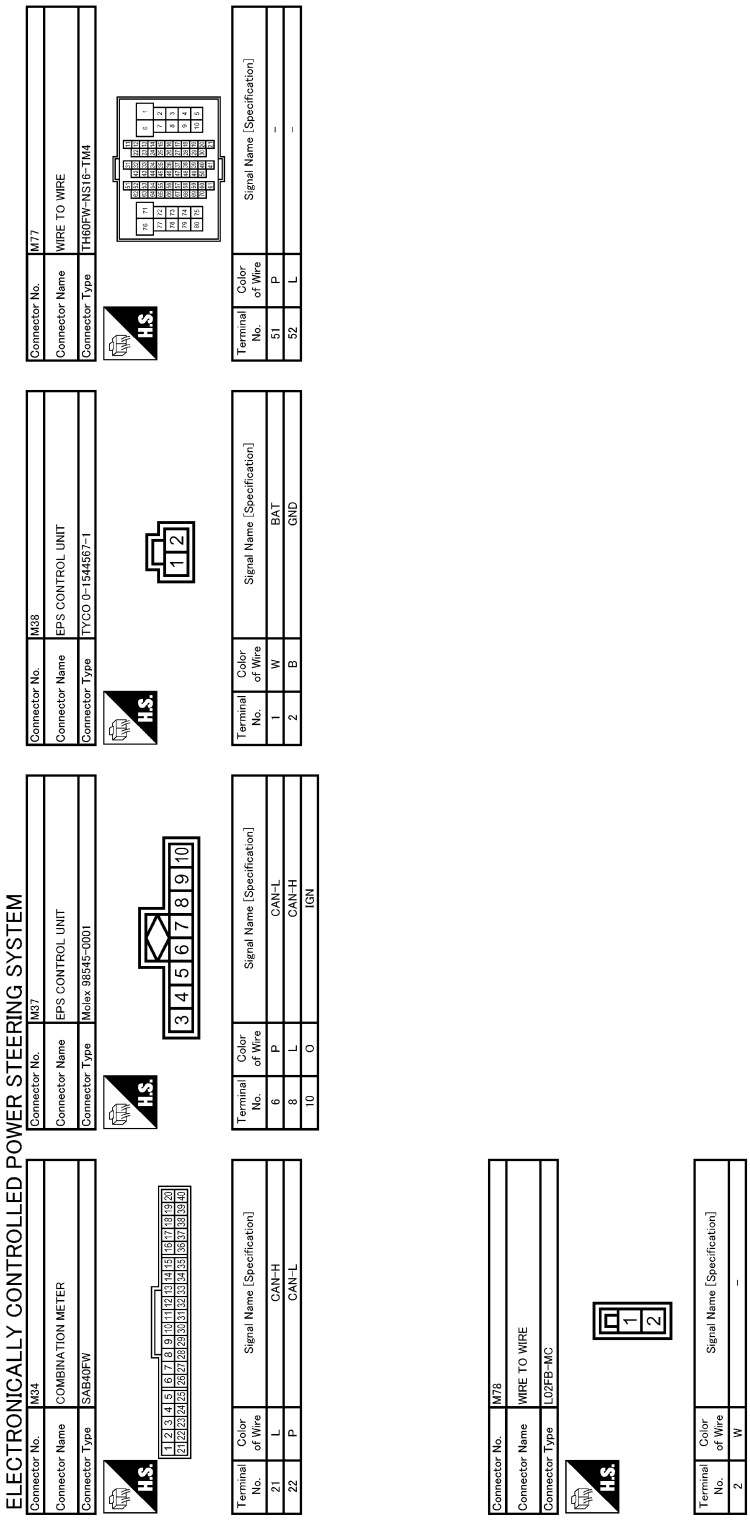


JCGWA0042GE

Fail-Safe

INFOID:0000000001182308

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

DTC No. Index

INFOID:0000000001182309

DTC	Items (CONSULT screen terms)	Reference
C1601	BATTERY VOLT	STC-8, "Description"
C1604	TORQUE SENSOR	STC-10, "Description"
C1606	EPS MOTOR	STC-11, "Description"
C1607	EEPROM	STC-12, "Description"
C1608	CONTROL UNIT	STC-13, "Description"
U1200	CAN VHCL SPEED (ABS)	STC-15, "Description"
U14FF	CAN VHCL SPEED (METER)	STC-16, "Description"
U1000	CAN COMM CIRCUIT	STC-17, "Description"

SYMPTOM DIAGNOSIS

EPS WARNING LAMP DOES NOT TURN ON

Diagnosis Procedure

INFOID:0000000001182310

1. CHECK SYSTEM FOR CAN COMMUNICATION LINE

Perform self-diagnosis. Refer to STC-7, "CONSULT-III Function (EPS)".

Is the “CAN COMM CIRCUIT [U1000]” displayed?

YES >> Perform trouble diagnosis for CAN communication line.
NO >> GO TO 2.

2. CHECK EPS CONTROL UNIT

Check EPS control unit input/output signal. Refer to STC-18, "Reference Value".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace damaged parts.

3. CHECK COMBINATION METER SELF-DIAGNOSIS RESULTS

Perform combination meter self-diagnosis. Refer to MWI-27, "CONSULT-III Function (METER/M&A)".

is self-diagnosis results indicated?

YES >> Repair or replace malfunctioning components.
NO >> GO TO 4.

4. SYMPTOM CHECK

Check again.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace combination meter.

EPS WARNING LAMP DOES NOT TURN OFF

Diagnosis Procedure

INFOID:0000000001182311

1.CHECK SELF-DIAGNOSIS RESULTS

Perform EPS control unit self-diagnosis.

Is any malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 2.

2.CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EPS control unit harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. Check voltage between EPS control unit harness connector terminals and ground.

EPS control unit		—	Voltage
Connector	Terminal		
M38	1	Ground	Battery voltage
M37	10		

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

EPS control unit		—	Voltage
Connector	Terminal		
M38	1	Ground	Battery voltage
M37	10		Approx. 0 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning components.

3.CHECK EPS CONTROL UNIT GROUND CIRCUIT

1. Check continuity between EPS control unit harness connector terminal and ground.

EPS control unit		—	Continuity
Connector	Terminal		
M38	2	Ground	Existed

2. Connect EPS control unit harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EPS CONTROL UNIT PIN TERMINAL

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace damaged parts.

5.CHECK COMBINATION METER SELF-DIAGNOSIS RESULTS

Perform combination meter self-diagnosis. Refer to MWI-27, "CONSULT-III Function (METER/M&A)".

is self-diagnosis results indicated?

YES >> Repair or replace malfunctioning components.

NO >> GO TO 6.

6. CHECK VEHICLE SPEED SIGNAL FROM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Perform self-diagnosis with ABS actuator and electric unit (control unit).
- Without ESP: BRC-17, "CONSULT-III Function (ABS)"
- With ESP: BRC-95, "CONSULT-III Function (ABS)"

Is any malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 7.

7. CHECK ENGINE STATUS SIGNAL

Perform self-diagnosis with ECM.
- HR16DE (with EURO-OBD): ECH-89, "CONSULT-III Function".
- HR16DE (Without EURO-OBD): ECH-419, "CONSULT-III Function".
- MR20DE (with EURO-OBD): ECM-91, "CONSULT-III Function".
- MR20DE (without EURO-OBD): ECM-425, "CONSULT-III Function".
- K9K: ECK-63, "Diagnosis Description".
- M9R: ECR-101, "CONSULT-III Function".

Is the malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 8.

8. SYMPTOM CHECK

Check again.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace combination meter. Refer to MWI-78, "Exploded View".

STEERING WHEEL TURNING FORCE IS HEAVY OR LIGHT

Diagnosis Procedure

INFOID:0000000001182312

1.CHECK SYSTEM FOR CAN COMMUNICATION LINE

Perform EPS control unit self-diagnosis.

Is the “CAN COMM CIRCUIT [U1000]” displayed.

YES >> Perform trouble diagnosis for CAN communication line. Refer to STC-17, "Description".
NO >> GO TO 2.

2.CHECK VEHICLE SPEED SIGNAL FROM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Perform self-diagnosis with ABS actuator and electric unit (control unit).
- Without ESP: BRC-17, "CONSULT-III Function (ABS)"
- With ESP: BRC-95, "CONSULT-III Function (ABS)"

Is any malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 3.

3.CHECK COMBINATION METER SIGNAL

Perform self-diagnosis with combination meter. Refer to MWI-27, "CONSULT-III Function (METER/M&A)".

Is the malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 4.

4.CHECK ENGINE STATUS SIGNAL

Perform self-diagnosis with ECM.
- HR16DE (with EURO-OBD): ECH-89, "CONSULT-III Function".
- HR16DE (Without EURO-OBD): ECH-419, "CONSULT-III Function".
- MR20DE (with EURO-OBD): ECM-91, "CONSULT-III Function".
- MR20DE (without EURO-OBD): ECM-425, "CONSULT-III Function".
- K9K: ECK-63, "Diagnosis Description".
- M9R: ECR-101, "CONSULT-III Function".

Is the malfunction detected by self-diagnosis?

YES >> Check the malfunctioning system.
NO >> GO TO 5.

5.CHECK EPS CONTROL UNIT

Check EPS control unit input/output signal. Refer to STC-18, "Reference Value".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace damaged parts.

6.CHECK STEERING WHEEL TURNING FORCE

Check steering wheel turning force. Refer to ST-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace malfunctioning components.

7.SYMPTOM CHECK

Check again.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check the steering wheel turning force for mechanical malfunction. Refer to ST-7, "Inspection".

UNBALANCE STEERING WHEEL TURNING FORCE AND RETURN BETWEEN RIGHT AND LEFT

Diagnosis Procedure

INFOID:0000000001182313

1.CHECK EPS WARNING LAMP

Confirm EPS warning lamp during engine running.

Does EPS warning lamp turn OFF?

YES >> GO TO 2.
NO >> Go to STC-25, "Diagnosis Procedure".

2.CHECK WHEEL ALIGNMENT

Check wheel alignment. Refer to FSU-7, "Wheel Alignment Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Adjust wheel alignment. Refer to FSU-7, "Wheel Alignment Inspection".

3.CHECK EPS CONTROL UNIT

Check EPS control unit input/output signal. Refer to STC-18, "Reference Value".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace damaged parts.

4.CHECK STEERING WHEEL TURNING FORCE

Check steering wheel turning force. Refer to ST-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace malfunctioning components.

5.SYMPTOM CHECK

Check again.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check the steering wheel turning force for mechanical malfunction. Refer to ST-7, "Inspection".

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION)

Diagnosis Procedure

INFOID:0000000001182314

1.CHECK EPS WARNING LAMP

Confirm EPS warning lamp during engine running.

Does EPS warning lamp turn OFF?

YES >> GO TO 2.
NO >> Go to STC-25, "Diagnosis Procedure".

2.CHECK STEERING COLUMN INTERMEDIATE SHAFT

Check the connection between intermediate shaft and the mounting part of steering column assembly and steering gear assembly. Refer to ST-10, "Exploded View".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK EPS CONTROL UNIT

Check EPS control unit input/output signal. Refer to STC-18, "Reference Value".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Check EPS control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace damaged parts.

4.SYMPTOM CHECK

Check again.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check the steering wheel turning force for mechanical malfunction. Refer to ST-7, "Inspection".

PRECAUTION

PRECAUTIONS

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

INFOID:0000000001583066

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 AIRBAG” and “SEAT BELT” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIRBAG”.**
- **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.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001583067

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the 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. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

Service Notice or Precautions for EPS System

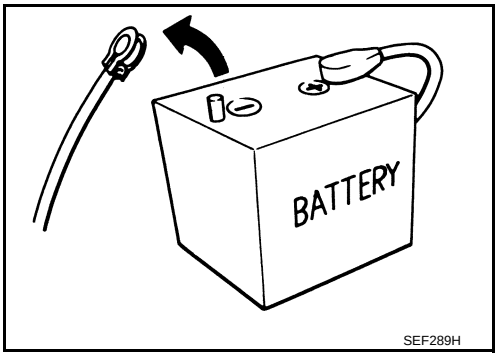
INFOID:0000000001182317

CAUTION:

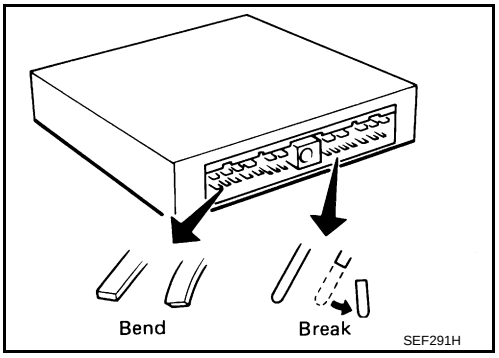
Check the following item when performing the trouble diagnosis.

- **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.**

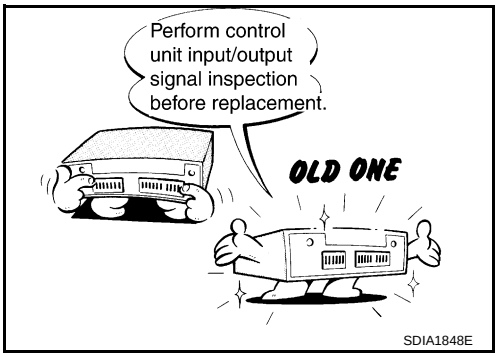
- **Check if the connection of steering column assembly and steering gear assembly is proper (there is not looseness of mounting bolts, damage of rods, boots or sealants, and leakage of grease, etc).**
- **Check if the wheel alignment is adjusted properly.**
- **Check if there is any damage or modification 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”.**



- **When connecting or disconnecting pin connectors into or from EPS control unit, take care not to damage pin terminals (bend or break).**
  When connecting pin connectors, make sure that there are no bends or breaks on EPS control unit pin terminal.



- **Before replacing EPS control unit, perform EPS control unit input/output signal inspection and make sure whether EPS control unit functions properly or not. Refer to STC-18, "Reference Value".**



ON-VEHICLE REPAIR

EPS CONTROL UNIT

Removal and Installation

INFOID:0000000001182318

CAUTION:
When replacing EPS control unit, replace steering column assembly. Refer to ST-10, "Removal and Installation".