SECTION STC
STEERING CONTROL SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:0000000013658872

Risk of injury

There is a risk of injury caused by parts becoming projectiles if uncontrolled deployment of air bag or seat belt pre-tensioner occurs, or by storing air bag with the deployment side facing downwards. When scrapping air bag or seat belt pre-tensioner by means of controlled deployment, there is also a danger present if a sufficiently safe distance is not maintained, or if opening using cutting torches or other cutting tools, or due to smelting or if parts that are not yet triggered are exposed to a blaze or a smoldering fire at landfills.

Safety instructions/precautions

- Removed air bag must always be stored with deployment side facing up.
- Acquisition, transportation, storage, testing and assembly work should only be performed or supervised by properly trained personnel.
- Install air bag or seat belt pre-tensioner immediately following retrieval from storage.
- Air bag and seat belt pre-tensioner must be protected from flying sparks, open fires and temperature exceeding 100°C (212°F).
- Never transport air bag and seat belt pre-tensioner in the passenger compartment. Store them securely in the luggage room of the vehicle in their original replacement part packaging and secure them so that they cannot slip around.
- Never allow air bag and seat belt pre-tensioner to come into contact with grease, oil, or cleaning agents.
- Perform system tests using approved testing equipment only, and only when the units are properly installed and the vehicle is unoccupied.
- Before the initial hookup of the battery or an external power supply, the ignition must be switched on and the vehicle unoccupied.
- Air bag and seat belt pre-tensioner that fall from a height of more than 0.5 m must be replaced.
- When scrapping by means of controlled deployment of air bag and seat belt pre-tensioner, a safe distance of at least 10 m must be maintained.
- Before starting work on air bag and seat belt pre-tensioner and work on components that are connected to air bag and seat belt pre-tensioner or require and intervention in their electric circuit (e.g. when removing the steering wheel):
- Disconnect any external power sources (e.g. charger).
- Disconnect and insulate ground line of battery
- Before starting bodywork in combination with welding or retrofitting, during which work is performed on uninsulated, current-carrying lines or require an intervention in their electric circuit (e.g. when removing the steering wheel):
- Disconnect any external power sources (e.g. charger).
- Disconnect and insulate ground line of battery.
- During welding, disconnect plug connection and from control unit of air bag.
- When the air bag deploys, the pyrofuse activates and the power source from the battery is disconnected. This prevents possible fires caused by electric leakage after an accident occurs.

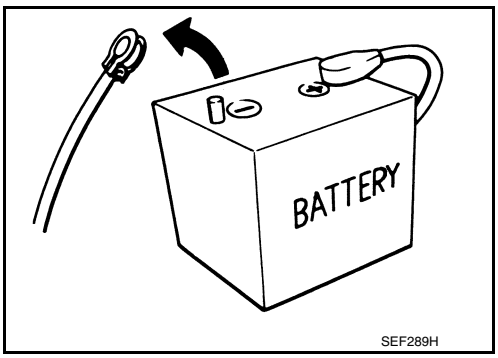
Precautions for Removing Battery Terminal

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When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:



BR08DE	: 4 minutes	YD25DDTi	: 2 minutes
D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		

NOTE:
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

NOTE:
- Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
- Example of high-load driving
  - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
  - Driving for 30 minutes or more on a steep slope.

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

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

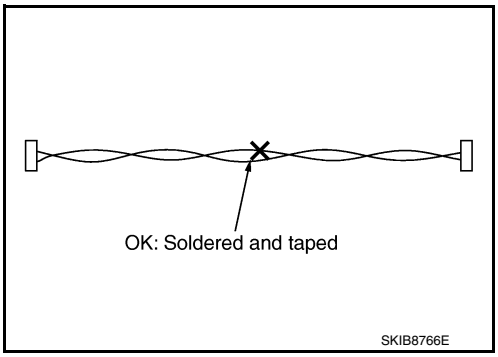
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

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

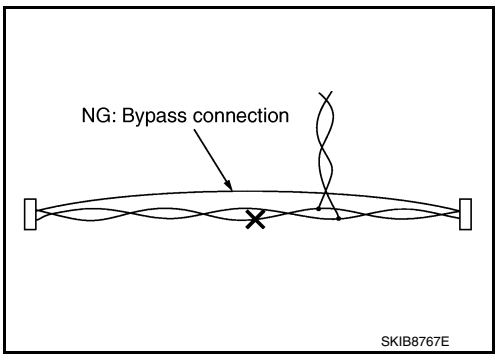
Precaution for Harness Repair

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- Solder the repair part, and wrap it with tape. [Twisted wire fray must be 110 mm (4.33 in) or less.]



- Never bypass the repair point with wire. (If it is bypassed, the turnout point cannot be separated and the twisted wire characteristics are lost.)

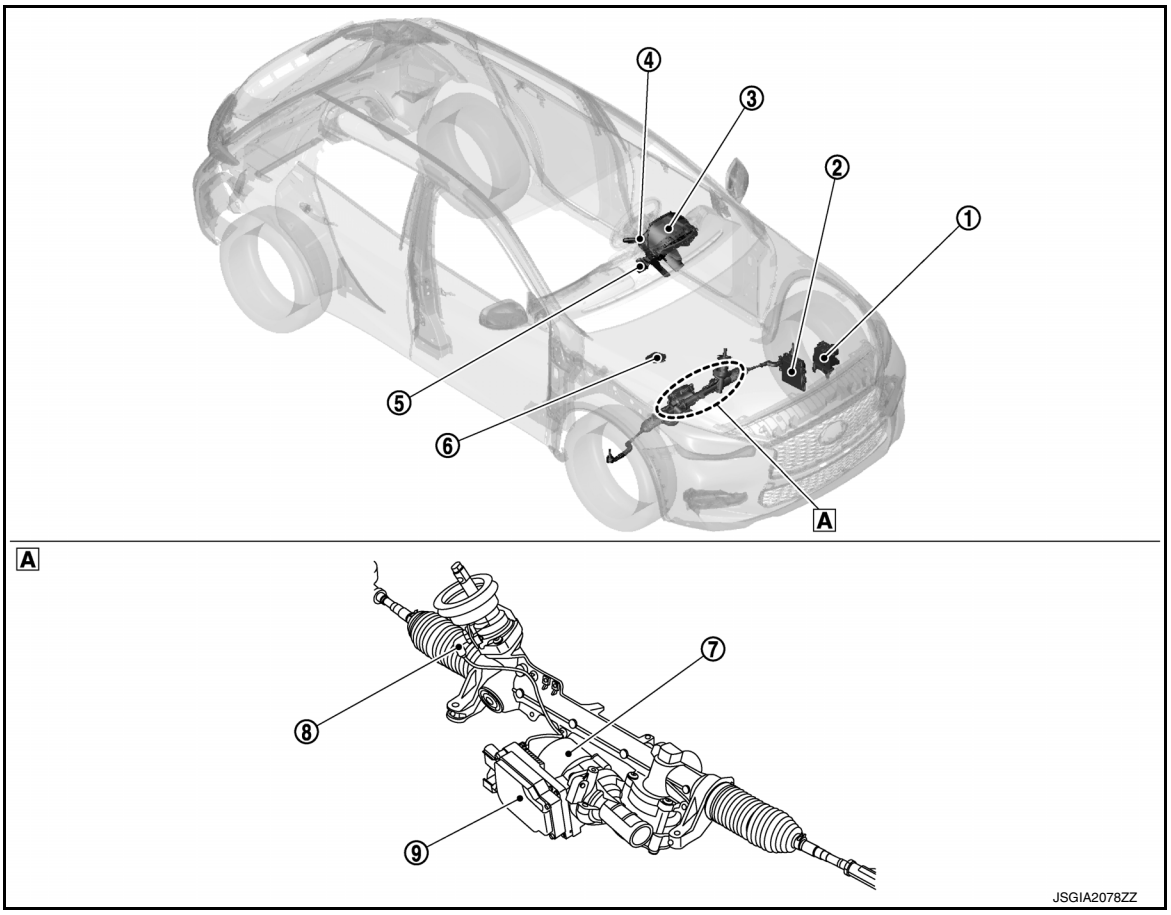


SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

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A Steering gear assembly

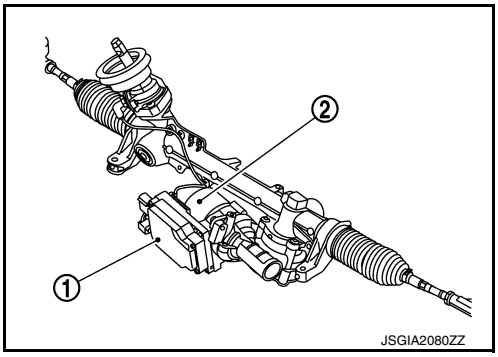
No.	Component	Function
①	Electronic stability program control unit	• Transmits mainly the following signals to EPS control unit via CAN communication. - Front LH wheel speed signal - Front RH wheel speed signal - Rear LH wheel speed signal - Rear RH wheel speed signal - Steering assistance torque request signal - Yaw rate signal - Side G signal • For detailed installation location, refer to BRC-29, "Component Parts Location".
②	ECM	• Transmits mainly the following signal to EPS control unit via CAN communication. - Engine speed signal • For detailed installation location, refer to EC-27, "Component Parts Location".

No.	Component	Function
③	Combination meter	• Receives mainly the following signals from EPS control unit via CAN communication. - EPS warning message signal • For detailed installation location, refer to MWI-7, "METER SYSTEM : Component Parts Location".
④	Steering column control module	• Transmits mainly the following signals to EPS control unit via CAN communication. - Steering angle sensor signal • For detailed installation location, refer to BCS-9, "STEERING COLUMN CONTROL SYSTEM : Component Parts Location".
⑤	Electronic ignition switch control unit	• Transmits mainly the following signal to EPS control unit via CAN communication. - Ignition switch ON signal - Battery voltage signal • For detailed installation location, refer to PCS-5, "Component Parts Location".
⑥	Sonar control unit	• Transmits mainly the following signals to EPS control unit via CAN communication. - Park assist status signal - Steering angle command signal • Receives mainly the following signals from EPS control unit via CAN communication. - EPS control unit status signal • For detailed installation location, refer to SN-6, "Component Parts Location".
⑦	EPS actuator	STC-6, "EPS Control Unit, EPS Actuator"
⑧	EPS torque sensor	STC-7, "EPS Torque Sensor"
⑨	EPS control unit	STC-6, "EPS Control Unit, EPS Actuator"

EPS Control Unit, EPS Actuator

INFOID:0000000013658805

EPS control unit ① and EPS actuator ② are installed to steering gear assembly.



EPS CONTROL UNIT

EPS control unit has the following functions:
- Reading in of signals
- Evaluation of input factors
- Actuation of components
- Transmission of requests/information

Reading in of Signals

The input factors are read in over the following connections:
- Direct line
- CAN communication line

Direct line
- The signals from the EPS torque sensor read in via a direct line.

CAN communication line

- The signals are read in from each control unit via CAN communication. For detail, refer to STC-8, "EPS SYSTEM : System Description".

Evaluation of Input Factors

The input factors which are read in are evaluated by the integrated microprocessor, the relevant components are then actuated and requests/information are output.

Actuation of Components

EPS actuator is actuated directly.

Transmission of Requests/Information

The requirements/information are sent to each control unit via CAN communication. For detail, refer to STC-8, "EPS SYSTEM : System Description".

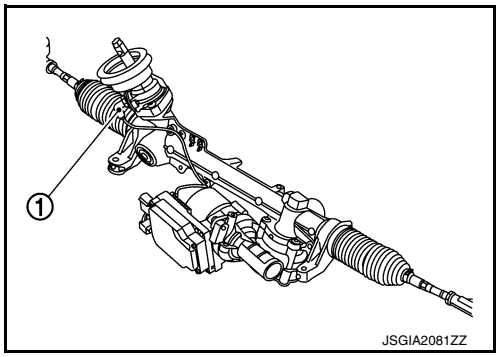
EPS ACTUATOR

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

EPS Torque Sensor

INFOID:0000000013658806

- EPS torque sensor ① is installed to steering gear assembly.
- EPS torque sensor detects the steering torque, and transmits the signal to EPS control unit.

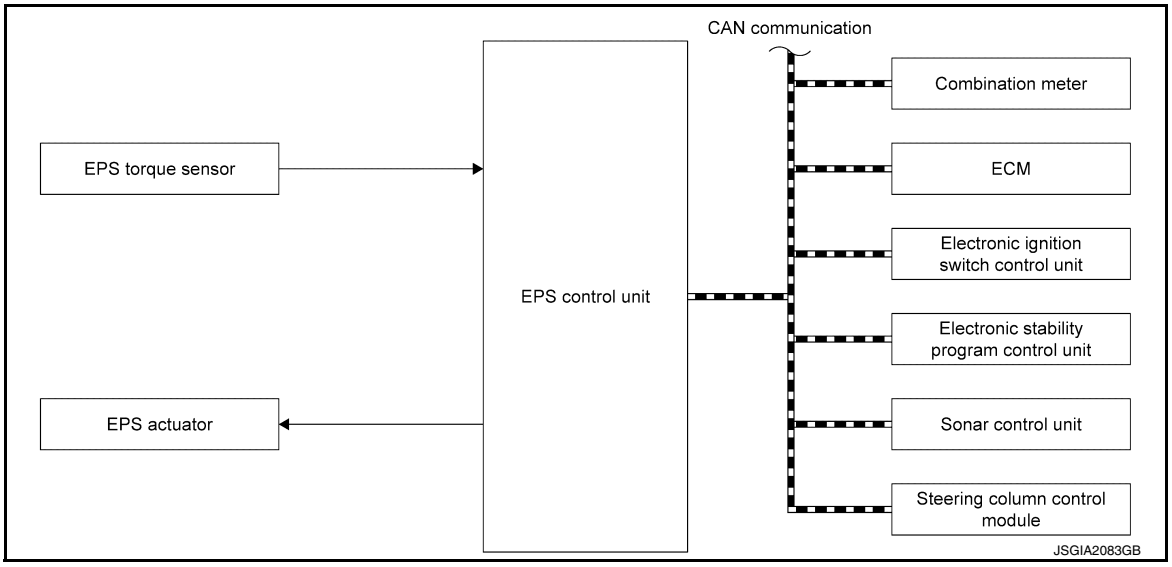


SYSTEM
EPS SYSTEM
EPS SYSTEM : System Description

INFOID:0000000013658807

- EPS system consists of the rack-and-pinion steering gear, the EPS torque sensor, the EPS actuator motor and the EPS control unit.
- EPS system performs continuous, speed-proportional power steering control.
- The advantages compared to hydraulic power steering are:
- Improved steering feel
- Fuel saving
- Hydraulic fluid not required
- Compact design
- Speed-dependent power assistance
- Steering return is assisted
- Diagnosis capability
- EPS system comprises the following sub-functions:
- Power steering function
- Steering assist function
- Parking assist function
- Reducing holding torque function
- Fail-safe function
- Display the warning massage function (on combination meter)

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL

Major signal transmission between each unit via communication lines is shown in the following table.

Component	Signal description
Electronic stability program control unit	• Transmits mainly the following signals to EPS control unit via CAN communication. - Front LH wheel speed signal - Front RH wheel speed signal - Rear LH wheel speed signal - Rear RH wheel speed signal - Steering assistance torque request signal - Yaw rate signal - Side G signal
ECM	• Transmits mainly the following signal to EPS control unit via CAN communication. - Engine speed signal
Combination meter	• Receives mainly the following signals from EPS control unit via CAN communication. - EPS warning message signal

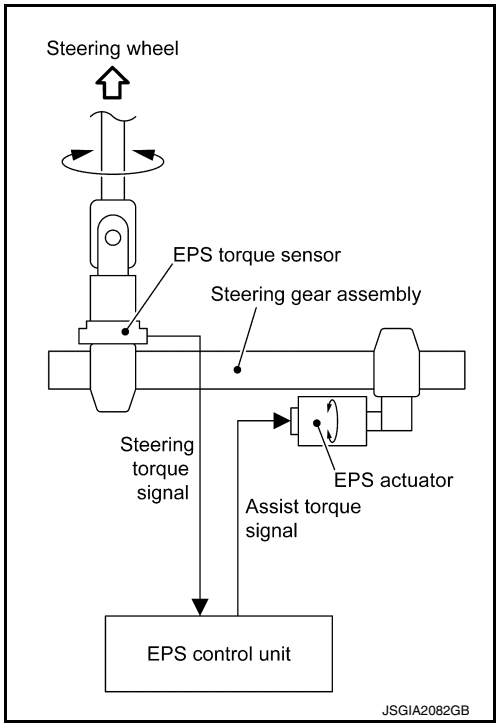
Component	Signal description
Steering column control module	• Transmits mainly the following signals to EPS control unit via CAN communication. - Steering angle sensor signal
Electronic ignition switch control unit	• Transmits mainly the following signal to EPS control unit via CAN communication. - Ignition switch ON signal - Battery voltage signal
Sonar control unit	• Transmits mainly the following signals to EPS control unit via CAN communication. - Park assist status signal - Steering angle command signal • Receives mainly the following signals from EPS control unit via CAN communication. - EPS control unit status signal

PRECONDITION OF THE FUNCTION

- The precondition is that the ignition switch is ON.
- The ignition switch ON signal is sent by the electronic ignition switch control unit to EPS control unit via CAN communication. The engine speed signal is sent by ECM to EPS control unit via CAN communication.

POWER STEERING FUNCTION

- The EPS control unit requires the following information to calculate the power steering required:
- Current steering moment from EPS torque sensor
- Current wheel speeds determined by each axle rpm sensor and made available by the electronic stability program control unit via CAN communication.
- Steering wheel angle and steering speed is sent by the steering wheel angle sensor in the steering column tube module control unit via CAN communication.
- Current engine speed (> 400 rpm) is send by ECM via CAN communication.
- EPS control unit uses this information to calculate the steering assistance to be set from the stored characteristics map and activates the EPS actuator accordingly.
- The direction of rotation of the EPS actuator depends on the direction of movement of the steering wheel.
- EPS system is transmitted from the EPS actuator to the rack-and-pinion steering gear, thereby supporting the steering torque applied by the driver.
- When the vehicle is at a standstill, no power steering is available if the engine and ignition are switched off. With the stop/start function, reduced power steering is available when the vehicle is at a standstill if the engine was switched off by the stop/start function. The EPS system is deactivated after the ignition is switched off. Power steering is active if the vehicle is maneuvered when the engine is off and the ignition is switched on.



STEERING ASSIST FUNCTION

- The steering assistance function helps the driver to achieve an optimum steering reaction in critical driving situations.
- Steering assistance is provided with the aid of the EPS control unit and electronic stability program control unit.
- The following functions are performed here:
- Driver support through counter steering for a vehicle with oversteer
- Driver support for braking on varying road surfaces
- The current vehicle status is sensed by the electronic stability program control unit.
- If necessary, the steering assistance torque request signal is transmitted via CAN communication to the EPS control unit, which actuates the EPS actuator accordingly.

PARKING ASSIST FUNCTION

- During a parking procedure the sonar control unit transmits the following signals to the EPS control unit via CAN communication:
- Current status of sonar control unit
- Vehicle stop signal, at which the vehicle stops at a maneuver point during the parking process
- Requested toothed rack position
- The EPS control unit transmits the following signals to the sonar control unit via CAN communication:
- Current status of the EPS control unit
- For the details of parking assist function, refer to SN-19, "SONAR SYSTEM (FRONT 6 & REAR 6 SENSORS WITH PARK ASSIST) : System Description".

REDUCING HOLDING TORQUE FUNCTION

- If a holding torque is applied by the driver when driving the vehicle straight ahead, e.g. for a crosswind or on a road surface inclined on one side, the EPS control unit detects it.
- The applied holding torque is partially compensated for by the EPS system.
- To rule out incorrect compensation (e.g. highway bend with large radius), the EPS control unit receives the yaw rate signal and the side G signal from the electronic stability program control unit via CAN communication.
- The reduction of the vehicle's holding torque depends on the speed.

FAIL-SAFE FUNCTION

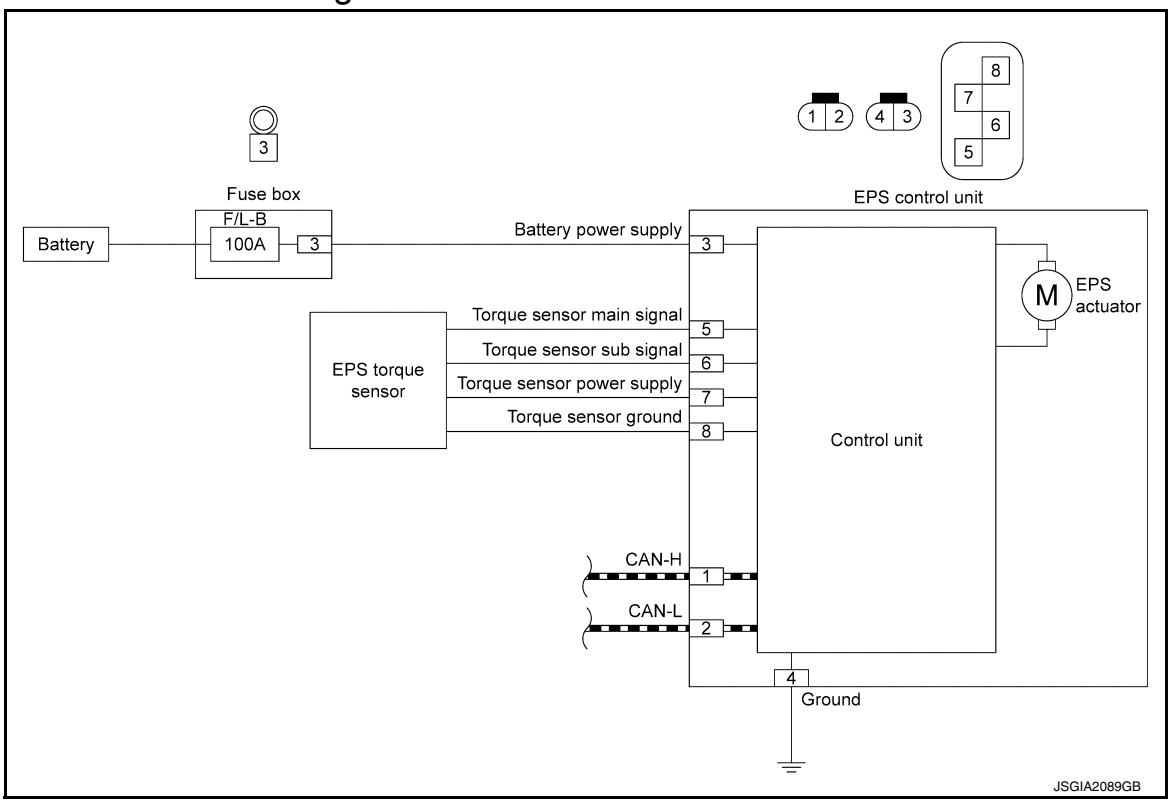
In case of an error in the electrical system, the fail-safe function stops output signals to the EPS actuator. Refer to STC-10, "EPS SYSTEM : Fail-Safe".

DISPLAY THE WARNING MASSAGE FUNCTION (ON COMBINATION METER)

For the warning massage, refer to STC-11, "INFORMATION DISPLAY (COMBINATION METER) : EPS Warning".

EPS SYSTEM : Circuit Diagram

INFOID:0000000013658808



EPS SYSTEM : Fail-Safe

INFOID:0000000013658809

- When the EPS system is switched on, the EPS control unit carries out a self-test. If a malfunction is detected, the EPS system is not switched on. The vehicle can be steered with increased force of the hand.

- During driving operation, the EPS control unit checks the signals from the EPS torque sensor. If these signals are outside the defined upper or lower limit, the EPS system is switched off by the EPS control unit. The vehicle can be steered with increased force of the hand.

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:0000000013658810

Name	Function
EPS warning	Refer to STC-11, "INFORMATION DISPLAY (COMBINATION METER) : EPS Warning".

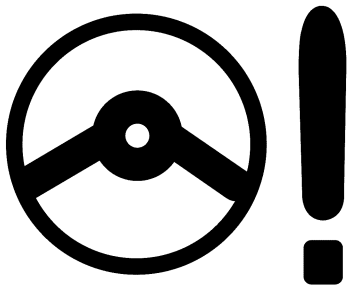
INFORMATION DISPLAY (COMBINATION METER)

INFORMATION DISPLAY (COMBINATION METER) : EPS Warning

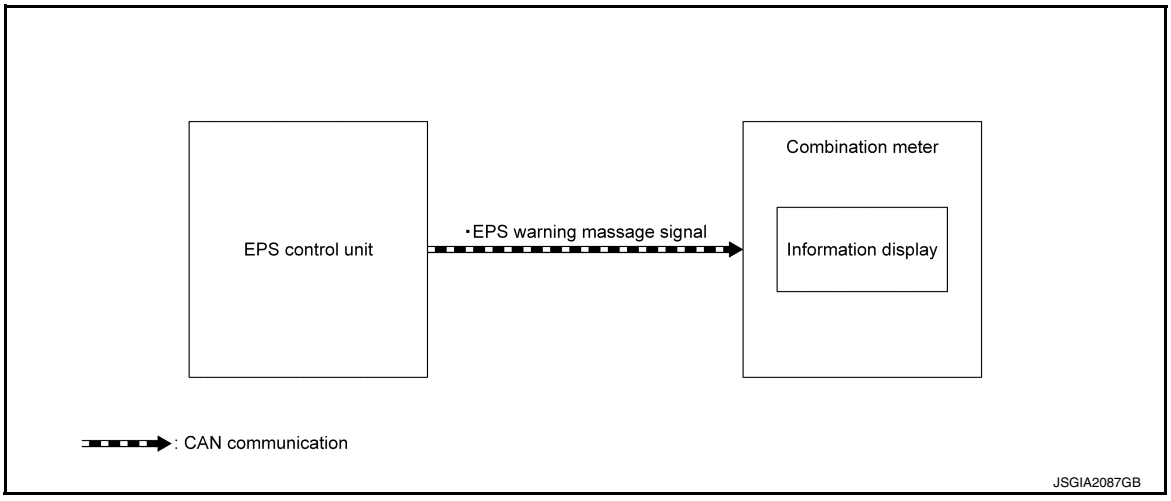
INFOID:0000000013658811

DESIGN/PURPOSE

It indicates that fail-safe mode is engaged and enters a manual steering state (Control turning force steering wheel becomes heavy).

Symbol	Warning Message
 JSGIA1243ZZ	Power Steering Malfunction See Operator's Manual

SYSTEM DIAGRAM



SIGNAL PATH

- If any malfunction occurs in the system and the system enters into a manual steering state according to fail-safe function, EPS control unit transmits EPS warning massage signal to combination meter.
- Combination meter displays the warning massage according to the EPS warning massage signal.

DIAGNOSIS SYSTEM (EPS CONTROL UNIT)

CONSULT Function

INFOID:0000000013658812

APPLICATION ITEM

CONSULT can display each diagnostic item using the diagnostic test modes as follows.

Diagnostic test mode	Function
Self Diagnostic Result	Self-diagnostic results and freeze frame data can be read and erased quickly.*
Data Monitor	Monitor the input/output signal of the low tire pressure warning control unit (tire pressure receiver) in real time.
Work support	Components can be quickly and accurately adjusted.
ECU Identification	The part number stored in the control unit can be read.

*: The following diagnosis information is erased by erasing.
- DTC
- Freeze frame data (FFD)

SELF DIAGNOSTIC RESULT

Refer to STC-16, "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.

Freeze Frame Data Item	Unit	Display item
Original Odometer Value	km	Display the odometer value stored when the respective DTC is detected for the first time.
Most Recent Odometer Value	km	Display the odometer value stored when the respective DTC is detected for the last time.
Frequency Counter	0 – 255	Display the frequency counter defined as the total number of times the DTC status has changed from “stored - not active” to “active”.
Ignition cycle counter	0 – 255	Display the number of consecutive operation cycles recorded since a DTC first became stored -not active and is no longer an active DTC. This information is needed for Self-healing functionality.
MELCO code first occurence	Refer to the following table.	Display the MELCO code stored when the respective DTC is detected for the first time.
BATTERY VOLTAGE-FIRST OCCURRENCE	V	Display the battery voltage value stored when the respective DTC is detected for the first time.
TSM first occurence	V	Display the torque sensor main signal value stored when the respective DTC is detected for the first time.
TSS first occurence	V	Display the torque sensor sub signal value stored when the respective DTC is detected for the first time.
Target current first occurence	A	Display the target current value stored when the respective DTC is detected for the first time.
Measured current first occurence	A	Display the measured current value stored when the respective DTC is detected for the first time.
Vehicle speed first occurrence	km/h	Display the vehicle speed stored when the respective DTC is detected for the first time.
MCU temperature first occurence	°C	Display the temperature inside control unit stored when the respective DTC is detected for the first time.

Freeze Frame Data Item	Unit	Display item
Engine running first occurence	Engine off Engine on	Display the engine status stored when the respective DTC is detected for the first time.
Ignition status first occurrence	IGN OFF IGNITION ON	Display the ignition switch status stored when the respective DTC is detected for the first time.
EPS assistance state first occurence	Assistance off Assistance on	Display the EPS assistance status stored when the respective DTC is detected for the first time.
Derating mode first occurence	Derating off Derating on	Display the derating mode stored when the respective DTC is detected for the first time.
APC control state first occurence	APC control off APC control on	Display the APC control status stored when the respective DTC is detected for the first time.
Add on control state first occurence	Add-on control off Add-on control on	Display the Add on control status stored when the respective DTC is detected for the first time.

Unit of “MELCO code first occurence”				
Torque sensor connector	Torque sensor signals	Torque sensor power supply	283h BODY R1 absent frame	Body R1 revGr eng invalid dat
2F1h TCM A1 absent frame	TCM a1 TSL pos TCM invld dat	VEH DYN STAT absent frame	Veh dyn stat yaw or acel invld	STW anglHP STAT absent fram
St ang sen stat invld or no inital	Resolver connector or signal	Main CPU target current	FET, wire, crnt dtct, bost, ASIC2	FET, wiring, current detector
FET or wiring	Coding	LHD/RHD	Bat high volt, ASIC2 overheat	Battery low voltage
EEPROM	Thermistor	MOTOR RELAY	EIS A1 ISw Stat invalid data	203h WHL STAT2 absent frame
CAN BUS OFF	105h ENG RS3 absent frame	001h EIS A1 absent frame	Whl stat2 whlrpm XX invalid dat	ENG RS3 EngRPM invalid data
207h CVI absent frame	A/D CONVERTER	MCU overheat	HD style <> Can Style	man Var./ new var on CAN
RAM	FET driver	Current detector	Communication main sub CPU	ASIC2
Vq clipping calculation	Vu Vv Vw calculation	Vq calculation	Iq calculation	Main CPU EPS current
Main CPU motor position	EM Style :SNA	105h CRC	18Dh MC/CRC	0D3h No information
0D3H MC/CRC	0D3h Unconsitency	208h CRC	005h MC/CRC	00Eh MC/CRC
SUB CPU	ROM	MAIN CPU	Oscillator	Vhcl spd rate limit safe bari err
Torque sen or targetIq safe err	Motor angle calcu safe err	Angle finding safety error	Asist gradi depnd filter safe err	Vhcl spd area & intplat safe err
Asist gradi calcu safe err	Motor ang spd calcu safe err	Torque diff calcu safe err	RHD safety barrier	CVI CRC
StStyle wrong value	ENG RQ2 TCM timeout	IC A5 timeout	IC A5 inv data	STW ANGLHP,CRC / MSC
StW Trq Rq STA : SNA	Calcul of basic cont safe err	Calcu of mtr ang spd safe err	Calcu of trq diff distb safe err	Calcu of sys stab safe err
Calcu of trq diff safe err	Calcu of act return safe err	Calcu of clse loop retn safe err	Fric compensation safe err	Calc of crnt cmnd prcs safe err
Vhcl pull compensation safe err	Rack-end noise limit safe err	Shimmy compensation safe err	APC Safety barrier Error	Add-on Safety barrier Error
201h No information	201h WhlPlsCnt SNA	201h MC frozen	203h Inconsistency	203h Invalid
229h No information	229h invalid/MC/CRC	18Dh No information	APC internal safety barrier D8	APC internal safety barrier D9

Unit of “MELCO code first occurence”				
APC internal safety barrier DA	APC internal safety barrier DB	APC internal safety barrier DC	APC internal safety barrier DD	APC internal safety barrier DE
AVI2 timeout				

DATA MONITOR

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

Monitor Item (Unit)	Description
IGNITION STATUS (LOCK, IGN OFF, IGN ACC, IGN ON, START)	Display the ignition switch status.

WORK SUPPORT

Support Item	Description
Reset of coding	Perform resetting coding of EPS control unit.
Calibration of EPS torque sensor	Perform calibration of EPS torque sensor.
Re learning	Perform learning of EPS torque sensor.
Resetting center position of steering	Perform resetting center position of steering.

ECU IDENTIFICATION

Displays the part number stored in the control unit.

ECU DIAGNOSIS INFORMATION

EPS CONTROL UNIT

Reference Value

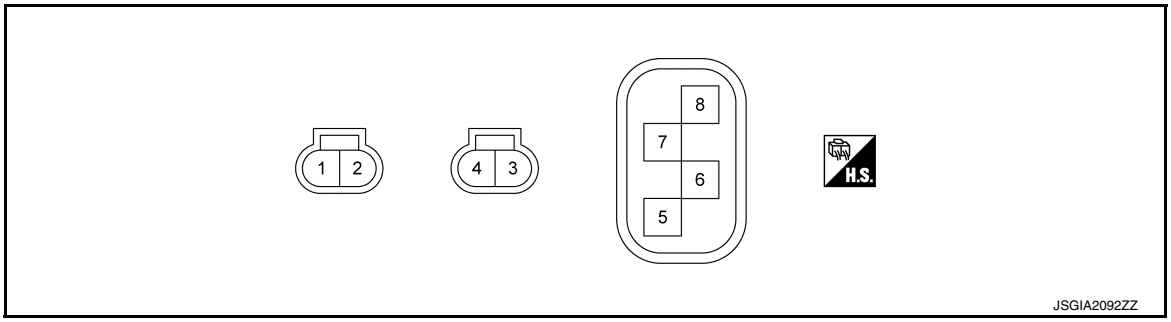
INFOID:0000000013658813

VALUES ON THE DIAGNOSIS TOOL

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

Monitor item	Data monitor	
	Condition	Display value
IGNITION STATUS	Ignition switch: LOCK	LOCK
	Ignition switch: OFF	IGN OFF
	Ignition switch: ACC	IGN ACC
	Ignition switch: ON	IGN ON
	Ignition switch: START	START

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire Color)		Description		Condition		Value (Approx.)
+	–	Signal name	Input/Output			
1 (W)	—	CAN-H	Input/Output	—		—
2 (G)	—	CAN-L	Input/Output	—		—
3 (R)	Ground	Battery power supply	Input	Always		8.5 V – 16 V
4 (BR)	Ground	Ground	—	Always		0 V
5 (–)	Ground	Torque sensor main signal	Input	Engine running	Steering wheel: steering	0.3 V – 4.7 V (The value is changed according to steering left or right)
6 (–)	Ground	Torque sensor sub signal	Input	Engine running	Steering wheel: steering	0.3 V – 4.7 V (The value is changed according to steering left or right)
7 (–)	Ground	Torque sensor power supply	Output	Ignition switch: ON		4.5 – 5.5 V
8 (–)	Ground	Torque sensor ground	—	Always		0 V

Fail-Safe

INFOID:0000000013658814

- When the EPS system is switched on, the EPS control unit carries out a self-test. If a malfunction is detected, the EPS system is not switched on. The vehicle can be steered with increased force of the hand.
- During driving operation, the EPS control unit checks the signals from the EPS torque sensor. If these signals are outside the defined upper or lower limit, the EPS system is switched off by the EPS control unit. The vehicle can be steered with increased force of the hand.

DTC Index

INFOID:0000000013658815

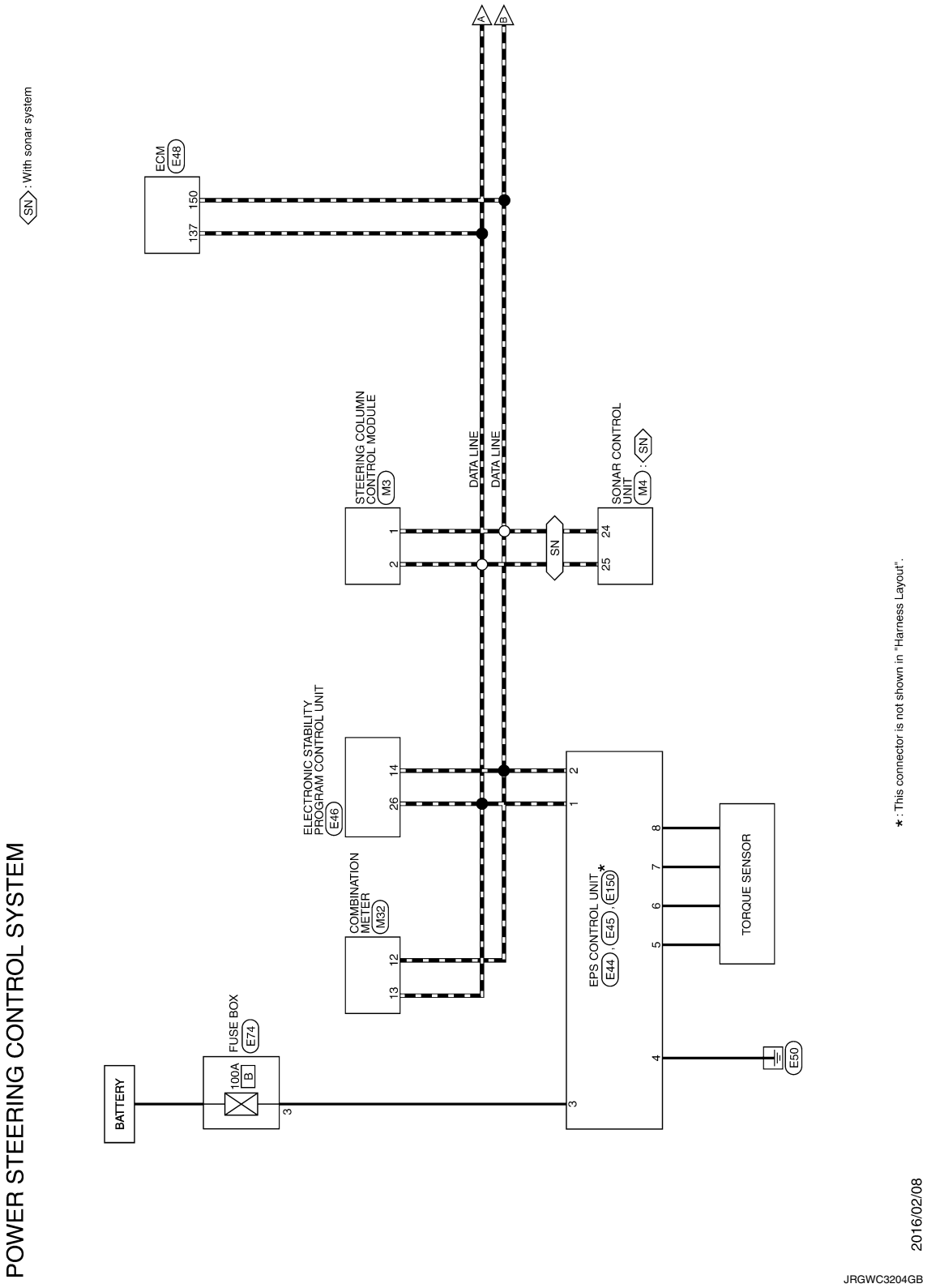
DTC		Items (CONSULT screen terms)	Sub type (CONSULT screen terms)	Reference
B210A	00	Power Supply circuit	[NO SUBTYPE INFORMATION]	STC-27, "DTC Description"
B210B	00	Power Supply circuit	[NO SUBTYPE INFORMATION]	STC-28, "DTC Description"
B210D	00	Power supply	[NO SUBTYPE INFORMATION]	STC-29, "DTC Description"
B210E	00	Power supply	[NO SUBTYPE INFORMATION]	STC-30, "DTC Description"
C1592	09	EPS actuator motor malf	[COMPONENT MALFUNCTION]	STC-31, "DTC Description"
	49		[INTERNAL ELECTRONIC ERROR]	
C1593	1C	Power steering torque sen malf	[CIRC VOLTAGE OUT OF RANGE]	STC-34, "DTC Description"
	62		[SIGNAL COMPARE ERROR]	
P0635	06	EPS malfunction	[ALGORITHM BASED ERROR]	STC-37, "DTC Description"
	09		[COMPONENT MALFUNCTION]	
	43		[SPECIAL MEMORY ERROR]	
	45		[PROGRAM MEMORY ERROR]	
	49		[INTERNAL ELECTRONIC ERROR]	
	98		[COMPONENT/SYS OVER TEMP]	
P1644	00	INTERNAL CONTROL MODULE	[NO SUBTYPE INFORMATION]	STC-42, "DTC Description"
U0001	88	Drivetrain CAN communication	[BUS OFF]	STC-44, "DTC Description"
U0100	87	Communication error	[MISSING MESSAGE]	STC-45, "DTC Description"
U0122	00	Lost Communication With VDCM	[NO SUBTYPE INFORMATION]	STC-46, "DTC Description"
U0155	00	COMMUNICATION ERROR (LOST)	[NO SUBTYPE INFORMATION]	STC-47, "DTC Description"
U0168	87	COMMUNICATION ERROR (LOST)	[MISSING MESSAGE]	STC-48, "DTC Description"
U0212	87	COMMUNICATION ERROR (LOST)	[MISSING MESSAGE]	STC-49, "DTC Description"
U0401	86	Communication error (invalid)	[SIGNAL INVALID]	STC-50, "DTC Description"
U0416	00	COMMUNICATION ERROR (INVALID)	[NO SUBTYPE INFORMATION]	STC-51, "DTC Description"
U0423	00	COMMUNICATION ERROR (INVALID)	[NO SUBTYPE INFORMATION]	STC-53, "DTC Description"
U0427	86	COMMUNICATION ERROR (INVALID)	[SIGNAL INVALID]	STC-54, "DTC Description"
U0429	86	COMMUNICATION ERROR (INVALID)	[SIGNAL INVALID]	STC-55, "DTC Description"

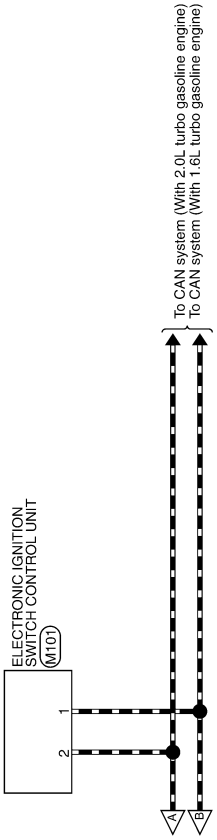
WIRING DIAGRAM

POWER STEERING CONTROL SYSTEM

Wiring Diagram

INFOID:0000000013658816





JRGWC3205GB

POWER STEERING CONTROL SYSTEM

Connector No.	E44
Connector Name	EPS CONTROL UNIT
Connector Type	MB_A0065401981

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	CAN-H
2	G	CAN-L

Connector No.	E45
Connector Name	EPS CONTROL UNIT
Connector Type	MB_A2465400181

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
3	R	BATTERY POWER SUPPLY
4	BR	GROUND

Connector No.	E46
Connector Name	ELECTRONIC STABILITY PROGRAM CONTROL UNIT
Connector Type	MB_A2465400581

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	MOTOR POWER SUPPLY
2	W	BRAKE PEDAL
4	P	RIGHT FRONT AXLE RPM SENSOR SIGNAL
5	GR	BRAKE VACUUM SENSOR POWER SUPPLY
6	B	BRAKE LIGHT SWITCH-L
7	R	BATTERY POWER SUPPLY
8	Y	LEFT FRONT AXLE RPM SENSOR SIGNAL
10	O	STANDSTILL CONTROL (SSC) STATUS
12	P	BRAKE VACUUM SENSOR SIGNAL
13	BR	GROUND (MOTOR)
14	G	CAN-L
16	B	RIGHT FRONT AXLE RPM SENSOR POWER SUPPLY
17	Y	RIGHT REAR AXLE RPM SENSOR POWER SUPPLY
18	BR	LEFT REAR AXLE RPM SENSOR SIGNAL
19	W	LEFT FRONT AXLE RPM SENSOR POWER SUPPLY
23	B	BRAKE VACUUM SENSOR GROUND
25	P	VALVE RELAY POWER SUPPLY
26	W	CAN-H
28	R	BATTERY POWER SUPPLY
29	P	RIGHT REAR AXLE RPM SENSOR SIGNAL
30	V	BRAKE LIGHT SWITCH-H
31	GR	LEFT REAR AXLE RPM SENSOR POWER SUPPLY
32	L	BRAKE LIGHT SWITCH GROUND
35	R	BRAKE LIGHT SWITCH POWER SUPPLY
38	B	GROUND (VALVE)

Connector No.	E48
Connector Name	ECM
Connector Type	MB_A0075406981

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
97	R	POWER SUPPLY (ECM)
98	BR	ECM GROUND
99	V	POWER SUPPLY (ECM)
100	BR	ECM GROUND
101	R	POWER SUPPLY (ECM)
102	B	ECM GROUND
103	L	COOLING FAN CONTROL SIGNAL
104	R	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2)
105	G	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2)
106	BR	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR1)
111	B	IGNITION SIGNAL
112	Y	POWER SUPPLY (BATTERY)
116	W	STARTER RELAY-L
119	GR	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2)
120	O	SENSOR GROUND
122	R	HOT START SIGNAL
123	GR	MOTOR RELAY CONTROL SIGNAL
127	O	FUEL PUMP ON SIGNAL
132	G	ACCELERATOR PEDAL POSITION SENSOR 1
136	Y	POWERTRAIN SENSOR CAN-H
137	W	CAN-H
138	GR	POWERTRAIN CAN-H
141	B	WATER PUMP RELAY CONTROL SIGNAL
145	W	ACCELERATOR PEDAL POSITION SENSOR 2
146	G	FUEL TANK PRESSURE SENSOR
147	L	CRASH SIGNAL
148	W	STARTER RELAY-H
149	B	POWERTRAIN SENSOR CAN-L
150	G	CAN-L
151	L	POWERTRAIN CAN-L
152	V	EVAP CANISTER VENT CONTROL VALVE
153	BR	EVAP PURGE CONTROL VALVE

Connector No.	E74
Connector Name	FUSE BOX
Connector Type	MB_A0035462440

H.S.

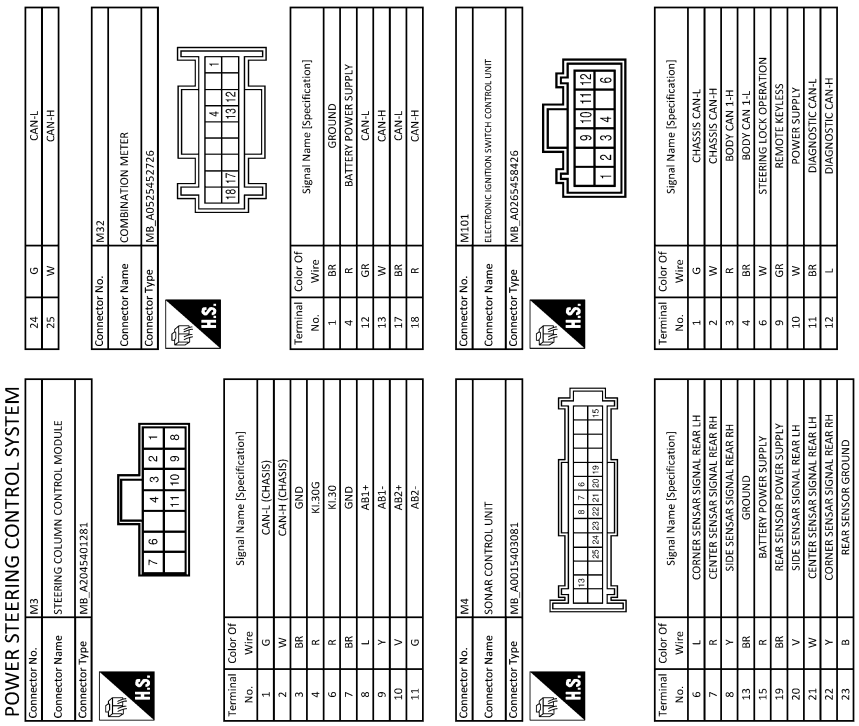
Terminal No.	Color Of Wire	Signal Name [Specification]
3	R	-

Connector No.	E150
Connector Name	EPS CONTROL UNIT
Connector Type	E150

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
5	-	TORQUE SENSOR MAIN SIGNAL
6	-	TORQUE SENSOR SUB SIGNAL
7	-	TORQUE SENSOR POWER SUPPLY
8	-	TORQUE SENSOR GROUND

JRGWC3206GB



JRGWC3207GB

BASIC INSPECTION

ADDITIONAL SERVICE WHEN REPLACING EPS CONTROL UNIT

Description

INFOID:0000000013658817

When replacing the EPS control unit, perform the following work. Refer to STC-21, "Work Procedure".
- Resetting center position of steering
- Reset of coding
- Calibration of EPS torque sensor
- Re learning

Work Procedure

INFOID:0000000013658818

1. PERFORM RESETTING CENTER POSITION OF STEERING

With CONSULT
Perform resetting center position of steering. Refer to STC-25, "Description".

>> GO TO 2.

2. PERFORM RESET OF CODING

With CONSULT
Perform reset of coding. Refer to STC-22, "Description".

>> GO TO 3.

3. PERFORM CALIBRATION OF EPS TORQUE SENSOR

With CONSULT
Perform calibration of EPS torque sensor. Refer to STC-23, "Description".

>> GO TO 4.

4. PERFORM RE LEARNING

With CONSULT
Perform re learning. Refer to STC-24, "Description".

>> GO TO 5.

5. PERFORM TEST DRIVING

Perform the test drive. Refer to STC-26, "Description".

Does the vehicle stayin a straight line?

YES >> WORK END
NO >> Perform test drive again.

RESET OF CODING

Description

INFOID:0000000013658819

- Perform resetting coding of EPS control unit.
- For work procedure, refer to STC-22, "Work Procedure".

Work Procedure

INFOID:0000000013658820

1.ERASE SELF-DIAGNOSTIC RESULT

With CONSULT
Erase self-diagnostic result.
NOTE:
The work cannot be performed in full if "CRNT" or "PAST" error codes are detected.

>> GO TO 2.

2.PERFORM RESET OF CODING

With CONSULT
1. On the CONSULT screen, select “EPS/DAST 3” >> “Work support” >> “Reset of coding”.
2. Touch “continue”.

>> WORK END

CALIBRATION OF ELECTRIC POWER STEERING TORQUE SENSOR

Description

INFOID:0000000013658821

- After replacement of EPS control unit, perform calibration of EPS torque sensor.
- For work procedure, refer to STC-23, "Work Procedure".

Work Procedure

INFOID:0000000013658822

1.PREPARATION BEFORE WORK SUPPORT

With CONSULT

1. Turn the ignition switch ON.
2. Turn the steering wheel to the straight-ahead position.
3. Keep the vehicle at a standstill.
4. Confirm the connection between EPS control unit and EPS torque sensor.
5. Erase self-diagnostic result.

>> GO TO 2.

2.PERFORM CALIBRATION OF EPS TORQUE SENSOR

With CONSULT

1. On the CONSULT screen, select “EPS/DAST 3” >> “Work support” >> “Calibration of EPS torque sensor”.
2. Touch “Start”.

What is current status?

Calibration OK>>WORK END
Power supply torque sensor too low>>GO TO 3.
Active malfunction exist>>GO TO 4.
Vehicle speed is not 0 km/h>>Keep the vehicle at a standstill and then re-perform the procedure. GO TO 1.
Thermistor temperature too high>>Wait for several minutes until the internal temperature becomes low. GO TO 1.
Motor revolution speed too high>>During calibration, never move the steering wheel. GO TO 1.
Sampled value out of range>>Before calibration, turn the steering wheel to the straight-ahead position. GO TO 1.
Difference of min and max value out of range>>During calibration, never move the steering wheel. GO TO 1.

3.CHECK THE ELECTRICAL LINE FOR EPS TORQUE SENSOR

Check the electrical line between EPS control unit and EPS torque sensor. If necessary, repair.

>> GO TO 1.

4.PERFORM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “EPS /DAST 3”.

Is any DTC detected?

YES >> Check the DTC. Refer to STC-16, "DTC Index". After repairing, GO TO 1.
NO >> GO TO 1.

RE LEARNING

Description

INFOID:0000000013658823

- After replacement of EPS control unit, perform learning of EPS torque sensor.
- For work procedure, refer to STC-24, "Work Procedure".

Work Procedure

INFOID:0000000013658824

1.PREPARATION BEFORE WORK SUPPORT

With CONSULT

1. Turn the ignition switch ON.
2. Turn the steering wheel to the straight-ahead position.
3. Keep the vehicle at a standstill.
4. Confirm the connection between EPS control unit and EPS torque sensor.
5. Erase self-diagnostic result.

>> GO TO 2.

2.PERFORM RE LEARNING

With CONSULT

1. On the CONSULT screen, select “EPS/DAST 3” >> “Work support” >> “Re learning”.
2. Touch “Start”.

What is current status?

Calibration OK>>WORK END
Power supply torque sensor too low>>GO TO 3.
Active malfunction exist>>GO TO 4.
Vehicle speed is not 0 km/h>>Keep the vehicle at a standstill and then re-perform the procedure. GO TO 1.
Thermistor temperature too high>>Wait for several minutes until the internal temperature becomes low. GO TO 1.
Motor revolution speed too high>>During calibration, never move the steering wheel. GO TO 1.
Sampled value out of range>>Before calibration, turn the steering wheel to the straight-ahead position. GO TO 1.
Difference of min and max value out of range>>During calibration, never move the steering wheel. GO TO 1.

3.CHECK THE ELECTRICAL LINE FOR EPS TORQUE SENSOR

Check the electrical line between EPS control unit and EPS torque sensor. If necessary, repair.

>> GO TO 1.

4.PERFORM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “EPS /DAST 3”.

Is any DTC detected?

YES >> Check the DTC. Refer to STC-16, "DTC Index". After repairing, GO TO 1.
NO >> GO TO 1.

RESETTING CENTER POSITION OF STEERING

Description

INFOID:0000000013658825

- Perform resetting center position of steering.
- For work procedure, refer to STC-25, "Work Procedure".

Work Procedure

INFOID:0000000013658826

1.PERFORM RESETTING CENTER POSITION OF STEERING

With CONSULT

1. On the CONSULT screen, select “EPS/DAST 3” >> “Work support” >> “Resetting center position of steering”.
2. Touch “Start”.

>> WORK END

TEST DRIVE

Description

INFOID:0000000013658827

Always performing test drive to calibrate the steering control when the following operation is performed. Refer to STC-26, "Work Procedure".

- EPS control unit is removed/replaced.
- Steering gear is removed/replaced.
- Steering column is removed/replaced.
- Adjusting wheel alignment.

Work Procedure

INFOID:0000000013658828

1.PERFORM TEST DRIVING

1. Drive the vehicle for several minutes.
2. Confirm that the vehicle stays in a straight line, by keeping the steering wheel in the neutral position.

Does the vehicle stay in a straight line?

YES >> WORK END
NO >> Perform test drive again.

DTC/CIRCUIT DIAGNOSIS

B210A CONTOL UNIT POWER SUPPLY

DTC Description

INFOID:0000000013658829

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
B210A	00	Power Supply circuit (Power Supply circuit)	[NO SUBTYPE INFORMATION]	37	Diagnosis condition	After 0.45 seconds from CAN communication active and ignition switch ON
					Signal (terminal)	Battery power supply signal
					Threshold	Battery power supply signal < 9 V
					Diagnosis delay time	15 seconds or more

POSSIBLE CAUSE

Battery power supply signal received via CAN communication is too low.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON and wait for 15 seconds or more.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “B210A” detected?

YES >> Proceed to STC-27, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658830

1.CHECK BATTERY AND CHARGING SYSTEM

Check battery and charging system condition. Refer to PG-102, "MAIN BATTERY : Work Procedure" and CHG-27, "Inspection Procedure".

Is the inspection result normal?

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

2.CHECK EPS CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT

Check power supply and ground circuit of EPS control unit. Refer to STC-56, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the EPS control unit. Refer to STC-57, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

B210B CONTOL UNIT POWER SUPPLY

DTC Description

INFOID:0000000013658831

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
B210B	00	Power Supply circuit (Power Supply circuit)	[NO SUBTYPE INFORMATION]	35	Diagnosis condition	After 0.45 seconds from CAN communication active and ignition switch ON
					Signal (terminal)	Battery power supply signal
					Threshold	Battery power supply signal > 16 V
					Diagnosis delay time	15 seconds or more

POSSIBLE CAUSE

Battery power supply signal received via CAN communication is too high.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON and wait for 15 seconds or more.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “B210B” detected?

YES >> Proceed to STC-28, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658832

1.CHECK BATTERY AND CHARGING SYSTEM

Check battery and charging system condition. Refer to PG-102, "MAIN BATTERY : Work Procedure" and CHG-27, "Inspection Procedure".

Is the inspection result normal?

YES >> Replace the EPS control unit. Refer to STC-57, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

B210D CONTOL UNIT POWER SUPPLY

DTC Description

INFOID:0000000013658833

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
B210D	00	Power supply (Power supply)	[NO SUBTYPE INFORMATION]	54	Diagnosis condition	Engine running
					Signal (terminal)	Battery power supply
					Threshold	Battery power supply < 8.5 V
					Diagnosis delay time	3 seconds

POSSIBLE CAUSE

Battery power supply is too low.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Start the engine and wait for 3 seconds.
   CAUTION:
   Never drive the vehicle.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “B210D” detected?

YES >> Proceed to STC-29, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658834

1.CHECK BATTERY AND CHARGING SYSTEM

Check battery and charging system condition. Refer to PG-102, "MAIN BATTERY : Work Procedure" and CHG-27, "Inspection Procedure".

Is the inspection result normal?

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

2.CHECK EPS CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT

Check power supply and ground circuit of EPS control unit. Refer to STC-56, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the EPS control unit. Refer to STC-57, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

B210E CONTOL UNIT POWER SUPPLY

DTC Description

INFOID:0000000013658835

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
B210E	00	Power supply (Power supply)	[NO SUBTYPE INFORMATION]	53a	Diagnosis condition	Ignition switch ON
					Signal (terminal)	Battery power supply
					Threshold	Battery power supply > 19.2 V
					Diagnosis delay time	0.048 seconds
B210E	00	Power supply (Power supply)	[NO SUBTYPE INFORMATION]	53b	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	• Internal malfunction is detected • Internal high voltage is detected • Internal temperature > 170°C (338°F)
					Diagnosis delay time	0.02 seconds

POSSIBLE CAUSE

- Connected to 24V battery
- Load dump surge
- (Battery over voltage/load dump surge) detected inside control unit
- Overheat of inside control unit

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “B210E” detected?

YES >> Proceed to STC-30, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658836

1.CHECK BATTERY AND CHARGING SYSTEM

Check battery and charging system condition. Refer to PG-102, "MAIN BATTERY : Work Procedure" and CHG-27, "Inspection Procedure".

Is the inspection result normal?

YES >> Replace the EPS control unit. Refer to STC-57, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

C1592 EPS MOTOR

DTC Description

INFOID:0000000013658837

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	41	Diagnosis condition	8.5 V < Battery terminal voltage < 19.2 V
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Malfunction in monitor part • Low voltage • Internal malfunction • Over current
					Diagnosis delay time	0.048 seconds
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	42	Diagnosis condition	Battery terminal voltage > 7.5 V
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Internal malfunction • Over current
					Diagnosis delay time	0.048 seconds
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	43	Diagnosis condition	Battery terminal voltage > 7.5 V
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Over current
					Diagnosis delay time	0.048 seconds
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	44	Diagnosis condition	Initial check
					Signal (terminal)	—
					Threshold	Motor terminal voltage is the following condition • Voltage < 0.7 V • Voltage > 3.9 V
					Diagnosis delay time	0.5 seconds
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	45	Diagnosis condition	• Battery terminal voltage > 8.5 V • Motor speed < 1,700 rpm • No internal malfunction
					Signal (terminal)	—
					Threshold	Internal current is the following condition • Measured current < 2 Arms • Desired current > 4 Arms
					Diagnosis delay time	2 seconds

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	46	Diagnosis condition	• 7.5 V < Battery terminal voltage < 19.2 V • Motor speed < 200 rpm • No internal malfunction
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Over voltage
					Diagnosis delay time	0.2 seconds
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	47a	Diagnosis condition	• Initial check is finished • Motor speed < 400 rpm • No over current for motor control
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Over voltage
					Diagnosis delay time	0.1 second
C1592	09	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[COMPONENT MALFUNCTION]	47b	Diagnosis condition	• Initial check is finished • Motor speed < 400 rpm
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Over voltage
					Diagnosis delay time	0.2 seconds
C1592	49	EPS actuator motor malf (The electric power steering actuator motor has a malfunction.)	[INTERNAL ELECTRONIC ERROR]	32, 33	Diagnosis condition	8.5 V < Battery terminal voltage < 19.2 V
					Signal (terminal)	—
					Threshold	Control unit detected the following condition. • Internal malfunction
					Diagnosis delay time	0.2 seconds

POSSIBLE CAUSE

Internal malfunction of EPS actuator

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Turn the steering wheel.
3. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “C1592” detected?

YES >> Proceed to STC-32, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658838

NOTE:
EPS actuator is malfunctioning. Replace EPS control unit.

1.REPLACE EPS CONTROL UNIT

1. Replace EPS control unit. Refer to STC-57, "Removal and Installation".
2. Erase the self-diagnosis result for “EPS/DAST 3”.

>> INSPECTION END

C1593 TORQUE SENSOR

DTC Description

INFOID:0000000013658839

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
C1593	1C	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[CIRC VOLTAGE OUT OF RANGE]	11	Diagnosis condition	4.5 V < Torque sensor power supply voltage < 5.5 V
					Signal (terminal)	Torque sensor main signal
					Threshold	Main sensor output voltage is the following state • Output voltage > 4.7 V • Output voltage < 0.3 V
					Diagnosis delay time	0.052 seconds
C1593	1C	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[CIRC VOLTAGE OUT OF RANGE]	12	Diagnosis condition	4.5 V < Torque sensor power supply voltage < 5.5 V
					Signal (terminal)	Torque sensor sub signal
					Threshold	Sub sensor output voltage is following state • Output voltage > 4.7 V • Output voltage < 0.3 V
					Diagnosis delay time	0.052 seconds
C1593	1C	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[CIRC VOLTAGE OUT OF RANGE]	14	Diagnosis condition	Battery power supply > 7.5 V
					Signal (terminal)	Torque sensor power supply
					Threshold	Torque sensor power supply voltage is the following state • Power supply voltage < 4.7 V • Power supply voltage > 5.3 V
					Diagnosis delay time	0.052 seconds
C1593	1C	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[CIRC VOLTAGE OUT OF RANGE]	17	Diagnosis condition	Ignition switch ON
					Signal (terminal)	Torque sensor power supply
					Threshold	Torque sensor power supply voltage is the following state • Power supply voltage < 2.5 V
					Diagnosis delay time	0.032 seconds
C1593	62	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[SIGNAL COMPARE ERROR]	13	Diagnosis condition	4.5 V < Torque sensor power supply voltage < 5.5 V
					Signal (terminal)	• Torque sensor main signal • Torque sensor sub signal
					Threshold	(Main sensor output voltage) + (Sub sensor output voltage) is the following state. • Total voltage > 5.375 V • Total voltage < 4.625 V
					Diagnosis delay time	0.052 seconds

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
C1593	62	Power steering torque sen malf (The power steering torque sensor has a malfunction.)	[SIGNAL COMPARE ERROR]	16	Diagnosis condition	4.5 V < Torque sensor power supply voltage < 5.5 V
					Signal (terminal)	• Torque sensor main signal • Torque sensor sub signal
					Threshold	|Peak value - Average value| > 0.25 V • Peak value = Peak value of |main sensor output voltage + sub sensor output voltage - 5| • Average value = Average value of |main sensor output voltage + sub sensor output voltage - 5|
					Diagnosis delay time	0.052 seconds

POSSIBLE CAUSE

DTC	MELCO code	Possible cause
C1593-1C	11, 12	• Poor contact of connector. • Omission of inserting the connector. • Wiring harness disconnection or earthing. • Poor characteristics.
C1593-1C	14, 17	Torque sensor power supply is malfunctioning
C1593-62	13, 16	Malfunction of torque sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “C1593” detected?

YES >> Proceed to STC-35, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658840

1.CHECK TORQUE SENSOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Check voltage between EPS control unit harness connector terminals and ground.
   CAUTION:
   Steering wheel is neutral position. (There is no steering force.)

Terminals			Voltage
(+)		(–)	
EPS control unit		Ground	
Connector	Terminal		
E150	7	—	Approx. 4.5 – 5.5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check power supply and ground circuit of EPS control unit. Refer to STC-56, "Diagnosis Procedure".

2.CHECK TORQUE SENSOR GROUND CIRCUIT

1. Turn the 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.)

EPS control unit		Ground	Continuity
Connector	Terminal		
E150	8	—	Existed

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 the ignition switch ON.

CAUTION:
Never start the engine.

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

Terminals			Voltage
(+)		(–)	
EPS control unit		Ground	
Connector	Terminal		
E150	5	—	Approx. 0.3 – 4.7 V* (The value is changed according to steering left or right)
	6		

*: Total voltage of two terminals is the following.

- 4.625 V < Total voltage < 5.375 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Torque sensor is malfunction. Replace the gear housing assembly. Refer to ST-16, "Disassembly and Assembly".

4.CHECK CONNECTOR

1. Turn the 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-57, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0635 CONTROL UNIT

DTC Description

INFOID:0000000013658841

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	AC, B3, B4, B5, B0, B1, B6, B7, C0, C1, C2, C3, C4, C5, C6, C8, C9, CA, CB, CC, CD, CE, CF	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.016 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	B2	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.24 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	9C	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.048 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	D8	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.02 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	D9	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	2 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	DA	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	1 second
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	DB	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.24 seconds

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	DC	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.2 seconds
P0635	06	EPS malfunction (The electric power steering has a malfunction.)	[ALGORITHM BASED ERROR]	DE	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.004 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	76	Diagnosis condition	Engine running
					Signal (terminal)	—
					Threshold	Battery terminal voltage > 3 V
					Diagnosis delay time	0.052 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	57	Diagnosis condition	Initial check
					Signal (terminal)	—
					Threshold	Motor terminal voltage < 0.75 V
					Diagnosis delay time	0.012 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	56	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects the following condition. • Internal temperature > 184°C (363.2°F) • Internal temperature < −50°C (−58°F) • Output voltage > 4.9 V • Output voltage < 0.1 V
					Diagnosis delay time	0.2 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	A0, A5, A8, 70, 87	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.016 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	77, 86	Diagnosis condition	8.5 V < Battery terminal voltage < 19.2 V
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.048 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	84, 90, 91, 93, 94	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.02 seconds

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	95, 96	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.016 seconds
P0635	09	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT MALFUNCTION]	36	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.15 seconds
P0635	43	EPS malfunction (The electric power steering has a malfunction.)	[SPECIAL MEMORY ERROR]	55	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	1 time
P0635	45	EPS malfunction (The electric power steering has a malfunction.)	[PROGRAM MEMORY ERROR]	A2a	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	1 time
P0635	45	EPS malfunction (The electric power steering has a malfunction.)	[PROGRAM MEMORY ERROR]	A2b	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	0.016 seconds
P0635	49	EPS malfunction (The electric power steering has a malfunction.)	[INTERNAL ELECTRONIC ERROR]	52	Diagnosis condition	After the initial check finishes and motor relay is turned ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	Immediately
P0635	98	EPS malfunction (The electric power steering has a malfunction.)	[COMPONENT/SYS OVER TEMP]	71	Diagnosis condition	All the time while wake-up by CAN
					Signal (terminal)	—
					Threshold	Control unit detects high internal temperature.
					Diagnosis delay time	1second

POSSIBLE CAUSE

DTC	MELCO code	Possible cause
P0635-06	All	Internal malfunction
P0635-09	All	Internal malfunction
P0635-43	55	Internal malfunction
P0635-45	A2	Internal malfunction

DTC	MELCO code	Possible cause
P0635-49	52	Motor relay conduction check
P0635-98	71	It's not a failure but normal state of EPS system. Power provided by motor is limited

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “P0635” detected?

YES >> Proceed to STC-40, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658842

P0635-06

1.CHECK THE REPLACEMENT HISTORY OF STEERING COMPONENT PARTS

Check the replacement history of steering component parts.

Was the steering component parts replaced?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK THE COMPONENT PARTS NUMBER

Check the component parts number.

Is the component parts number correct?

YES >> GO TO 3.
NO >> Install the correct component parts.
- Steering gear assembly: Refer to ST-14, "Removal and Installation".
- EPS control unit: Refer to STC-57, "Removal and Installation".

3.PERFORM THE RESET OF CODING OF EPS CONTROL UNIT

With CONSULT

1. Erase the self-diagnosis result for “EPS/DAST 3”.
2. Perform the reset of coding of EPS control unit. Refer to STC-22, "Description".

>> INSPECTION END

P0635-09

1.REPLACE STEERING GEAR ASSEMBLY

With CONSULT

1. Replace steering gear assembly with EPS control unit. Refer to ST-14, "Removal and Installation" and STC-57, "Removal and Installation".
2. Erase the self-diagnosis result for “EPS/DAST 3”.

>> INSPECTION END

P0635-43

1.ERASE SELF-DIAGNOSTIC RESULT

With CONSULT

Ignore DTC code and erase self-diagnostic result.

>> INSPECTION END

P0635-45

1.REPLACE EPS CONTROL UNIT

With CONSULT
1. Replace EPS control unit. Refer to STC-57, "Removal and Installation".
2. Erase the self-diagnosis result for “EPS/DAST 3”.

>> INSPECTION END

P0635-49

1.ERASE SELF-DIAGNOSTIC RESULT

With CONSULT
This is not a system error. Ignore DTC code and erase self-diagnostic result.

>> INSPECTION END

P0635-98

NOTE:
This is not a malfunction but normal state of EPS system. Power provided by motor is limited. In order to avoid an excessively high thermal load, the assistance of the electric power steering is partially reduced.

1.WAIT FOR SEVERAL MINUTES

Wait for several minutes until the internal temperature becomes low.

>> INSPECTION END

P1644 CONTROL UNIT

DTC Description

INFOID:0000000013658843

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
P1644	00	INTERNAL CONTROL MODULE (An incorrect variant coding or configuration was detected.)	[NO SUBTYPE INFORMATION]	50	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	1 time
P1644	00	INTERNAL CONTROL MODULE (An incorrect variant coding or configuration was detected.)	[NO SUBTYPE INFORMATION]	72	Diagnosis condition	• Ignition switch ON • CAN communication is active
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	—
P1644	00	INTERNAL CONTROL MODULE (An incorrect variant coding or configuration was detected.)	[NO SUBTYPE INFORMATION]	73	Diagnosis condition	Ignition switch ON
					Signal (terminal)	—
					Threshold	Control unit detects internal malfunction.
					Diagnosis delay time	—

POSSIBLE CAUSE

DTC	MELCO code	Possible cause
P1644-00	50	• Internal malfunction • Vehicle coding miss-setting
P1644-00	72	Inconsistent of setting
P1644-00	73	Inconsistent informations between ECU variant and CAN variant

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “P1644” detected?

YES >> Proceed to STC-42, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658844

1.CHECK THE REPLACEMENT HISTORY OF STEERING COMPONENT PARTS

Check the replacement history of steering component parts.

Was the steering component parts replaced?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK THE SPECIFICATION OF STEERING COMPONENT PARTS

Check the specification of steering component parts.

Is the specification of steering component parts correct?

YES >> GO TO 4.
NO >> Replace steering gear assembly. Refer to ST-14, "Removal and Installation".

3.PERFORM THE SCN CODING OF ELECTRONIC IGNITION SWITCH CONTROL UNIT

Perform the SCN coding of electronic ignition switch control unit.

>> GO TO 4.

4.PERFORM THE RESET OF CODING OF EPS CONTROL UNIT

Perform the reset of coding of EPS control unit. Refer to STC-22, "Description".

>> INSPECTION END

U0001 CAN COMMUNICATION

DTC Description

INFOID:0000000013658845

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0001	88	Drivetrain CAN communication (Drive train can communication)	[BUS OFF]	62	Diagnosis condition	CAN communication is active
					Signal (terminal)	CAN communication signal
					Threshold	CAN controller detects Bus off
					Diagnosis delay time	—

POSSIBLE CAUSE

CAN bus off

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0001” detected?

YES >> Proceed to STC-44, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658846

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the EPS control unit. Refer to STC-57, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0100 ENGINE SYSTEM

DTC Description

INFOID:0000000013658847

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0100	87	Communication error (Communication error)	[MISSING MESSAGE]	22, 63	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	0.2 seconds
U0100	87	Communication error (Communication error)	[MISSING MESSAGE]	D7	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	2 seconds
U0100	87	Communication error (Communication error)	[MISSING MESSAGE]	BB	Diagnosis condition	After 0.45 seconds from ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	0.2 seconds

POSSIBLE CAUSE

No information is transmitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0100” detected?

YES >> Proceed to STC-45, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658848

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the ECM. Refer to EC-963, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0122 ELECTRIC STABILITY PROGRAM (ESP) SYSTEM

DTC Description

INFOID:0000000013658849

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0122	00	Lost Communication With VDCM (Lost Communication With Vehicle Dynamics Control Module)	[NO SUBTYPE INFORMATION]	61, 24	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	0.2 seconds
U0122	00	Lost Communication With VDCM (Lost Communication With Vehicle Dynamics Control Module)	[NO SUBTYPE INFORMATION]	D0	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	1 second

POSSIBLE CAUSE

No information is transmitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0122” detected?

YES >> Proceed to STC-46, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658850

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the electronic stability program control unit. Refer to BRC-975, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0155 COMBINATION METER SYSTEM

DTC Description

INFOID:0000000013658851

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0155	00	COMMUNICATION ERROR (LOST) (Communication with the instrument cluster has a malfunction.)	[NO SUBTYPE INFORMATION]	BC	Diagnosis condition	After 0.45 seconds from ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	2 seconds

POSSIBLE CAUSE

No information is transmitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0155” detected?

YES >> Proceed to STC-47, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658852

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the combination meter. Refer to MWI-155, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0168 ELECTRIC IGNITION LOCK SYSTEM

DTC Description

INFOID:0000000013658853

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0168	87	COMMUNICATION ERROR (LOST) (Communication with the electronic ignition lock has a malfunction.)	[MISSING MESSAGE]	67	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	3 seconds
U0168	87	COMMUNICATION ERROR (LOST) (Communication with the electronic ignition lock has a malfunction.)	[MISSING MESSAGE]	20, 64	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	1 second
U0168	87	COMMUNICATION ERROR (LOST) (Communication with the electronic ignition lock has a malfunction.)	[MISSING MESSAGE]	DF	Diagnosis condition	After 0.45 seconds from ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	2 seconds

POSSIBLE CAUSE

No information is transmitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0168” detected?

YES >> Proceed to STC-48, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658854

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the electronic ignition switch control unit. Refer to PCS-47, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0212 STEERING COLUMN CONTROL MODULE

DTC Description

INFOID:0000000013658855

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0212	87	COMMUNICATION ERROR (LOST) (Communication with the steering column module has a malfunction.)	[MISSING MESSAGE]	26	Diagnosis condition	• After 0.45 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Message is missing
					Diagnosis delay time	0.1 second

POSSIBLE CAUSE

No information is transmitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0212” detected?

YES >> Proceed to STC-49, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658856

1.CAN COMMUNICATION SYSTEM DIAGNOSIS

Perform the trouble diagnosis for CAN communication system. Refer to LAN-58, "Trouble Diagnosis Flow Chart".

Is the inspection result normal?

YES >> Replace the steering column control module. Refer to BCS-250, "Removal and Installation".
NO >> Repair or replace the malfunctioning parts.

U0401 ENGINE SYSTEM

DTC Description

INFOID:0000000013658857

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0401	86	Communication error (invalid) [Communication error (invalid)]	[SIGNAL INVALID]	23, 66	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from ECM
					Diagnosis delay time	0.1 second

POSSIBLE CAUSE

ECM does not send valid values.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0401” detected?

YES >> Proceed to STC-50, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658858

1.PERFORM SELF-DIAGNOSIS OF ECM

With CONSULT

Perform self-diagnosis for “ENGINE”. Refer to EC-97, "CONSULT Function".

Is DTC detected?

YES >> Check the DTC. Refer to EC-142, "DTC Index".
NO >> INSPECTION END

U0416 ELECTRIC STABILITY PROGRAM (ESP) SYSTEM

DTC Description

INFOID:0000000013658859

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0416	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from control unit 'Traction system'.)	[NO SUBTYPE INFORMATION]	65, 25, D1	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic stability program control unit
					Diagnosis delay time	0.1 second
U0416	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from control unit 'Traction system'.)	[NO SUBTYPE INFORMATION]	D2	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic stability program control unit
					Diagnosis delay time	0.2 seconds
U0416	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from control unit 'Traction system'.)	[NO SUBTYPE INFORMATION]	D3	Diagnosis condition	• After 1.05 seconds from CAN communication wake up • Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic stability program control unit
					Diagnosis delay time	1 second
U0416	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from control unit 'Traction system'.)	[NO SUBTYPE INFORMATION]	D4	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic stability program control unit
					Diagnosis delay time	1 second
U0416	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from control unit 'Traction system'.)	[NO SUBTYPE INFORMATION]	9B, 9E	Diagnosis condition	—
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic stability program control unit
					Diagnosis delay time	0.048 seconds

POSSIBLE CAUSE

Electronic stability program control unit does not send valid values.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0416” detected?

YES >> Proceed to STC-52, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658860

1. PERFORM SELF-DIAGNOSIS OF ELECTRONIC STABLITY PROGRAM CONTROL UNIT

With CONSULT
Perform self-diagnosis for “ABS”. Refer to BRC-49, "CONSULT Function".

Is DTC detected?

YES >> Check the DTC. Refer to BRC-59, "DTC Index".
NO >> INSPECTION END

U0423 COMBINATION METER SYSTEM

DTC Description

INFOID:0000000013658861

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0423	00	COMMUNICATION ERROR (INVALID) (Implausible data were received from the instrument cluster.)	[NO SUBTYPE INFORMATION]	BD	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from combination meter
					Diagnosis delay time	2 seconds

POSSIBLE CAUSE

Combination meter does not send valid values.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0423” detected?

YES >> Proceed to STC-53, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658862

1.PERFORM SELF-DIAGNOSIS OF COMBINATION METER

With CONSULT

Perform self-diagnosis for “METER/M&A”. Refer to MWI-68, "CONSULT Function".

Is DTC detected?

YES >> Check the DTC. Refer to MWI-85, "DTC Index".
NO >> INSPECTION END

U0427 ELECTRIC IGNITION LOCK SYSTEM

DTC Description

INFOID:0000000013658863

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0427	86	COMMUNICATION ERROR (INVALID) (Implausible data were received from the electronic ignition lock.)	[SIGNAL INVALID]	21, 60	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic ignition switch control unit
					Diagnosis delay time	0.5 seconds
U0427	86	COMMUNICATION ERROR (INVALID) (Implausible data were received from the electronic ignition lock.)	[SIGNAL INVALID]	97, 9D, B9, BA	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from electronic ignition switch control unit
					Diagnosis delay time	1 second

POSSIBLE CAUSE

Electronic ignition switch control unit does not send valid values.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0427” detected?

YES >> Proceed to STC-54, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658864

1.PERFORM SELF-DIAGNOSIS OF ELECTRONIC IGNITION SWITCH CONTROL UNIT

With CONSULT

Perform self-diagnosis for “Electric ign switch cont unit”. Refer to PCS-8, "CONSULT Function".

Is DTC detected?

YES >> Check the DTC. Refer to PCS-12, "DTC Index".
NO >> INSPECTION END

U0429 STEERING COLUMN CONTROL MODULE

DTC Description

INFOID:0000000013658865

DTC DETECTION LOGIC

DTC		CONSULT screen terms (Trouble diagnosis content)	CONSULT screen terms [Malfunction type]	MELCO code	DTC detection condition	
U0429	86	COMMUNICATION ERROR (INVALID) (Implausible data were received from the steering column module.)	[SIGNAL INVALID]	27	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from steering column control module
					Diagnosis delay time	0.05 seconds
U0429	86	COMMUNICATION ERROR (INVALID) (Implausible data were received from the steering column module.)	[SIGNAL INVALID]	BE	Diagnosis condition	Ignition switch ON
					Signal (terminal)	CAN communication signal
					Threshold	Control unit receive the invalid data from steering column control module
					Diagnosis delay time	0.088 seconds

POSSIBLE CAUSE

Steering column control module does not send valid values.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Perform self-diagnosis for “EPS/DAST 3”.

Is DTC “U0429” detected?

YES >> Proceed to STC-55, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-56, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000013658866

1.PERFORM SELF-DIAGNOSIS OF STEERING COLUMN CONTROL MODULE

With CONSULT

Perform self-diagnosis for “Steering column cont module”. Refer to BCS-30, "CONSULT Function (Steering Column Control Module)".

Is DTC detected?

YES >> Check the DTC. Refer to BCS-61, "DTC Index".
NO >> INSPECTION END

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000013658867

1. CHECK EPS CONTROL UNIT POWER SUPPLY

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

Terminals			Voltage
(+)		(–)	
EPS control unit		Ground	
Connector	Terminal		
E45	3	—	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK EPS CONTROL UNIT POWER SUPPLY CIRCUIT

1. Check the 100A fusible link (#B).
2. Disconnect fuse box harness connector.
3. Check the continuity between EPS control unit harness connector and fuse box harness connector.

EPS control unit		Fuse box		Continuity
Connector	Terminal	Connector	Terminal	
E45	3	E74	3	Existed

4. Check the continuity between EPS control unit harness connector and ground.

EPS control unit		Ground	Continuity
Connector	Terminal		
E45	3	—	Not existed

Is the inspection result normal?

YES >> Perform trouble diagnosis for battery power supply. Refer to PG-15, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3. CHECK EPS CONTROL UNIT GROUND CIRCUIT

Check the continuity between EPS control unit harness connector and ground.

EPS control unit		Ground	Continuity
Connector	Terminal		
E45	4	—	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK TERMINAL

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

Is the inspection result normal?

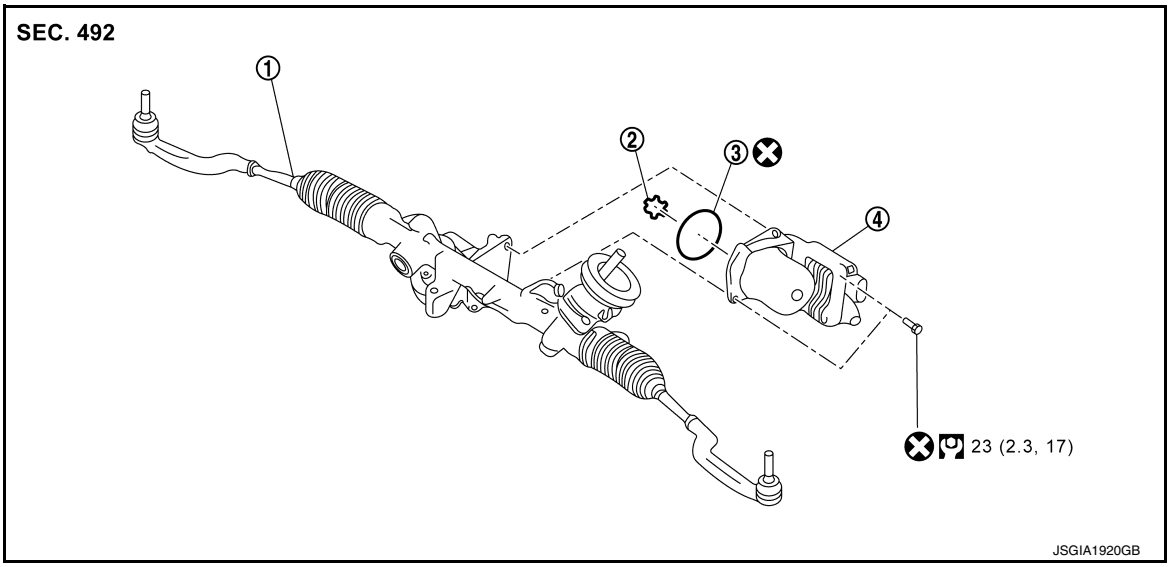
YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

REMOVAL AND INSTALLATION

EPS CONTROL UNIT

Exploded View

INFOID:0000000013658868



① Steering gear assembly ② Damper coupling ③ Sealing ring
④ EPS control unit

: Always replace after every disassembly.

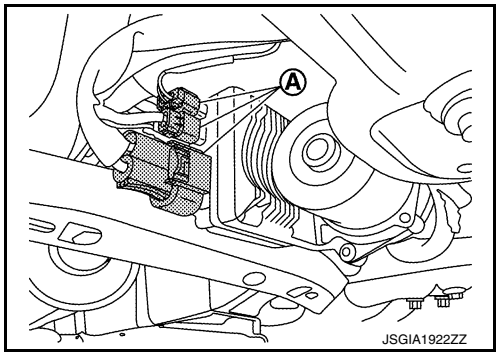
: N·m (kg-m, ft-lb)

Removal and Installation

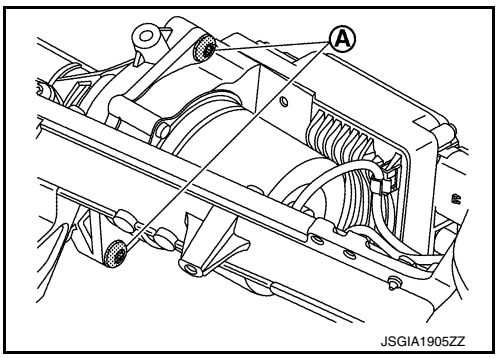
INFOID:0000000013658869

REMOVAL

1. Remove engine under cover. Refer to EXT-44, "ENGINE UNDER COVER : Removal and Installation".
2. Set the front wheels to straight-ahead position and fix steering wheel at center position.
3. Disconnect EPS control unit harness connectors Ⓐ.
   CAUTION:
   Observe routing of EPS control unit harness.
4. Remove heat insulator to aside. Refer to ST-13, "Exploded View".



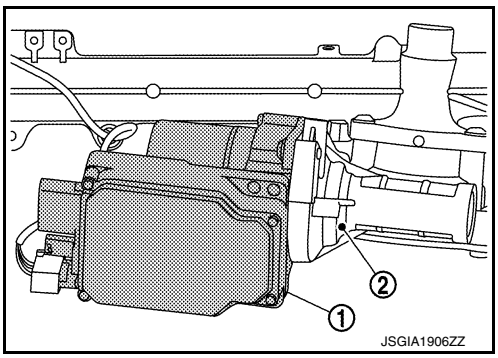
5. Remove EPS control unit mounting bolts Ⓐ.



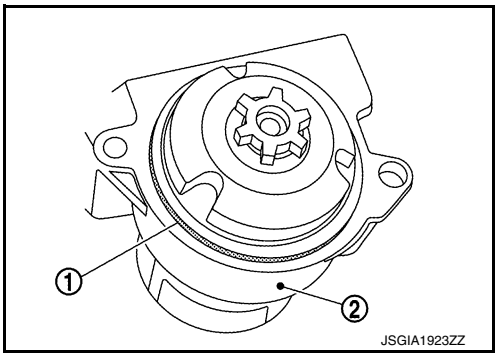
6. Remove EPS control unit ① and sealing ring from steering gear assembly ②.

CAUTION:

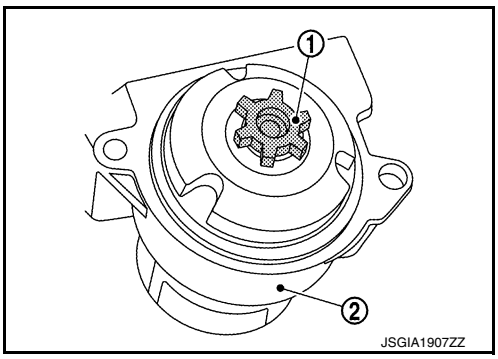
- **Use lint-free rag to protect steering gear assembly and EPS control unit against dirt.**
- **Soiling on the inside will result in destruction of the steering gear assembly or the EPS control unit.**



7. Remove sealing ring ① from EPS control unit ②.



8. Remove damper coupling ① from EPS control unit ②.
9. Perform inspection after removal. Refer to STC-59, "Inspection and Adjustment".



INSTALLATION

Note the following, and install in the reverse order of removal.

- Check that damper coupling is correctly seated.

  CAUTION:

  If damage is replace damper coupling.
- Check that sealing ring is seated correctly.

  CAUTION:

  Never reuse sealing ring.
- Check that harness is not damaged when installing EPS control unit. Also, check that EPS control unit is installed without trapping harness of foreign materials.

  CAUTION:

  - **Never reuse EPS control unit mounting bolt.**

- **Observe routing of EPS control unit harness.**
- Perform adjustment when replacement. Refer to STC-59, "Inspection and Adjustment".

Inspection and Adjustment

INFOID:0000000013658870

INSPECTION AFTER REMOVAL

- Check damper coupling for damage. Replace if necessary.

ADJUSTMENT WHEN REPLACEMENT

- Perform additional service when replacing EPS control unit. Refer to STC-21, "Description".
- Perform test drive when removing EPS control unit. Refer to STC-26, "Description".