

SECTION **STC**

STEERING CONTROL SYSTEM

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SYSTEM DESCRIPTION

[EPS]

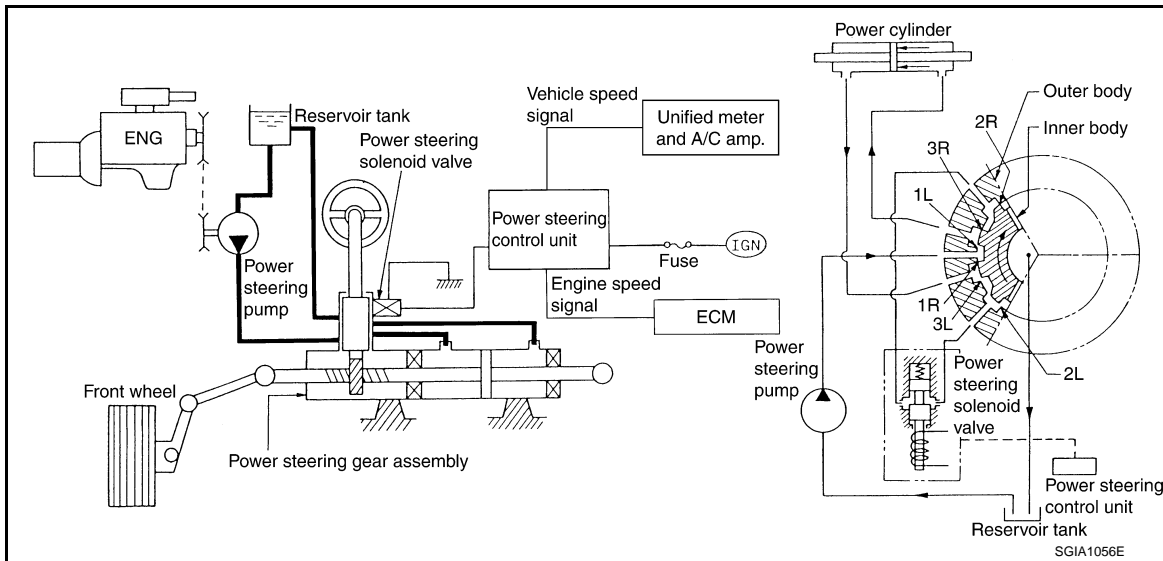
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SERVICE INFORMATION

SYSTEM DESCRIPTION

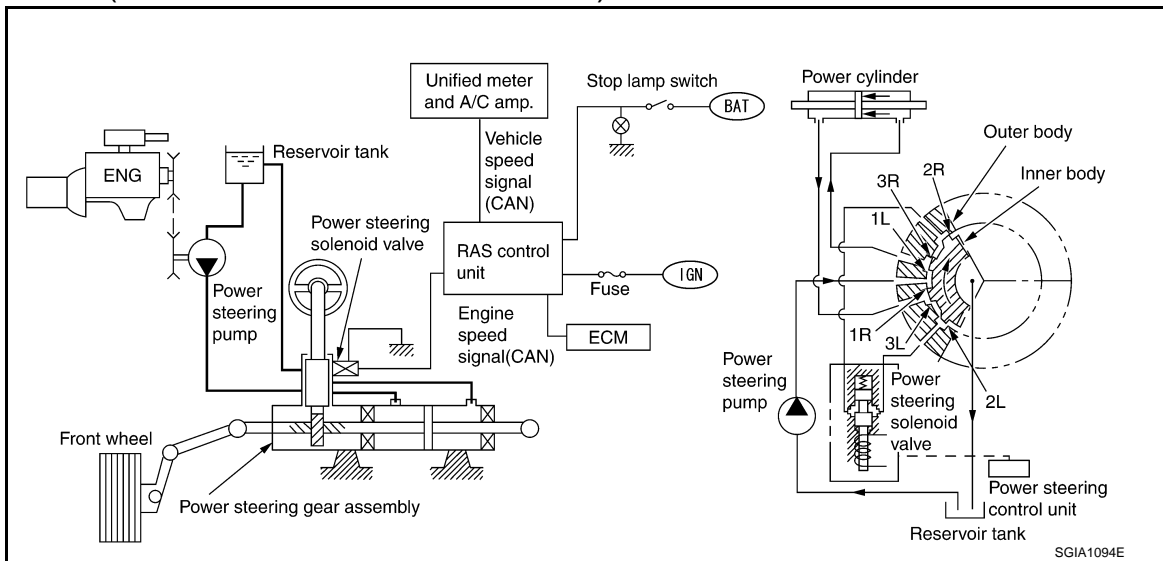
Component

INFOID:000000002955991



Component (Models with Rear Active Steer)

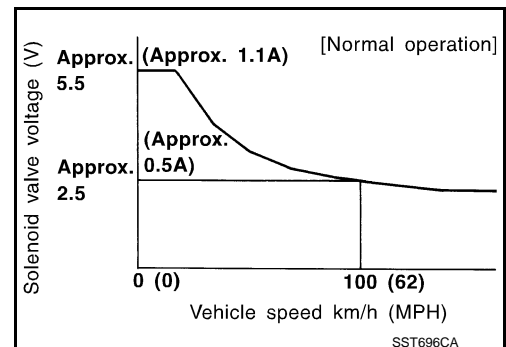
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Electronically Controlled Power Steering System Function

INFOID:000000002955993

- Vehicle speed sensing electronically controlled power steering (that properly controls the steering force by the vehicle speed) has been adopted. When it is normal, it controls the power steering solenoid valve according to the vehicle speed as shown in the figure and makes the steering force proper.
- For the models with RAS (Rear Active Steer), RAS control unit performs the same control as power steering control unit. For schematic, refer to [STC-19, "Wiring Diagram - RAS -"](#) and trouble diagnosis, refer to [STC-41, "Diagnosis Chart by Symptom 2"](#).



SYSTEM DESCRIPTION

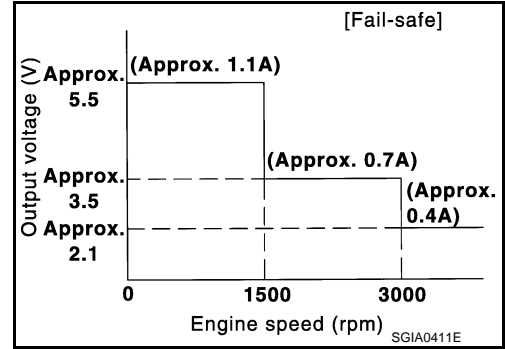
[EPS]

< SERVICE INFORMATION >

Fail-Safe Function

INFOID:00000002955994

When the fail-safe function operate, it controls power steering solenoid valve by the engine speed as shown in the figure and maintains the steering force.



FAIL-SAFE INPUT/CANCEL CONDITIONS

Input conditions	Cancel conditions
When vehicle runs at an engine speed of 1,500 rpm or higher and no vehicle speed signal is received for 10 seconds.	<ul style="list-style-type: none"> A vehicle speed of 2 km/h (1.2 MPH) or more is input. Turn the ignition switch ON after turning it OFF.
The continuous vehicle speed signal 30 km/h (19 MPH) or more suddenly drops to less than 2 km/h (1.2 MPH) within 1.4 seconds.	

CAUTION:

Fail-safe function is activated when the engine runs at 1,500 rpm or higher for 10 seconds with the vehicle stopped. This is normal and the fail-safe function is automatically deactivated when a vehicle speed signal of 2 km/h (1.2 MPH) or higher is input or the ignition switch is turned OFF.

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TROUBLE DIAGNOSIS

How to Perform Trouble Diagnosis

INFOID:000000002955995

BASIC CONCEPT

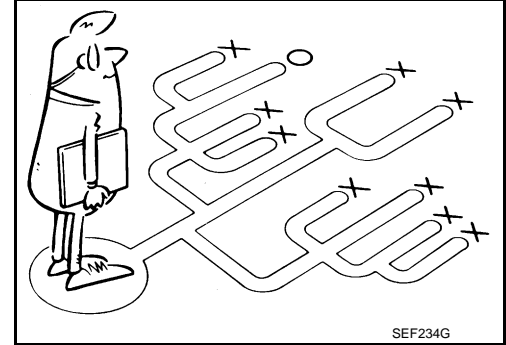
- The most important point to perform trouble diagnosis is to understand systems (control and mechanism) in vehicle thoroughly.
- It is also important to clarify customer complaints before inspection.

First of all, reproduce symptom, and understand it fully.

Ask customer about his/her complaints carefully. In some cases, they will be necessary to check symptom by driving vehicle with customer.

CAUTION:

Customers are not professionals. Do not assume “maybe customer means...” or “maybe customer mentioned this symptom”.

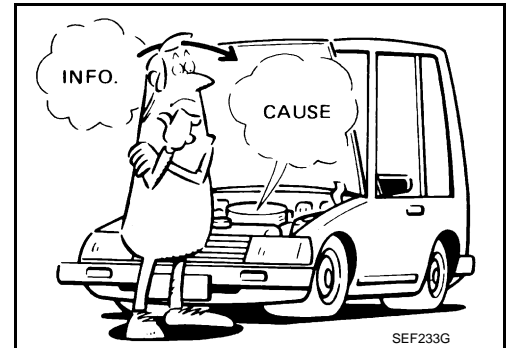


SEF234G

- It is essential to check symptoms right from beginning in order to repair a malfunction completely.

For an intermittent malfunction, it is important to reproduce symptom based on interview with customer and past examples. Do not perform inspection on ad hoc basis. Most intermittent malfunctions are caused by poor contacts. In this case, it will be effective to shake suspected harness or connector by hand. When repairs are performed without any symptom check, no one can judge if malfunction has actually been eliminated.

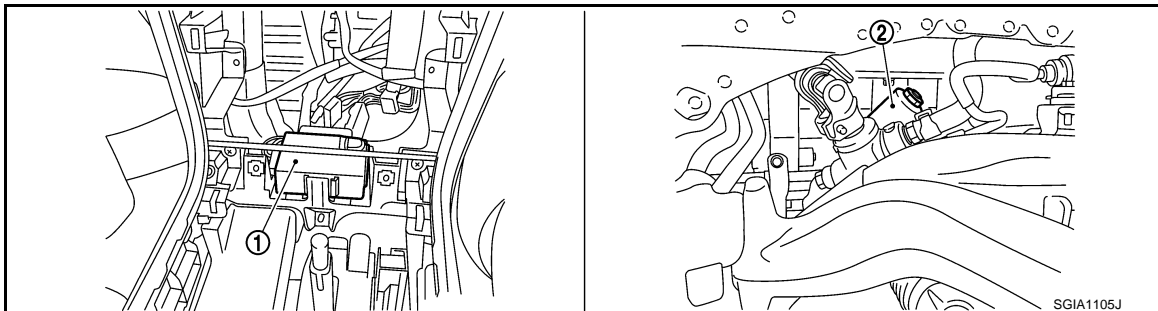
- Always read “GI General Information” to confirm general precautions. Refer to [GI-3. "General Precaution"](#).



SEF233G

Component Parts Location

INFOID:000000002955996



SGIA1105J

1. Power steering control unit
(Back of center console assembly)

2. Power steering solenoid valve

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

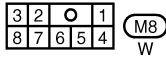
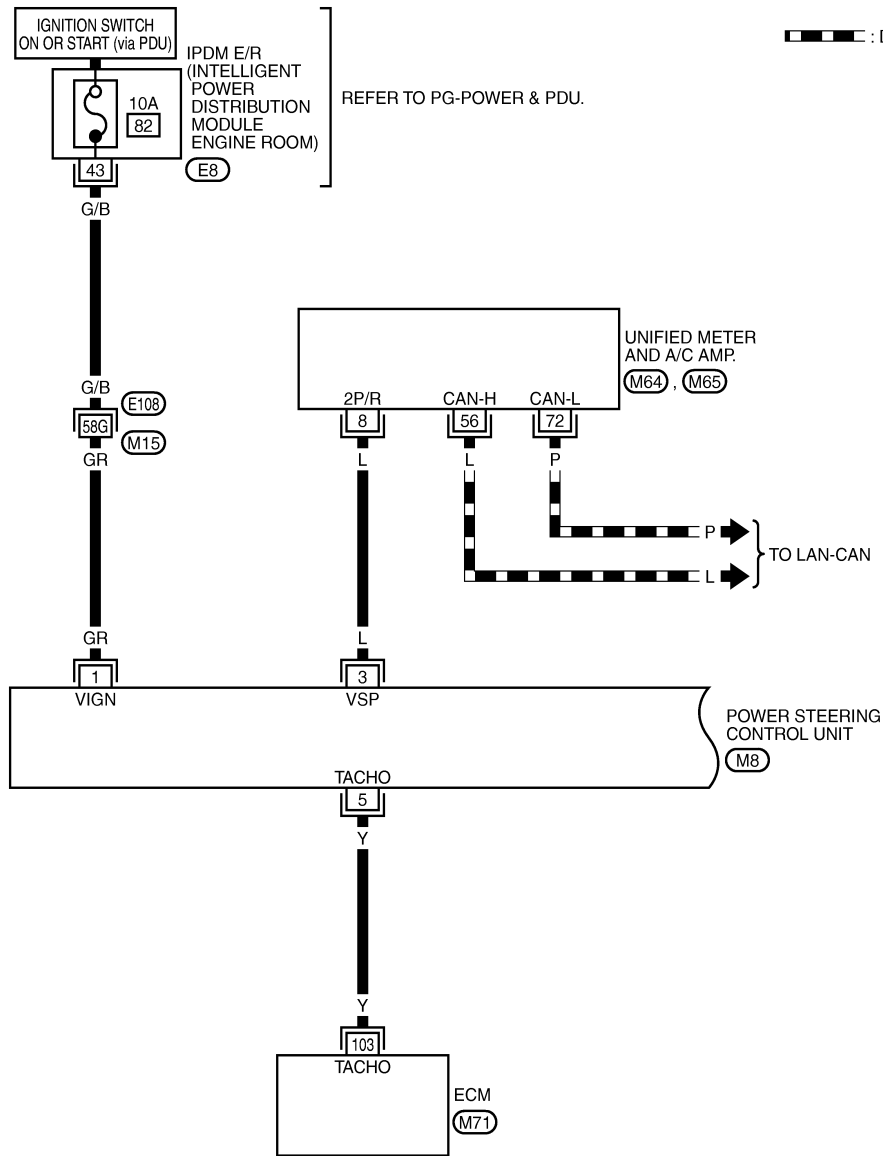
[EPS]

Wiring Diagram - EPS -

INFOID:00000002955997

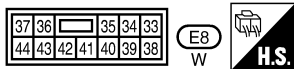
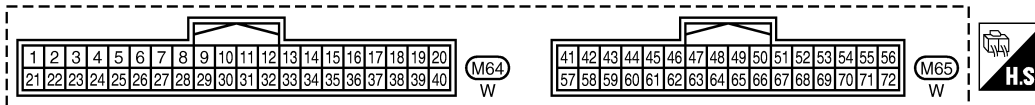
STC-EPS-01

▬ : DATA LINE



REFER TO THE FOLLOWING.

- (E108) - SUPER MULTIPLE JUNCTION (SMJ)
- (M71) - ELECTRICAL UNITS



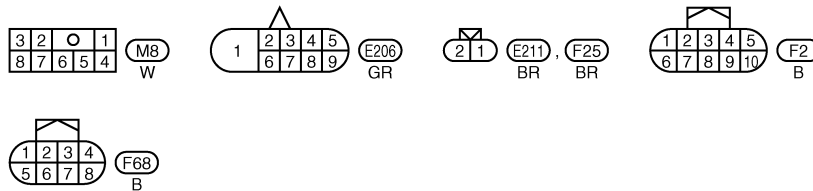
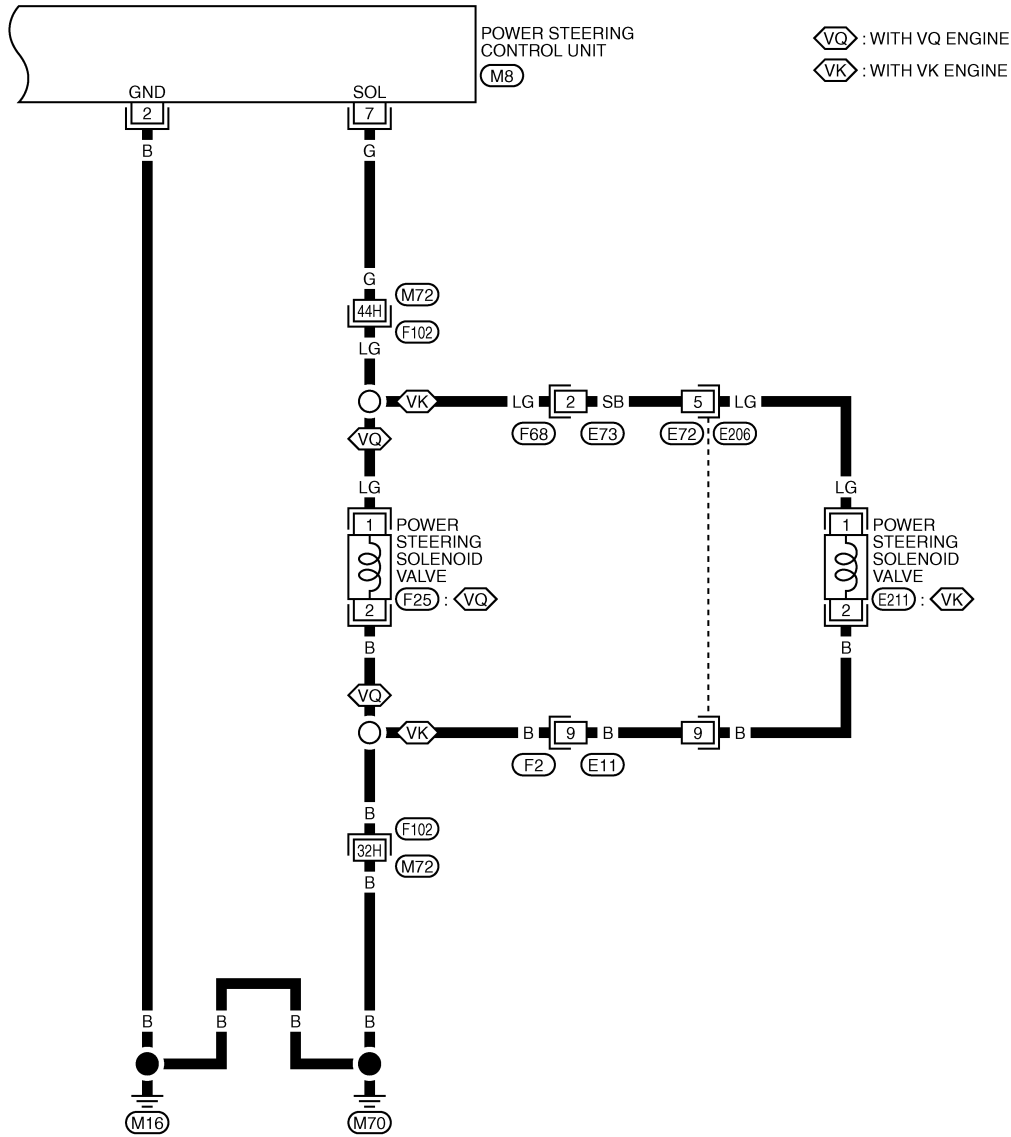
TGWT0109E

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[EPS]

STC-EPS-02



REFER TO THE FOLLOWING.
 F102 -SUPER MULTIPLE JUNCTION (SMJ)

TGWT0024E

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Control Unit Input/Output Signal Standard

STANDARD BY CIRCUIT TESTER AND OSCILLOSCOPE

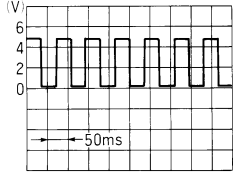
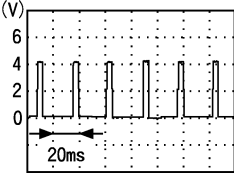
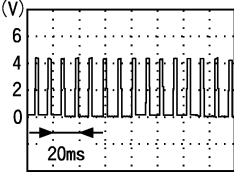
CAUTION:

When checked using a circuit tester for voltage measurement, connector terminals should not be forcefully extended.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[EPS]

Terminal		Measuring point	Measuring condition		Standard
+ (wire color)	-				
1 (GR)	Ground	IGN	Ignition switch ON.		Battery voltage (Approx. 12 V)
2 (B)		Ground	—		—
3 (L)		Vehicle speed signal (2-pulse)	At 40 km/h (25MPH)		 <p style="text-align: right; font-size: small;">ELF1080D</p>
5 (Y)		Engine speed signal	At idle after warming up		 <p style="text-align: right; font-size: small;">PBIA3654J</p>
		Engine speed signal	At approx. 2,000 rpm		 <p style="text-align: right; font-size: small;">PBIA3655J</p>
7 (G)		Power steering solenoid valve	Normal (Vehicle speed)	0 km/h (0 MPH)	Approx. 4.4 - 6.6 V
	100 km/h (62 MPH)			Approx. 2.4 - 3.6 V	
	In fail-safe mode (Engine speed)		0 - 1,500 rpm	Approx. 4.4 - 6.6 V	
			1,500 - 3,000 rpm	Approx. 3.5 V	
			More than 3,000 rpm	Approx. 2.1 V	

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For Fast and Accurate Trouble Diagnosis

INFOID:000000002955999

Check the following items with the vehicle stopped

- Is air pressure and size of tires proper?
- Is the specified part used for the steering wheel?
- Is control unit a genuine part?
- Are there any fluid leakage from steering gear assembly, power steering oil pump, and hydraulic pipes, etc?
Refer to [PS-7, "Checking Fluid Leakage"](#).
- Is the fluid level proper? Refer to [PS-7, "Checking Fluid Level"](#).
- Is the wheel alignment adjusted properly? Refer to [FSU-5, "Wheel Alignment Inspection"](#) (2WD), [FSU-22, "Wheel Alignment Inspection"](#) (AWD).
- Are there any damage or modification to suspension or body resulting in increased weight or altered ground clearance?
- Check each link installation condition of suspension and axle.
- Check each connector connection condition.

Check the following items while driving the vehicle

- Check conditions when the malfunction occurred (5W 1H).
- Is the engine condition normal?

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TROUBLE DIAGNOSIS

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< SERVICE INFORMATION >

Basic Inspection

INFOID:000000002956001

POWER SUPPLY CIRCUIT TERMINAL LOOSENESS AND BATTERY

Check battery terminals for looseness on both positive and negative ones and ground connection. Also make sure that battery voltage does not drop.

Inspection: Power Steering Control Unit Power Supply Circuit and Ground

INFOID:000000002956001

1. CHECK POWER STEERING CONTROL UNIT CONNECTOR

Turn ignition switch OFF, disconnect power steering control unit harness connector, and check terminal for deformation, disconnection, looseness, etc.

OK or NG

OK >> GO TO 2.

NG >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2. CHECK POWER STEERING CONTROL UNIT GROUND CIRCUIT

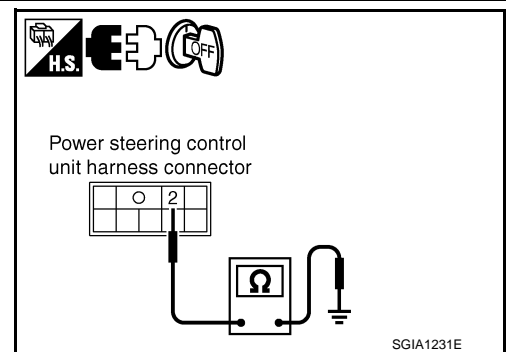
Disconnect power steering control unit harness connector M8, and then check continuity between power steering control unit harness connector M8 and ground.

Terminal 2 – Ground : Continuity exist.

OK or NG

OK >> GO TO 3.

NG >> Ground circuit open or shorted. Repair or replace any inoperative parts.



3. CHECK POWER STEERING CONTROL UNIT POWER SUPPLY CIRCUIT

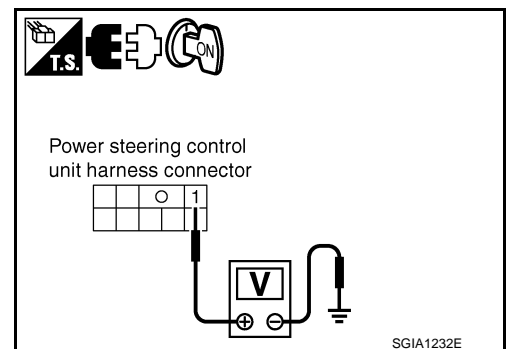
Turn ignition switch ON, and then check voltage between power steering control unit harness connector M8 and ground.

Terminal 1 – ground : Battery voltage (Approx. 12 V)

OK or NG

OK >> Power supply and ground circuit are normal.

NG >> Power supply circuit open or shorted. Repair or replace any inoperative parts.



Symptom: the Steering Force Does Not Change Smoothly According to the Vehicle Speed

INFOID:000000002956002

Heavy steering force with the static steering/light steering force during high-speed driving

1. POWER STEERING SOLENOID VALVE SIGNAL INSPECTION 1

1. Start engine.

TROUBLE DIAGNOSIS

[EPS]

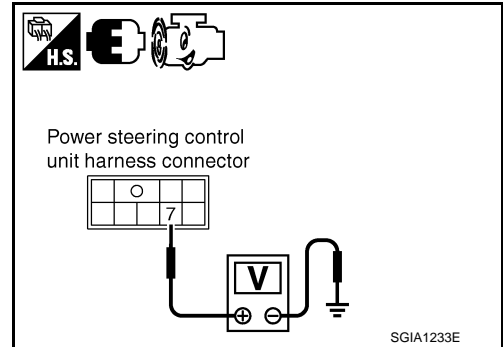
< SERVICE INFORMATION >

- Change the vehicle speed from 0 to 100 km/h (0 to 62 MPH) slowly, and then check voltage between power steering control unit harness connector M8 and ground.

Terminal 7 – ground : The voltage has changed from approximately 4.4 - 6.6 V to approximately 2.4 - 3.6 V

OK or NG

- OK >> GO TO 2.
NG >> GO TO 7.



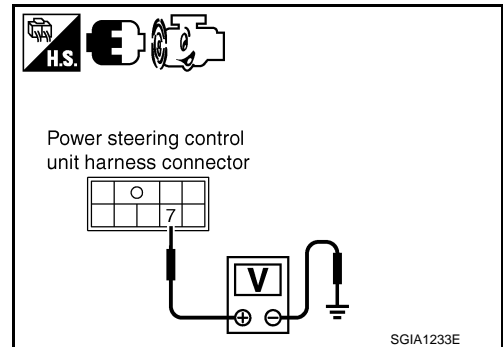
2. POWER STEERING SOLENOID VALVE SIGNAL INSPECTION 2

- Activate fail-safe function by running the engine speed at 1,500 rpm or higher for 10 seconds with the vehicle stopped.
- Change the engine speed to the idling, to approximately 1,600 rpm, and to approximately 3,000 rpm slowly, and then check voltage between power steering control unit harness connector M8 and ground.

Terminal 7 – ground : The voltage has changed from approximately 5.5 V to approximately 2.1 V step-by-step.

OK or NG

- OK >> GO TO 3.
NG >> GO TO 8.



3. CHECK POWER STEERING SOLENOID VALVE CONNECTOR

Turn ignition switch OFF, disconnect power steering solenoid valve harness connector, and check terminal for deformation, disconnection, looseness, etc.

OK or NG

- OK >> GO TO 4.
NG >> Harness or connector open or shorted. Repair or replace any inoperative parts.

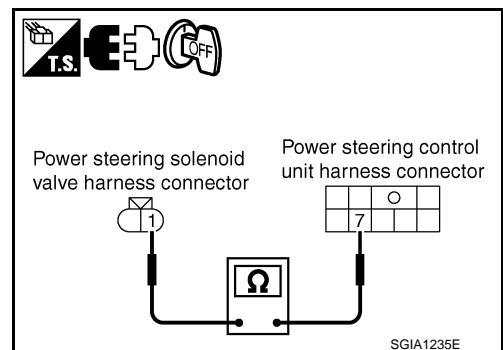
4. CHECK POWER STEERING SOLENOID VALVE POWER SUPPLY CIRCUIT

Check continuity between power steering control unit harness connector M8 and power steering solenoid valve harness connector F25 (VQ35DE), E211 (VK45DE).

Power steering control unit	Power steering solenoid valve	Continuity
Terminal 7	Terminal 1	Yes

OK or NG

- OK >> GO TO 5.
NG >> Open or short in harness. Repair or replace any inoperative parts.



5. CHECK POWER STEERING SOLENOID VALVE GROUND CIRCUIT

TROUBLE DIAGNOSIS

[EPS]

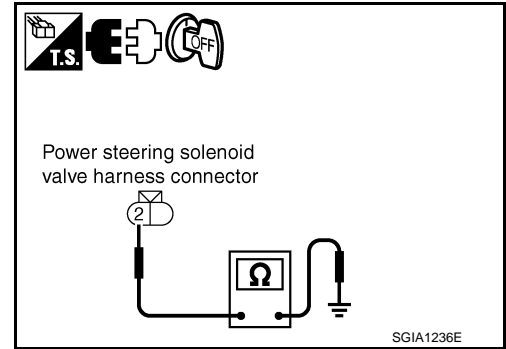
< SERVICE INFORMATION >

Check continuity between power steering solenoid valve harness connector F25 (VQ35DE), E211 (VK45DE) and ground.

Terminal 2 – Ground : Continuity exist.

OK or NG

- OK >> GO TO 6.
- NG >> Open or short in harness. Repair or replace any inoperative parts.



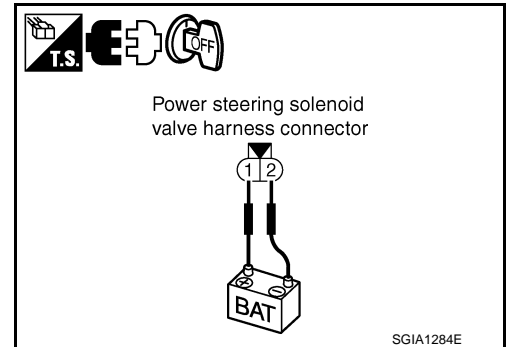
6.CHECK POWER STEERING SOLENOID VALVE

Apply voltage power steering solenoid valve connector, and then make sure that the operating sound (clicking sound) is heard.

Terminal 1 (+) - 2 (-) : Operating sound is heard.

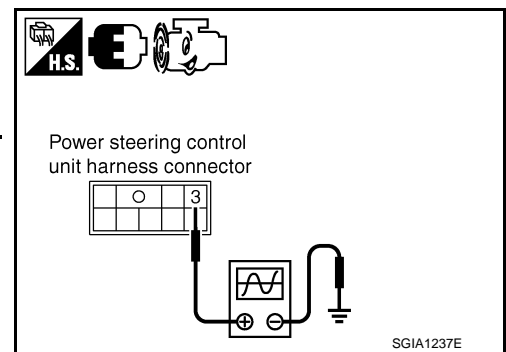
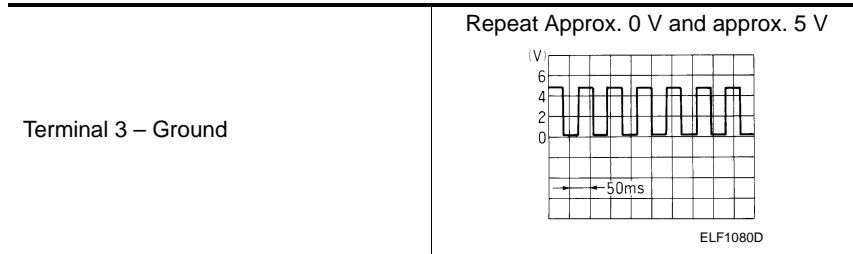
OK or NG

- OK >> Perform steering wheel turning force inspection. Refer to [PS-9. "On-Vehicle Inspection and Service"](#).
- NG >> Power steering solenoid valve is inoperative. Replace.



7.CHECK VEHICLE SPEED SIGNAL CIRCUIT

Change the vehicle speed, and then check voltage waveform between power steering control unit harness connector M8 and ground.

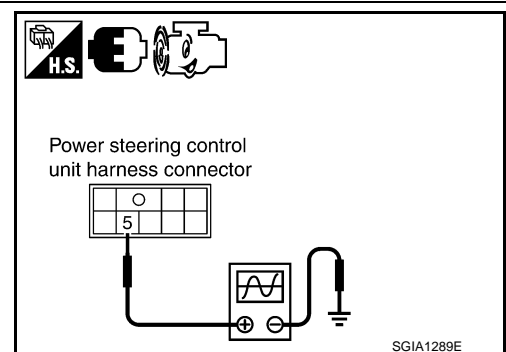


OK or NG

- OK >> Power steering control unit is inoperative. Replace it.
- NG >> Check the following systems and replace if necessary.
 - Harness between unified meter & A/C amp and power steering control unit.
 - Unified meter & A/C amp and vehicle speed signal circuit Refer to [DI-26](#).

8.CHECK ENGINE SPEED SIGNAL CIRCUIT

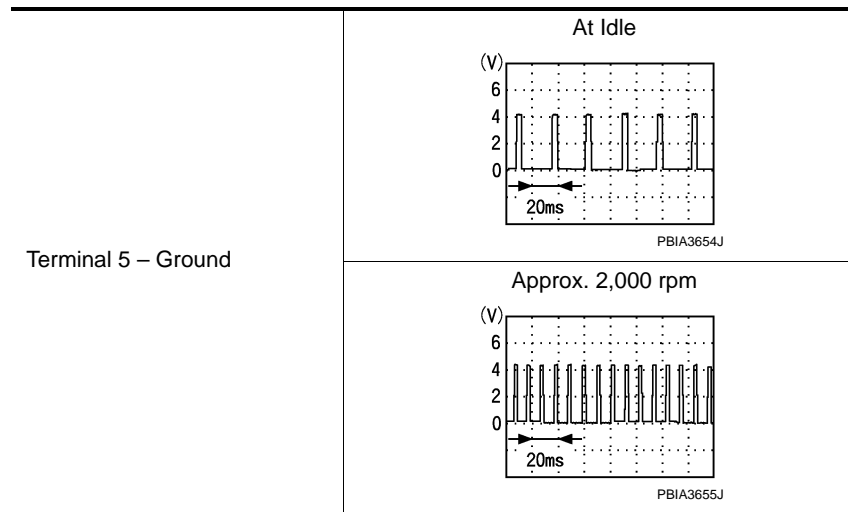
Warm up the engine, and then check voltage waveform between power steering control unit harness connector M8 and ground when the engine speed is the idling and at approximately 2,000 rpm.



TROUBLE DIAGNOSIS

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[EPS]



OK or NG

- OK >> Power steering control unit is inoperating. Replace it.
- NG >> Check the following systems and replace if malfunction is detected.
 - Harness between ECM and power steering control unit
 - ECM engine speed signal circuit. Refer to [EC-741, "CONSULT-III Function"](#).

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[RAS]

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C1900-C1913

INFOID:000000003295252

DTC	Items (CONSULT screen items)	Reference
C1900	CONTROL UNIT [ABNORMAL1]	STC-31, "Inspection 1 RAS Control Unit Malfunction"
C1901	CONTROL UNIT [ABNORMAL2]	
C1902	MOTOR OUTPUT [REV CURRENT]	STC-33, "Inspection 3 RAS Motor Output Malfunction"
C1903	MOTOR OUTPUT [NO CURRENT]	
C1904	MOTOR OUTPUT [OVERCURRENT]	
C1905	CONTROL UNIT [ABNORMAL3]	STC-31, "Inspection 1 RAS Control Unit Malfunction"
C1906	CONTROL UNIT [ABNORMAL5]	
C1907	CONTROL UNIT [ABNORMAL4]	
C1908	CONTROL UNIT [ABNORMAL7]	
C1909	CONTROL UNIT [ABNORMAL6]	STC-33, "Inspection 3 RAS Motor Output Malfunction"
C1910	MOTOR OUTPUT [MOTOR LOCK]	
C1911	MOTOR VOLTAGE [LOW VOLTAGE]	STC-31, "Inspection 2 Motor Power Supply System"
C1912	MOTOR VOLTAGE [BAD OBSTRCT]	
C1913	MOTOR OUTPUT [ABNORMAL SIG]	STC-33, "Inspection 3 RAS Motor Output Malfunction"

C1914-C1929

INFOID:000000003295253

DTC	Items (CONSULT screen items)	Reference
C1914	RR ST ANGLE SENSOR [ABNORMAL VOL]	STC-35, "Inspection 6 Rear Main Signal and Rear Sub Signal Malfunction"
C1915	RR ST ANGLE SENSOR [MAIN SIGNAL]	
C1916	RR ST ANGLE SENSOR [SUB SIGNAL]	
C1917	RR ST ANGLE SENSOR [OFFSET SIG1]	
C1918	RR ST ANGLE SENSOR [OFFSET SIG2]	STC-34, "Inspection 4 Vehicle Speed Signal"
C1919	VEHICLE SPEED SEN [NO SIGNAL]	
C1920	STEERING ANGLE SEN [NO SIGNAL]	STC-34, "Inspection 5 Steering Angle Signal Malfunction"
C1921	MOTOR OUTPUT	STC-38, "Inspection 8 Engine Speed Signal Malfunction"
C1922	CONTROL UNIT [ABNORMAL 8]	STC-31, "Inspection 1 RAS Control Unit Malfunction"
C1923	STEERING ANGLE SEN [NO CHANGE]	STC-34, "Inspection 5 Steering Angle Signal Malfunction"
C1924	STEERING ANGLE SEN [NO NEUT STATE]	
C1926	STEERING ANGLE SEN	
C1927	CONTROL UNIT [ABNORMAL 5]	STC-31, "Inspection 1 RAS Control Unit Malfunction"
C1928	CONTROL UNIT [ABNORMAL 9]	
C1929	VDC	STC-38, "Inspection 7 VDC Malfunction"

U1000-U1010

INFOID:000000003295255

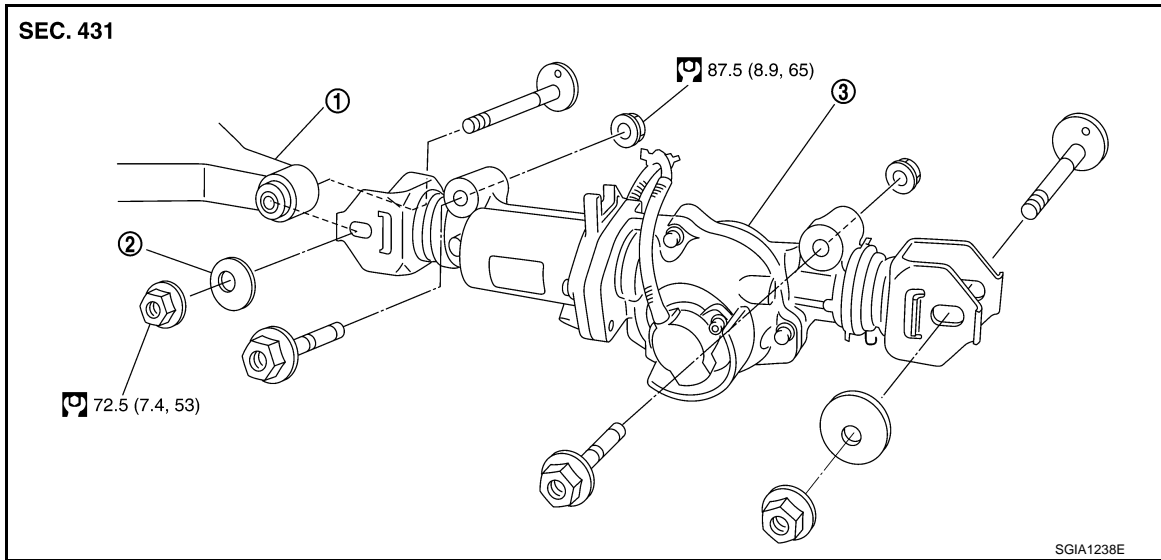
DTC	Items (CONSULT screen items)	Reference
U1000	CAN COMM CIRCUIT	STC-39, "Inspection 9 CAN Communication System Malfunction"
U1010	CONTROL UNIT (CAN)	

REAR ACTIVE STEER

Removal and Installation

INFOID:000000003302536

COMPONENTS

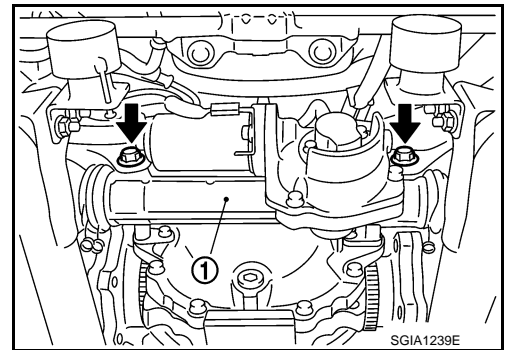


- 1. Rear lower link
- 2. Decenter cam
- 3. RAS actuator assembly

Refer to [GI-8. "Contents"](#), for the symbols in the figure.

REMOVAL

1. Remove coil spring. Refer to [RSU-15. "Removal and Installation"](#).
2. Disconnect harness connector from RAS actuator assembly and rear suspension member.
3. Remove fixing bolts and nuts of RAS actuator assembly (1), and then remove RAS actuator assembly (1) from rear suspension member.



INSTALLATION

- Installation is the reverse order of removal. For tightening torque, refer to "COMPONENTS".
- When installing RAS actuator assembly to rear suspension member, check the mounting surfaces of RAS actuator assembly and rear suspension member for oil, dirt, sand, or other foreign materials.
- To perform the neutral position adjustment. Refer to [BRC-8. "Adjustment of Steering Angle Sensor Neutral Position"](#).

SYSTEM DESCRIPTION

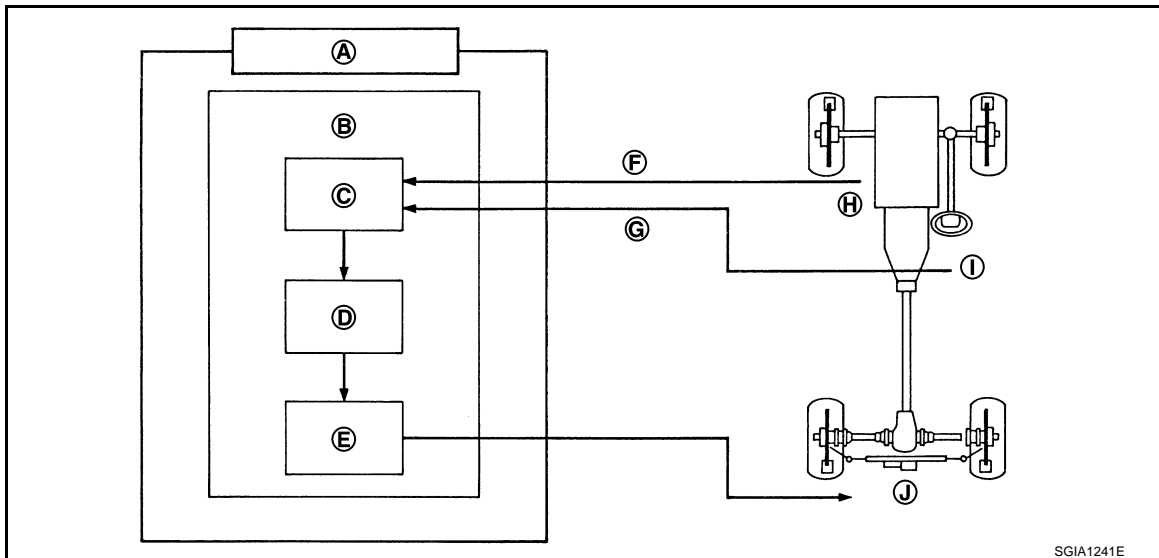
< SERVICE INFORMATION >

[RAS]

SYSTEM DESCRIPTION

Component

INFOID:000000003302539



SGIA1241E

- | | | |
|--|------------------------------------|----------------------------------|
| A. RAS control unit | B. Model following control | C. Target vehicle dynamics model |
| D. Rear wheel steering angle command value operation | E. Rear wheel steering angle servo | F. Vehicle speed signal (CAN) |
| G. Steering angle signal (CAN) | H. Vehicle speed sensor | I. Steering angle sensor |
| J. RAS actuator assembly | | |

RAS (Rear Active Steer) Function

INFOID:000000003302540

Part name	Function
RAS control unit	<ul style="list-style-type: none"> Calculate the vehicle speed signal from CAN communication and the signals from steering angle sensor and rear wheel steering angle sensor by a computer, and then control the rear wheel steering angle. Fail-safe function is activated when the electrical system is malfunctioning. The output signal to the actuator is turned OFF during this mode. At that time, the RAS warning lamp illuminates and indicates the system is malfunctioning. It performs the communication control function with other control units via CAN communication. This enables system diagnosis with CONSULT-III.
RAS actuator	The efficiency of the rear wheel steer improves by locating the electric motor actuator into the lower link of rear suspension.
Steering angle sensor	<ul style="list-style-type: none"> Measure the steering angle and send it to RAS control unit via CAN communication. It is shared with the steering angle sensor for VDC.
Rear wheel steering angle sensor	<ul style="list-style-type: none"> It sends the rear wheel steering angle status to RAS control unit. The accuracy of rear wheel steer improves by comparing the vehicle speed signal from CAN communication with the rear wheel steering angle target value calculated from the wheel angle sensor signal, and it controls them. There are 2 types of rear wheel steering angle sensors (main/sub). If one of them is malfunctioning, the other operates the fail-safe mode and stops the control.
RAS warning lamp	<ul style="list-style-type: none"> It turns on when the fail-safe function is operated and indicates that a RAS control malfunction has occurred. It turns on when ignition switch turns on and turns off after the engine is started. It indicates the suspect system by blinking when performing the self-diagnosis (without CONSULT-III).

SYSTEM DESCRIPTION

< SERVICE INFORMATION >

[RAS]

Fail-Safe Function

INFOID:000000003302541

In the event there is a malfunction with the electrical system, the RAS control is stopped and the fail-safe mode is activated. At that time, it indicates the malfunction by turning the RAS warning lamp ON and stops the rear wheel control.

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STC

TROUBLE DIAGNOSIS

How to Perform Trouble Diagnosis

INFOID:000000003302542

BASIC CONCEPT

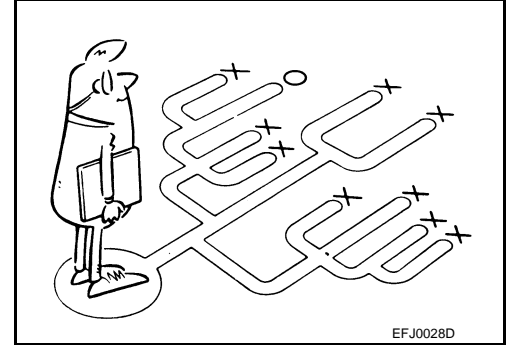
- The most important point to perform trouble diagnosis is to understand systems (control and mechanism) in vehicle thoroughly.
- It is also important to clarify customer complaints before inspection.

First of all, reproduce symptom, and understand it fully.

Ask customer about his/her complaints carefully. In some cases, they will be necessary to check symptom by driving vehicle with customer.

CAUTION:

Customers are not professionals. Do not assume “maybe customer means...” or “maybe customer mentioned this symptom”.

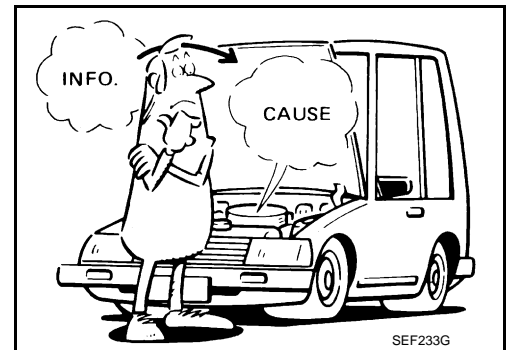


EFJ0028D

- It is essential to check symptoms right from beginning in order to repair a malfunction completely.

For an intermittent malfunction, it is important to reproduce symptom based on interview with customer and past examples. Do not perform inspection on ad hoc basis. Most intermittent malfunctions are caused by poor contacts. In this case, it will be effective to shake suspected harness or connector by hand. When repairs are performed without any symptom check, no one can judge if malfunction has actually been eliminated.

- After diagnosis, make sure to perform “ERASE MEMORY”. Refer to [STC-25. "CONSULT-III Function \(RAS/HICAS\)"](#).
- Always read “GI General Information” to confirm general precautions. Refer to [GI-3. "General Precaution"](#).



SEF233G

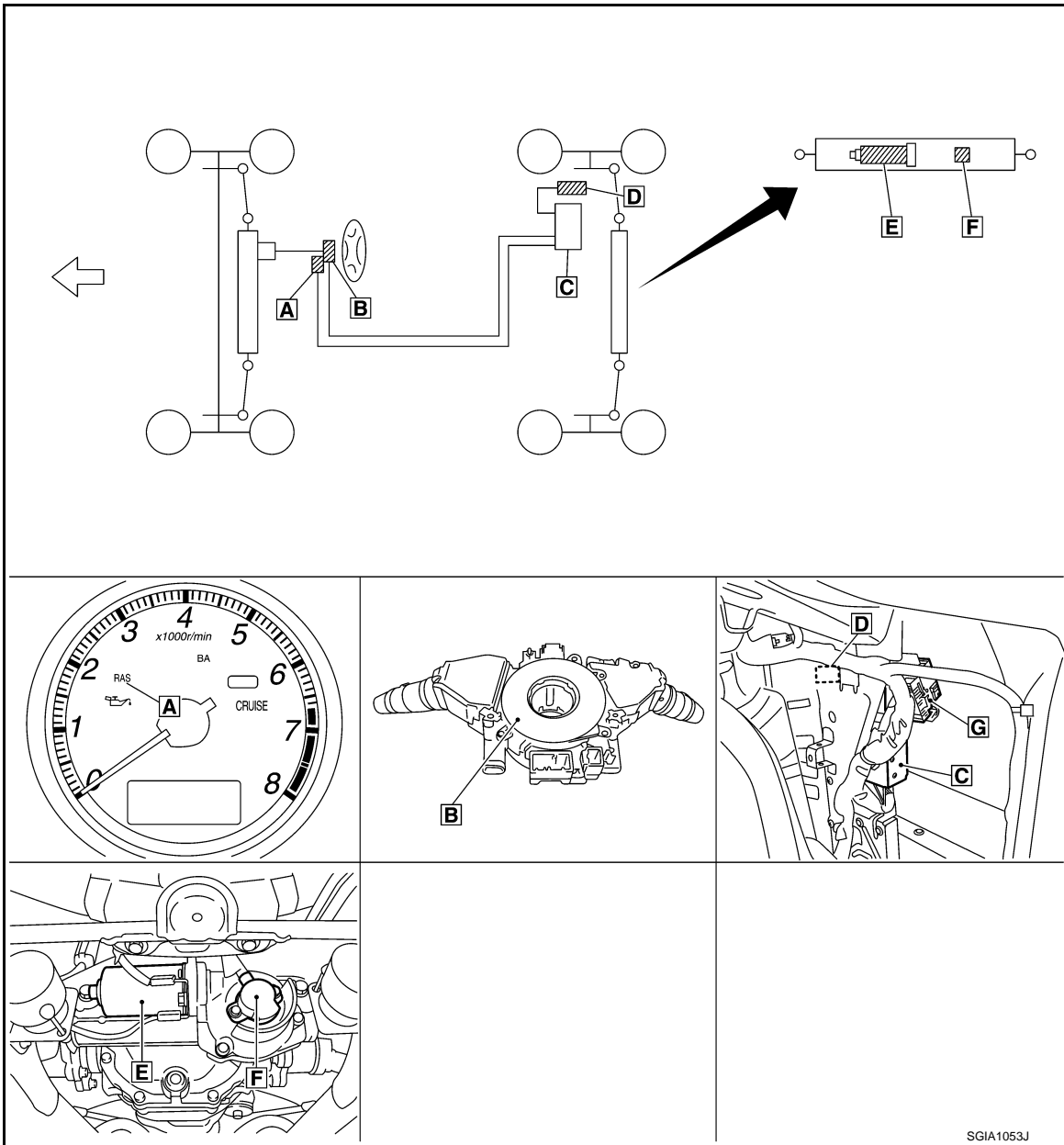
TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

Component Parts Location

INFOID:000000003302543



- A. RAS warning lamp
- D. RAS motor relay
- G. Noise suppressor

- B. Steering angle sensor
- E. RAS motor

- C. RAS control unit
- F. Rear wheel steering angle sensor

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TROUBLE DIAGNOSIS

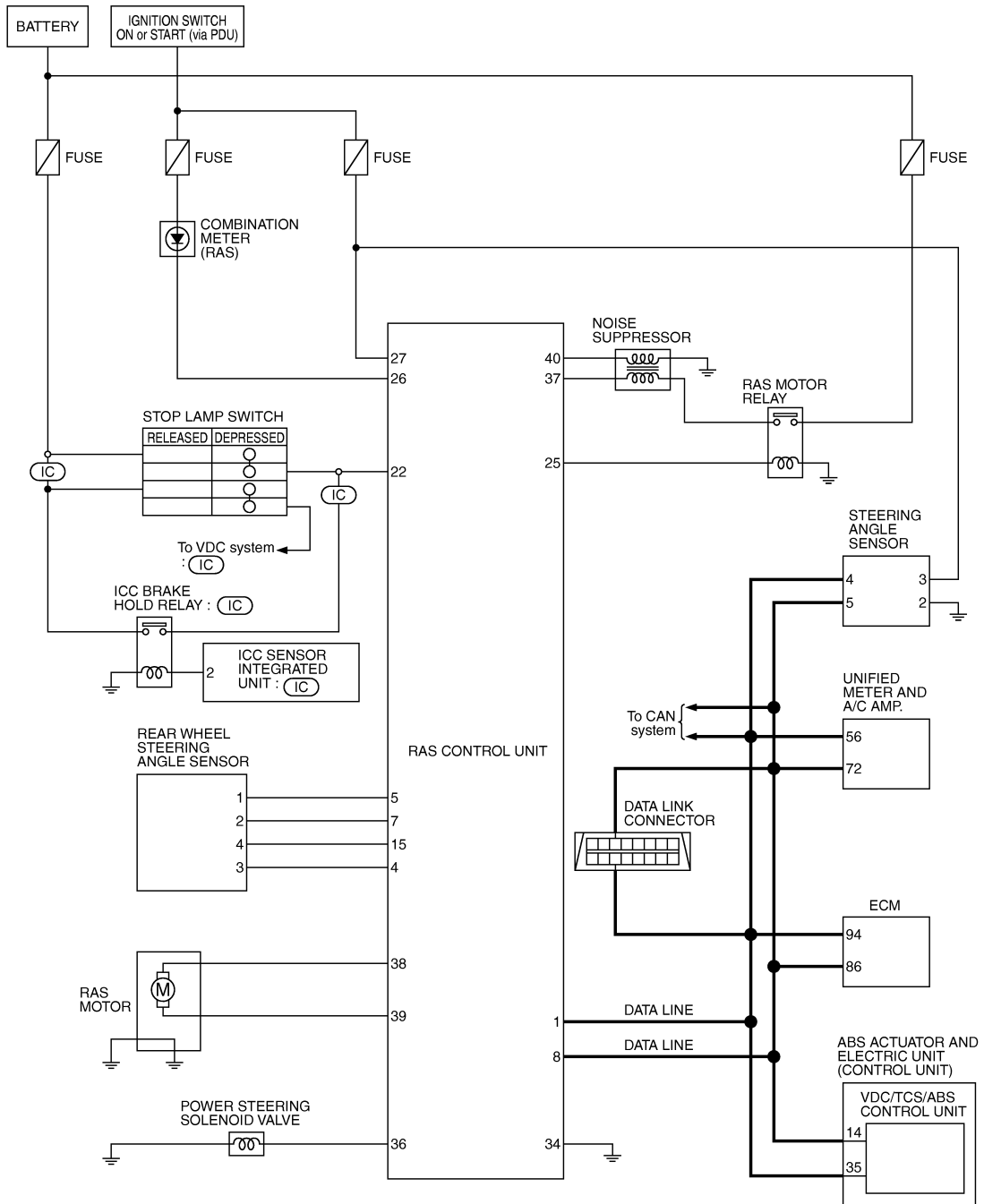
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[RAS]

Schematic

INFOID:000000003302544

(IC) : With ICC



TGWT0110E

TROUBLE DIAGNOSIS

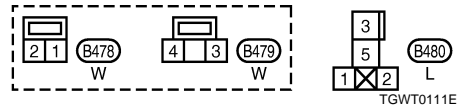
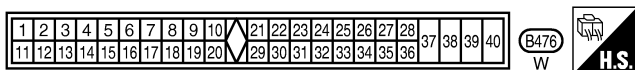
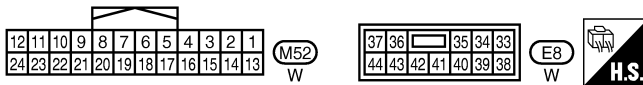
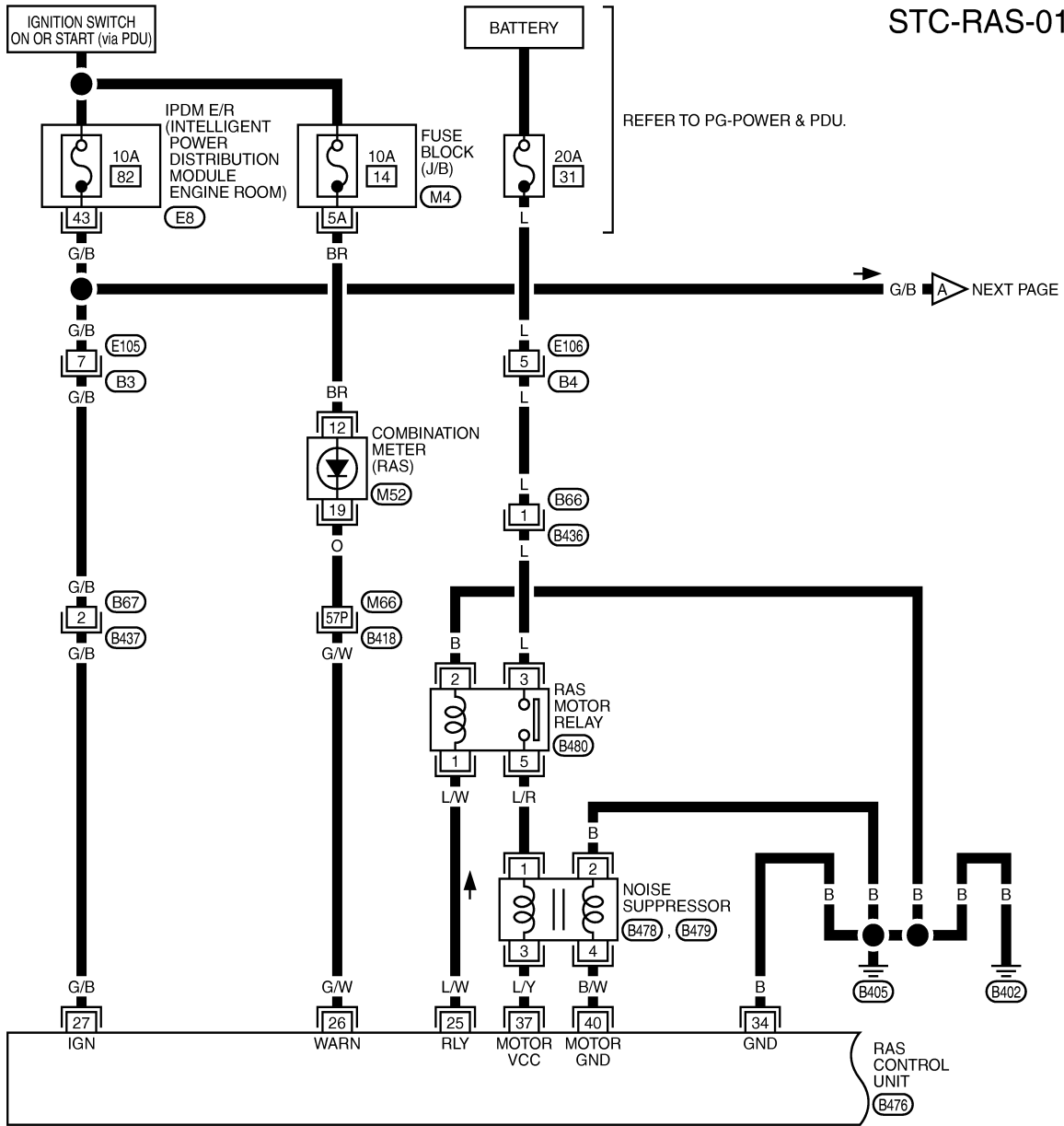
[RAS]

< SERVICE INFORMATION >

Wiring Diagram - RAS -

INFOID:000000003302545

STC-RAS-01



REFER TO THE FOLLOWING.
 (B418) - SUPER MULTIPLE JUNCTION (SMJ)
 (M4) - FUSE BLOCK - JUNCTION BOX (J/B)

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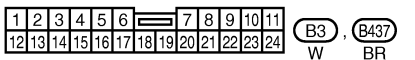
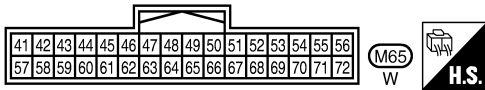
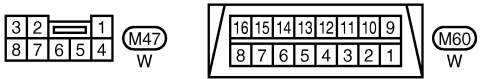
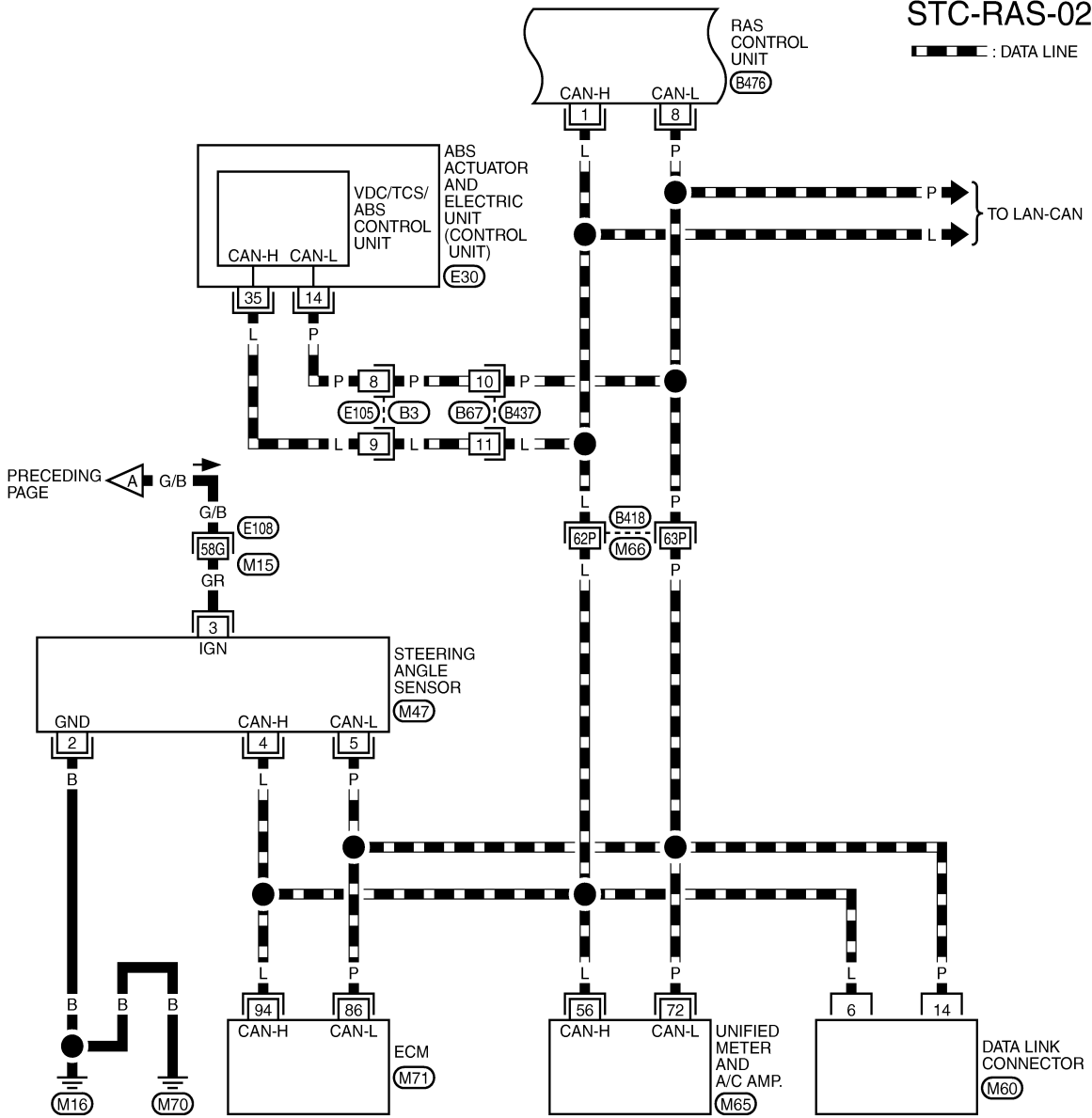
TROUBLE DIAGNOSIS

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[RAS]

STC-RAS-02

▬ : DATA LINE



REFER TO THE FOLLOWING.
 (E108), (B418) - SUPER MULTIPLE JUNCTION (SMJ)
 (M71), (E30) - ELECTRICAL UNITS

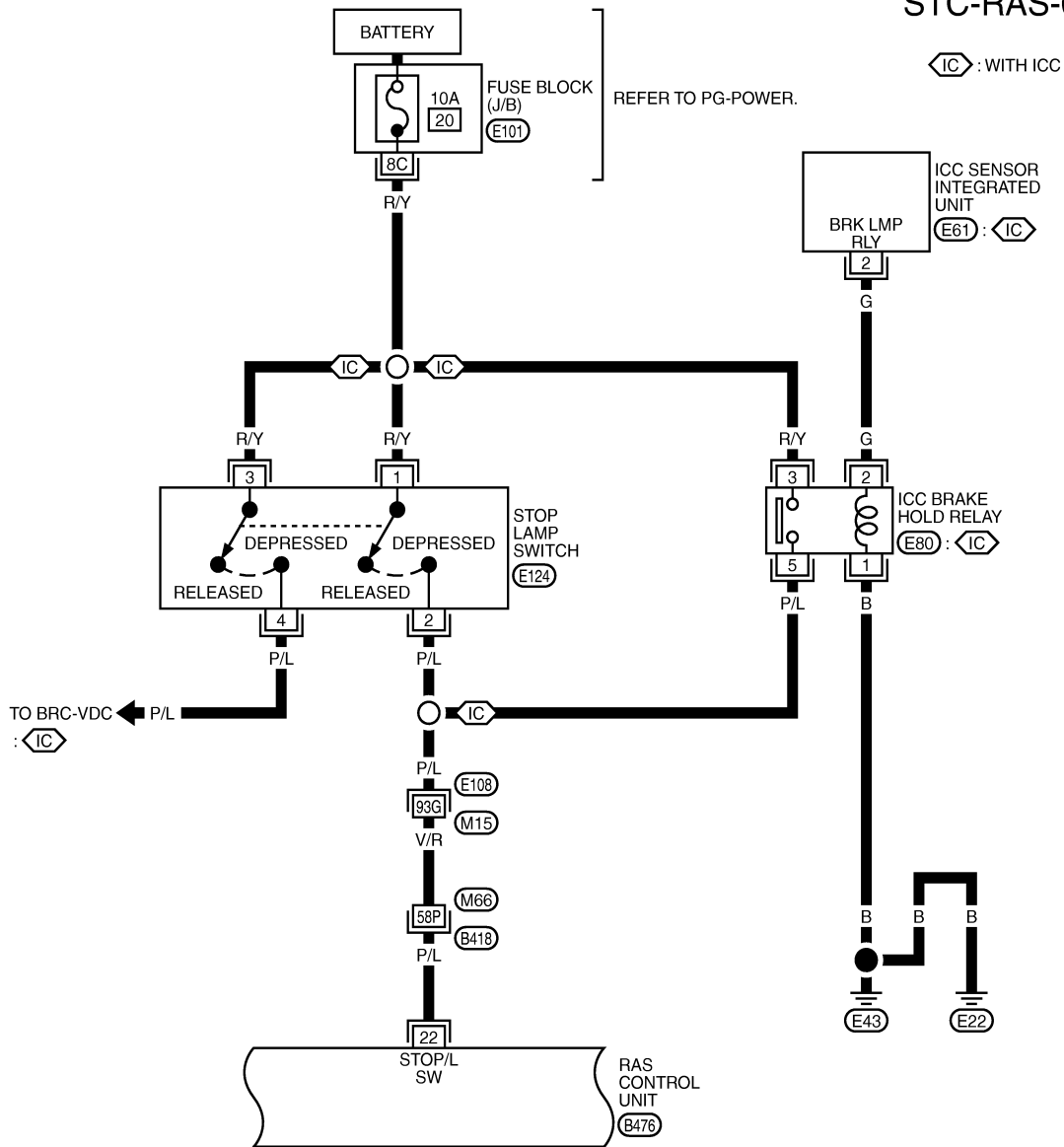


TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

STC-RAS-03



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REFER TO THE FOLLOWING.
 (E108), (B418) - SUPER MULTIPLE JUNCTION (SMJ)
 (E101) - FUSE BLOCK - JUNCTION BOX (J/B)

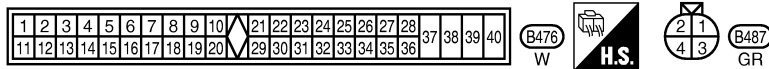
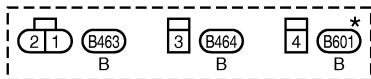
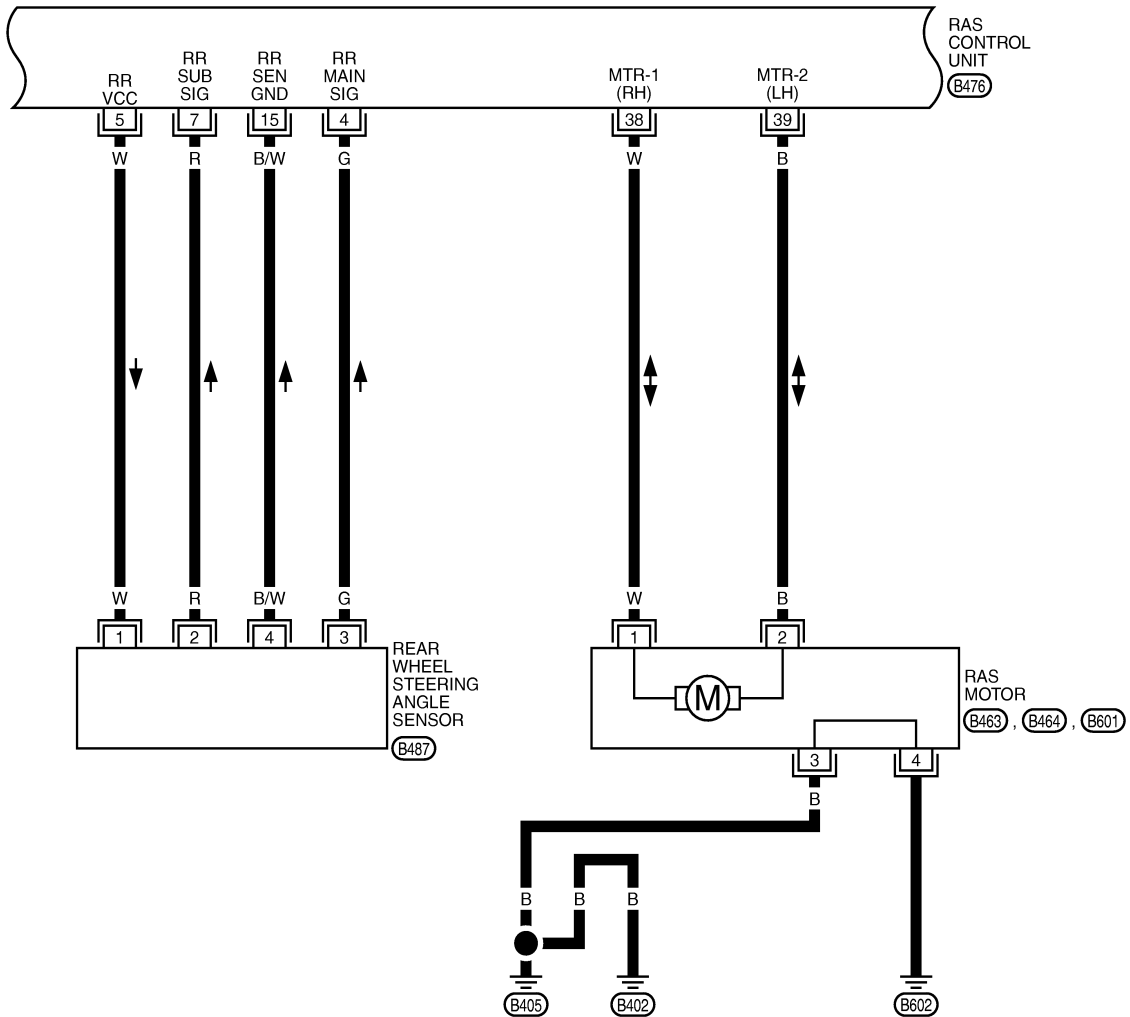
TGWT0113E

TROUBLE DIAGNOSIS

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[RAS]

STC-RAS-04



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

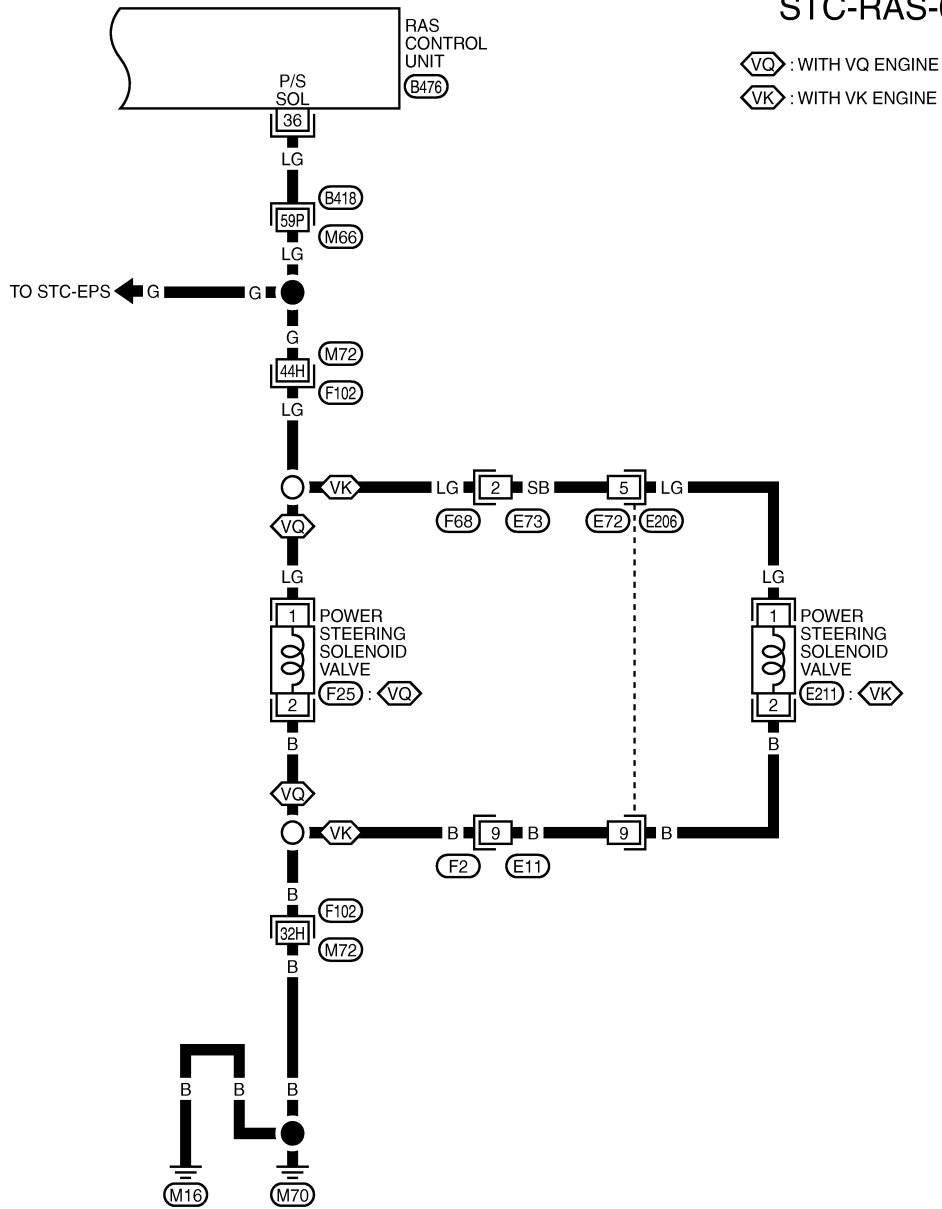
TGWT0114E

TROUBLE DIAGNOSIS

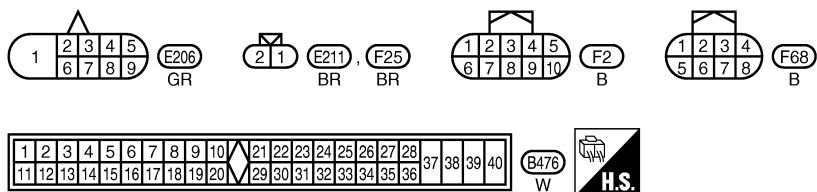
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[RAS]

STC-RAS-05



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REFER TO THE FOLLOWING.
F102, B418 - SUPER
MULTIPLE JUNCTION (SMJ)

TGWT0115E

INFOID:000000003302546

Control Unit Input/Output Signal Standard

CIRCUIT TESTER REFERENCE VALUE

CAUTION:

When checked using a circuit tester for voltage measurement, connector terminals should not be forcefully extended.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

Terminal		Measuring point	Measuring condition	Standard	
+	-				
(wire color)					
1 (L)	—	CAN-H	—		
4 (G)	Ground	RR MAIN SIG	Neutral	Approx. 2.4 V	
5 (W)		RR VCC	Ignition switch ON	Approx. 5 V	
			Ignition switch OFF	Approx. 0 V	
7 (R)		RR SUB SIG	Neutral	Approx. 2.4 V	
8 (P)	—	CAN-L	—		
15 (B/W)	Ground	RR SEN GND	—	Continuity exit	
22 (P/L)		STOP/L SW	Brake pedal depressed	Battery voltage (Approx. 12 V)	
			Brake pedal not depressed	Approx. 0 V	
25 (L/W)		RLY	Ignition switch ON	Battery voltage (Approx. 12 V)	
			Ignition switch OFF	Approx. 0 V	
26 (G/W)		WARN	ON	Approx. 1.4 V or less	
			OFF	Ignition voltage: 2.8 V or more	
27 (G/B)		IGN	Ignition switch ON	Battery voltage (Approx. 12 V)	
			Ignition switch OFF	Approx. 0 V	
34 (B)		GND	—	Continuity exit	
36 (LG)		P/S SOL	Normal (Vehicle speed)	0 km/h (0 MPH)	Approx. 4.4 - 6.6 V
				100 km/h (62 MPH)	Approx. 2.4 - 3.6 V
			In fail-safe mode (Engine speed)	0 - 1,500 rpm	Approx. 4.4 - 6.6 V
				1,500 - 3,000 rpm	Approx. 3.5 V
	3,000 rpm or more			Approx. 2.1 V	
37 (L/Y)	MOTOR VCC	Ignition switch ON	Battery voltage (Approx. 12 V)		
		Ignition switch OFF	Approx. 0 V		
38 (W)	MTR-1 (RH)	—			
39 (B)	MTR-2 (LH)	—			
40 (B/W)	MOTOR GND	—	Continuity exit		

STANDARD BY CONSULT-III

CAUTION:

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

Monitor item	Condition	Reference values
VHCL SPEED SE [km/h] or [mph]	Ignition switch ON or engine running	Almost in accordance with the speedometer display. It is not a malfunction, though it might not be corresponding just after ignition switch is turned ON.
STEERING ANG [°]	Turning steering wheel clockwise or counterclockwise.	Displays the angle when the steering wheel turns from the neutral position
ENGINE SPEED [rpm]	Engine running	Almost in accordance with tachometer display
POWER STR SOL [A]	Accelerate the vehicle from 0 to 100 km/h (0 to 62 MPH)	0 km/h (0 MPH): Approx. 1.10 A 100 km/h (62 MPH): Approx. 0.54 A

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

Monitor item	Condition	Reference values
RR ST ANG-MAI [V]	Perform the ACTIVE TEST and stroke the actuator (with tires off the ground)	Neutral: Approx. 2.4 V
RR ST ANG-SUB [V]		Turn steering wheel to right for full stroke: Approx. 4.4 V Turn steering wheel to left for full stroke: Approx. 0.4 V
RR ST ANG-VOL [V]	Ignition switch ON or engine running	Approx. 5 V
C/U VOLTAGE [V]		Battery voltage (Approx. 12 V)
MOTOR VOLTAGE [V]		Battery voltage (Approx. 12V)
MOTOR CURRENT [A]	Perform the ACTIVE TEST and stroke the actuator.	It is normal when there is the current output at stroke
MTR CRNT OPE [A]	Turning steering wheel clockwise or counterclockwise while ignition switch is ON or running the engine	Neutral (Steering force is zero and straight-ahead position): Approx. 0 A The value is changed according to steering left or right
RR ANGLE OPE [°]	RAS actuator assembly turned full right	Approx. 1°
	RAS actuator assembly neutral	Approx. 0°
	RAS actuator assembly turned full left	Approx. - 1°
STOP LAMP SW [On/Off]	Depressing or releasing brake pedal	Brake pedal depressed: ON
		Brake pedal not depressed: OFF
HICAS RELAY [On/Off]	Ignition switch ON or engine running	Ignition switch ON: ON
FAIL SAFE [On/Off]		Not activated
WARNING LAMP [On/Off]		RAS warning lamp ON: ON RAS warning lamp OFF: OFF

CONSULT-III Function (RAS/HICAS)

INFOID:000000003302547

FUNCTION

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

Diagnostic test mode	Function
SELF-DIAG RESULTS	Receives self-diagnosis results from RAS control unit and indicates DTCs.
DATA MONITOR	Receives input/output signals from RAS control unit and indicates and stores them to facilitate locating cause of malfunctions.
CAN DIAG SUPPORT MNTR	Monitors transmitting/receiving status of CAN communication.
ACTIVE TEST	Sends command to RAS actuator to change output signals and check operation of output system.
ECU PART NUMBER	Displays RAS control unit part number.

SELF-DIAG RESULT MODE

Display Item List

CAUTION:

When malfunctions are detected in several systems, including the “CAN COMM [U1000]” and “CONTROL UNIT (CAN) [U1010]”, inspect the CAN communication system.

DTC	Diagnostic item	Diagnostic item is detected when...	Check items
C1923	STEERING ANGLE SEN [NO CHANGE]	While driving at 60 km/h (37 MPH) or more, steering angle does not change for a while.	STC-34
C1924	STEERING ANGLE SEN [NO NEUT STATE]	When driving some distance, no neutral signal (ON signal) is input.	STC-34
C1915	RR ST ANGLE SENSOR [MAIN SIGNAL]	The main sensor input signal is malfunctioning for some time against the sensor power supply value.	STC-35

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

DTC	Diagnostic item	Diagnostic item is detected when...	Check items
C1916	RR ST ANGLE SENSOR [SUB SIGNAL]	When the main sensor input signal is 2.4 - 2.6 V, the sub sensor input signal is malfunctioning for some time compared to the sensor power supply value.	STC-35
C1917	RR ST ANGLE SENSOR [OFFSET SIG1]	An excessive difference has occurred in the input values of main sensor and sub sensor.	STC-35
C1918	RR ST ANGLE SENSOR [OFFSET SIG2]		
C1914	RR ST ANGLE SENSOR [ABNORMAL VOL]	Higher or lower value compared to the standard voltage.	STC-35
C1921	MOTOR OUTPUT	No engine speed is input for a certain time.	STC-38
C1911	MOTOR VOLTAGE [LOW VOLTAGE]	The motor power supply voltage is lower than ignition power supply voltage with RAS motor relay ON.	STC-31
C1912	MOTOR VOLTAGE [BAD OBSTRCT]	The motor power supply voltage is inputting for some time with motor power supply OFF by RAS control unit.	STC-31
C1913	MOTOR OUTPUT [ABNORMAL SIG]	When the motor current value is 10 A or more, actual output is excessively low and the condition continues for some time.	STC-33
C1902	MOTOR OUTPUT [REV CURRENT]	The current flows in the opposite direction when the motor current is output.	STC-33
C1903	MOTOR OUTPUT [NO CURRENT]	The current flows when the motor current is not output.	STC-33
C1904	MOTOR OUTPUT [OVERCURRENT]	The excessive high current flows when the motor current is output.	STC-33
C1910	MOTOR OUTPUT [MOTOR LOCK]	When 17 A or more current flows to the motor, the rear wheel steering angle sensor signal does not change for some time.	STC-33
C1919	VEHICLE SPEED SEN [NO SIGNAL]	No vehicle speed signal is input for some time.	STC-34
C1900	CONTROL UNIT [ABNORMAL1]	Control unit malfunction	STC-31
C1901	CONTROL UNIT [ABNORMAL2]		
C1905	CONTROL UNIT [ABNORMAL3]		
C1906	CONTROL UNIT [ABNORMAL5]		
C1907	CONTROL UNIT [ABNORMAL4]		
C1908	CONTROL UNIT [ABNORMAL7]		
C1909	CONTROL UNIT [ABNORMAL6]		
C1922	CONTROL UNIT [ABNORMAL8]		
C1927	CONTROL UNIT [ABNORMAL5]		
C1928	CONTROL UNIT [ABNORMAL9]		
C1920	STEERING ANGLE SEN [NO SIGNAL]	No steering angle signal is input for some time.	STC-34
C1926	STEERING ANGLE SEN	<ul style="list-style-type: none"> • An unexpected signal is input. • Steering angle sensor outputs the malfunction signal. 	STC-34
C1929	VDC	ABS actuator and electric unit (control unit) outputs the malfunction signal.	STC-38

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

DTC	Diagnostic item	Diagnostic item is detected when...	Check items
U1000	CAN COMM CIRCUIT	When a RAS control unit is not transmitting or receiving CAN communication signal 2 seconds or more.	STC-39
U1010	CONTROL UNIT (CAN)	When detecting error during the initial diagnosis of CAN controller of RAS control unit.	STC-39

DATA MONITOR MODE

Display Item List

Item [Display or Unit]	Remarks
VHCL SPEED SE [km/h] or [mph]	Vehicle speed received via CAN communication is displayed.
STEERING ANG [°]	Steering angle received via CAN communication is displayed.
ENGINE SPEED [rpm]	Engine speed received via CAN communication is displayed.
POWER STR SOL [A]	Power steering solenoid controlling current that RAS control unit outputs is displayed.
RR ST ANG-MAI [V]	Rear wheel steering angle main sensor output voltage is displayed.
RR ST ANG-SUB [V]	Rear wheel steering angle sub sensor output voltage is displayed.
RR ST ANG VOL [V]	Voltage supplied from RAS control unit to rear wheel steering angle sensor is displayed.
C/U VOLTAGE [V]	Voltage supplied to RAS control unit is displayed.
MOTOR VOLTAGE [V]	Voltage supplied from RAS control unit to RAS motor is displayed.
MOTOR CURRENT [A]	RAS motor relay controlling current that RAS control unit outputs is displayed.
MOTOR CRNT OPE [A]	Current commanded value to RAS motor is displayed.
RR ANG OPE [°]	Angle commanded value to rear wheel steering angle sensor is displayed.
STOP LAMP SW [On/Off]	Condition of stop lamp switch ON/OFF is displayed.
HICAS RELAY [On/Off]	RAS motor relay ON/OFF condition is displayed.
FAILSAFE [On/Off]	Fail-safe ON/OFF condition is displayed.
WARNING LAMP [On/Off]	RAS warning lamp operating condition is displayed.

ACTIVE TEST MODE

Test Item

- When turning the steering wheel right or left, the rear wheel turns in the same direction. If the steering wheel is not turned, the rear wheel turns left and right 5 times.

STEERING ANG	RR ST ANG MAI	RR ST ANG SUB	MOTOR CURRENT
0° (Neutral)	2.4 V	2.4 V	No output (Approx. 0 A)
R 90°	Approx. 4.4 V	Approx. 4.4 V	Output (change)
L 90°	Approx. 0.4 V	Approx. 0.4 V	

Diagnosis Procedure with Self-Diagnosis Function (Without CONSULT-III) INFOID:000000003302548

DESCRIPTION

If a malfunction is detected in the system, the RAS warning lamp turns on and indicates the malfunction. At that time, fail-safe activates, and then stops the function.

SELF-DIAGNOSIS PROCEDURE

1. Start engine.

TROUBLE DIAGNOSIS

[RAS]

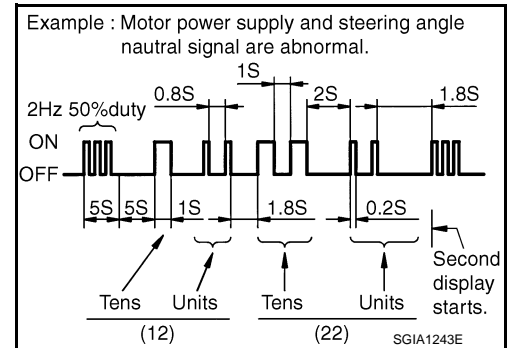
< SERVICE INFORMATION >

- Turn steering wheel left and right at 20° or more and 5 times or more within 10 seconds. And then depress the service brake 5 times or more.
- RAS warning lamp blinks (displays normal/malfunction).

SELF-DIAGNOSIS DISPLAY

RAS warning lamp blinks and displays the self-diagnostic results.

- Only DTCs are displayed as the pattern shown in the figure, and then repeat the display.
- If all items are normal, RAS warning lamp blinks at 4 Hz cycle.



SELF-DIAGNOSIS DISPLAY ITEMS

DTC (warning lamp blinks)	Diagnosis item	Inspection item
11	RAS control unit	STC-31. "Inspection 1 RAS Control Unit Malfunction"
12	Motor power supply	STC-31. "Inspection 2 Motor Power Supply System"
13	Motor output	STC-33. "Inspection 3 RAS Motor Output Malfunction"
21	Vehicle speed signal	STC-34. "Inspection 4 Vehicle Speed Signal"
22	Steering angle signal	STC-34. "Inspection 5 Steering Angle Signal Malfunction"
24	Rear wheel steering angle (main)	STC-35. "Inspection 6 Rear Main Signal and Rear Sub Signal Malfunction"
25	Rear wheel steering angle (sub)	STC-35. "Inspection 6 Rear Main Signal and Rear Sub Signal Malfunction"
26	VDC	STC-38. "Inspection 7 VDC Malfunction"
33	Engine speed signal	STC-38. "Inspection 8 Engine Speed Signal Malfunction"

HOW TO ERASE SELF-DIAGNOSIS

If there is the history data for when the fail-safe has activated in the past, erase the memory with CONSULT-III. Refer to [STC-25. "CONSULT-III Function \(RAS/HICAS\)"](#).

CAN Communication

INFOID:000000003302549

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. Refer to [LAN-30. "CAN Communication Signal Chart"](#).

For Fast and Accurate Trouble Diagnosis

INFOID:000000003302550

Check the following items with the vehicle stopped

- Is air pressure and size of tires proper?
- Is the specified part used for the steering wheel?
- Is control unit a genuine part?
- Are there any fluid leakage from steering gear assembly, power steering oil pump, and hydraulic pipes, etc?
Refer to [PS-7. "Checking Fluid Leakage"](#).
- Is the fluid level proper? Refer to [PS-7. "Checking Fluid Level"](#).
- Is the wheel alignment is adjusted properly? Refer to [FSU-5. "Wheel Alignment Inspection"](#) (2WD), [FSU-22. "Wheel Alignment Inspection"](#) (AWD).

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

- Are there any damage or modification to suspension or body resulting in increased weight or altered ground clearance?
- Check each link installation condition of suspension and axle.
- Is the battery voltage proper?
- Check each connector connection condition.

Check the following items while driving the vehicle

- Conditions when the error occurred (5W 1H).
- Is the engine is normal?

Basic Inspection

INFOID:000000003302551

BASIC INSPECTION 1: POWER SUPPLY CIRCUIT TERMINAL LOOSENESS AND BATTERY

Check battery terminals for looseness on both positive and negative ones and ground connection. Also make sure that battery voltage does not drop.

BASIC INSPECTION 2: RAS WARNING LAMP INSPECTION

1. Make sure RAS warning lamp turns on when ignition switch is turned ON.
 - If it does not turn on, refer to [STC-30. "Trouble Diagnosis Chart"](#).
2. Make sure that RAS warning lamp turns off when the engine is started after ignition switch is turned ON. If it does not turn off, perform self-diagnosis. Refer to [STC-25. "CONSULT-III Function \(RAS/HICAS\)"](#).
3. Always erase DTC memory after completing self-diagnosis. Refer to [STC-25. "CONSULT-III Function \(RAS/HICAS\)"](#).

BASIC INSPECTION 3: RAS CONTROL UNIT POWER SUPPLY CIRCUIT AND GROUND CIRCUIT INSPECTION

1. CHECK RAS CONTROL UNIT CONNECTOR

Turn ignition switch OFF, disconnect RAS control unit harness connector, and check terminal for deformation, disconnection, looseness, etc.

OK or NG

OK >> GO TO 2.

NG >> Poor connection of connector terminal. Repair or replace the terminal.

2. CHECK RAS CONTROL UNIT GROUND CIRCUIT

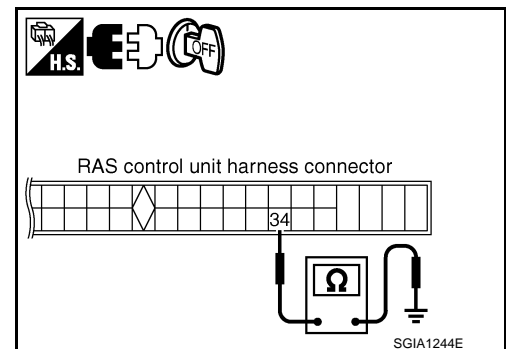
1. Disconnect RAS control unit harness connector B476, and then check continuity between RAS control unit harness connector B476 and ground.

Terminal 34 – Ground : Continuity should exit.

OK or NG

OK >> GO TO 3.

NG >> Ground circuit open or shorted. Repair or replace any inoperative parts.



3. CHECK RAS CONTROL UNIT POWER SUPPLY CIRCUIT

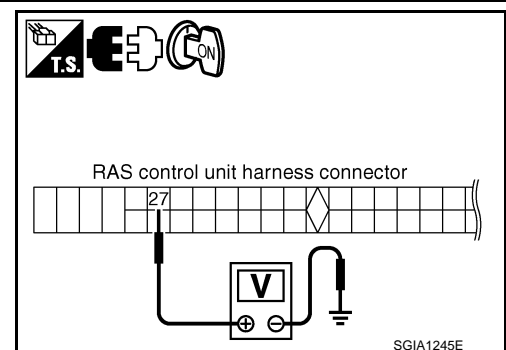
Turn ignition switch ON, and then check voltage between RAS control unit harness connector B476 and ground.

Terminal 27 – Ground : Battery voltage (Approx. 12 V)

OK or NG

OK >> Power supply and ground circuit are normal.

NG >> Power supply circuit open or shorted. Repair or replace any inoperative parts.



TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

Trouble Diagnosis Chart

INFOID:000000003302552

SELF-DIAGNOSIS

Self-diagnosis function		Item	Reference
DTC (warning lamp blinks)	Diagnosis item	CONSULT-III Diagnosis item	
11	RAS control unit	CONTROL UNIT [ABNORMAL1] [C1900]	STC-31
		CONTROL UNIT [ABNORMAL2] [C1901]	
		CONTROL UNIT [ABNORMAL3] [C1905]	
		CONTROL UNIT [ABNORMAL5] [C1906]	
		CONTROL UNIT [ABNORMAL4] [C1907]	
		CONTROL UNIT [ABNORMAL7] [C1908]	
		CONTROL UNIT [ABNORMAL6] [C1909]	
		CONTROL UNIT [ABNORMAL8] [C1922]	
		CONTROL UNIT [ABNORMAL5] [C1927]	
		CONTROL UNIT [ABNORMAL9] [C1928]	
12	Motor power supply	MOTOR VOLTAGE [LOW VOLTAGE] [C1911]	STC-31
		MOTOR VOLTAGE [BAD OBSTRCT] [C1912]	
13	Motor output	MOTOR OUTPUT [ABNORMAL SIG] [C1913]	STC-33
		MOTOR OUTPUT [REV CURRENT] [C1902]	
		MOTOR OUTPUT [NO CURRENT] [C1903]	
		MOTOR OUTPUT [OVERCURRENT] [C1904]	
		MOTOR OUTPUT [MOTOR LOCK] [C1910]	
21	Vehicle speed signal	VEHICLE SPEED SEN [NO SIGNAL] [C1919]	STC-34
22	Steering angle signal	STEERING ANGLE SEN [NO CHANGE] [C1923]	STC-34
		STEERING ANGLE SEN [NO NEUT STATE] [C1924]	
		STEERING ANGLE SEN [NO SIGNAL] [C1920]	
		STEERING ANGLE SEN [C1926]	
24	Rear wheel steering angle (main)	RR ST ANGLE SENSOR [MAIN SIGNAL] [C1915]	STC-35
		RR ST ANGLE SENSOR [ABNORMAL VOL] [C1914]	
		RR ST ANGLE SENSOR [OFFSET SIG1] [C1917]	
		RR ST ANGLE SENSOR [OFFSET SIG2] [C1918]	
25	Rear wheel steering angle (sub)	RR ST ANGLE SENSOR [SUB SIGNAL] [C1916]	STC-35
		RR ST ANGLE SENSOR [ABNORMAL VOL] [C1914]	
		RR ST ANGLE SENSOR [OFFSET SIG1] [C1917]	
		RR ST ANGLE SENSOR [OFFSET SIG2] [C1918]	
26	VDC	VDC [C1929]	STC-38
33	Engine speed signal	MOTOR OUTPUT [C1921]	STC-38
	—	CAN COMM CIRCUIT [U1000]	STC-39
	—	CONTROL UNIT (CAN) [U1010]	

DIAGNOSIS CHART BY SYMPTOM

Symptom	Reference
---------	-----------

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

It is not entering the self-diagnosis mode.	STC-29. "Basic Inspection" STC-39. "Inspection 10 Stop Lamp Switch Harness" STC-39. "Inspection 11 RAS Warning Lamp Harness"	A
RAS warning lamp does not turn on with ignition switch ON.	STC-29. "Basic Inspection" STC-39. "Inspection 11 RAS Warning Lamp Harness"	B
RAS warning lamp turns on with ignition switch ON. It does not turn off even if the engine is started.	STC-29. "Basic Inspection" <ul style="list-style-type: none"> • STC-25. "CONSULT-III Function (RAS/HICAS)" • STC-27. "Diagnosis Procedure with Self-Diagnosis Function (Without CONSULT-II)" 	C
RAS warning lamp may turn on after the engine is started.	STC-25. "CONSULT-III Function (RAS/HICAS)"	D
The steering force does not change smoothly according to the vehicle speed.	STC-41. "Diagnosis Chart by Symptom 2"	E
Noise	<ul style="list-style-type: none"> • STC-25. "CONSULT-III Function (RAS/HICAS)" • STC-27. "Diagnosis Procedure with Self-Diagnosis Function (Without CONSULT-II)" 	E
Malfunction other than above	STC-40. "Diagnosis Chart by Symptom 1"	F

Inspection 1 RAS Control Unit Malfunction

INFOID:000000003302553

1. CHECK SELF-DIAGNOSIS RESULTS

STC

Check self-diagnosis results.

With CONSULT-III

Self-diagnostic results
CONTROL UNIT [ABNORMAL1] [C1900]
CONTROL UNIT [ABNORMAL2] [C1901]
CONTROL UNIT [ABNORMAL3] [C1905]
CONTROL UNIT [ABNORMAL5] [C1906]
CONTROL UNIT [ABNORMAL4] [C1907]
CONTROL UNIT [ABNORMAL7] [C1908]
CONTROL UNIT [ABNORMAL6] [C1909]
CONTROL UNIT [ABNORMAL8] [C1922]
CONTROL UNIT [ABNORMAL5] [C1927]
CONTROL UNIT [ABNORMAL9] [C1928]

Without CONSULT-III

DTC (warning lamp blinks)
11

Is above displayed on self-diagnosis display?

- YES >> Replace RAS control unit. Perform self-diagnosis again after replacing.
- NO >> INSPECTION END

Inspection 2 Motor Power Supply System

INFOID:000000003302554

1. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector and RAS motor harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

With CONSULT-III

Self-diagnosis results

MOTOR VOLTAGE [LOW VOLTAGE] [C1911]

MOTOR VOLTAGE [BAD OBSTRCT] [C1912]

Without CONSULT-III

DTC (warning lamp blinks)

12

Is above displayed on self-diagnosis display?

YES >> GO TO 2.

NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2. CHECK RAS MOTOR RELAY BATTERY CIRCUIT

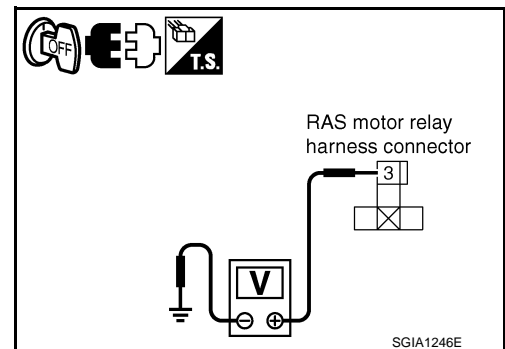
1. Turn ignition switch OFF, and disconnect RAS motor relay harness connector B480.
2. Check voltage between RAS motor relay harness connector B480 and ground.

Terminal 3 – Ground : Battery voltage (Approx. 12 V)

OK or NG

OK >> GO TO 3.

NG >> RAS motor relay power supply circuit open or shorted. Repair or replace power supply circuit and fuse.



3. CHECK RAS MOTOR RELAY HARNESS

1. Disconnect RAS motor relay harness connector B480 and RAS control unit harness connector B476.
2. Check continuity between RAS motor relay harness connector B480 and RAS control unit harness connector B476.

Terminal 5 – 37 : Continuity should exist.

Terminal 1 – 25 : Continuity should exist.

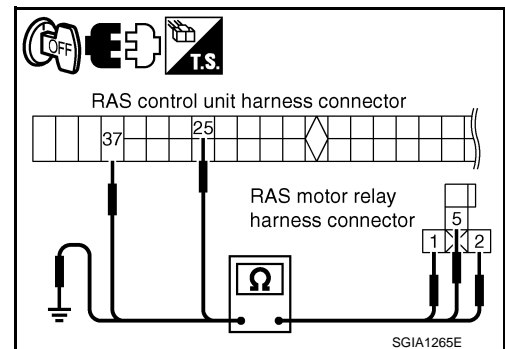
3. Check continuity between RAS motor relay harness connector B480 and ground.

2 – Ground : Continuity should exist.

OK or NG

OK >> GO TO 4.

NG >> RAS motor relay harness open or shorted. Repair or replace applicable malfunctioning harness.



4. CHECK RAS MOTOR RELAY RESISTANCE

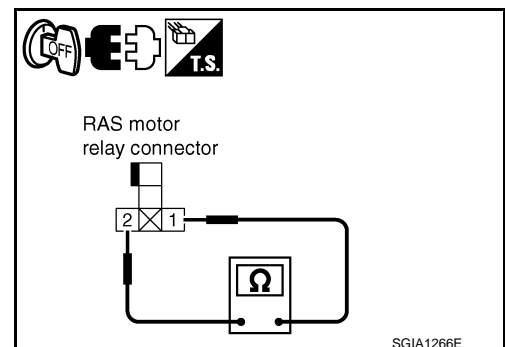
Check the resistance between RAS motor relay connector.

Terminal 1 – 2 : Approx. 74 Ω

OK or NG

OK >> GO TO 5.

NG >> RAS motor relay malfunction (replacement)



5. CHECK RAS CONTROL UNIT OUTPUT SIGNAL

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

1. Connect RAS control unit harness connector B476 and RAS motor relay harness connector B480.
2. Check voltage between RAS motor relay harness connector B480 and ground.

1 – Ground

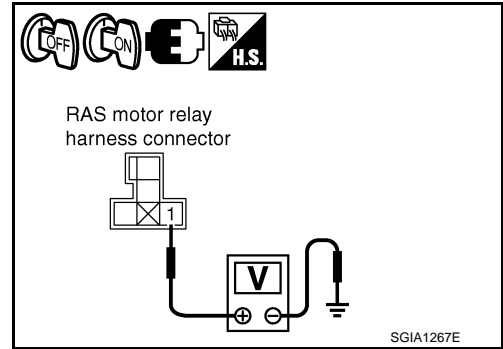
Ignition switch ON : Battery voltage (Approx. 12 V)

Ignition switch OFF : Approx. 0V

OK or NG

OK >> Check RAS motor relay separately from other parts.
Refer to [STC-43. "Component Inspection"](#).

NG >> RAS control unit malfunction (replacement).



Inspection 3 RAS Motor Output Malfunction

INFOID:000000003302555

1. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector and RAS motor harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

With CONSULT-III

Self-diagnosis results
MOTOR OUTPUT [ABNORMAL SIG] [C1913]
MOTOR OUTPUT [REV CURRENT] [C1902]
MOTOR OUTPUT [NO CURRENT] [C1903]
MOTOR OUTPUT [OVERCURRENT] [C1904]
MOTOR OUTPUT [MOTOR LOCK] [C1910]

Without CONSULT-III

DTC (warning lamp blinks)
13

Is above displayed on self-diagnosis display?

YES >> GO TO 2.

NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2. CHECK RAS MOTOR RESISTANCE

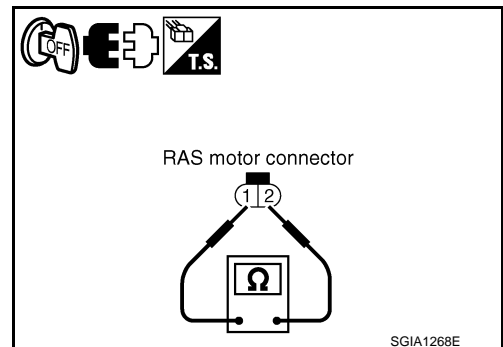
1. Turn ignition switch OFF, and disconnect RAS motor harness connector B463.
2. Check the resistance RAS motor connector.

Terminal 1 – 2 : Approx. 0.6 Ω

OK or NG

OK >> GO TO 3.

NG >> RAS motor malfunction. Replace RAS motor.



3. CHECK RAS MOTOR HARNESS

1. Connect RAS motor harness connector B463.
2. Disconnect RAS control unit harness connector B476.

TROUBLE DIAGNOSIS

[RAS]

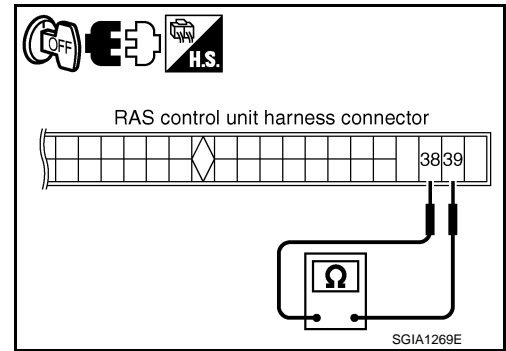
< SERVICE INFORMATION >

3. Check continuity RAS control unit harness connector B476.

Terminal 38 – 39 : Continuity should exist.

OK or NG

- OK >> RAS control unit malfunction. Replace RAS control unit.
NG >> Harness between RAS motor and RAS control unit open or shorted. Repair or replace harness.



INFOID:000000003302556

Inspection 4 Vehicle Speed Signal

1. CHECK SPEEDOMETER

Start the engine, and then check the combination meter (speedometer) operation.

Does it operate normally?

- YES >> GO TO 2.
NO >> Combination meter. Refer to [DI-18, "Trouble Diagnosis"](#).

2. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

With CONSULT-III

Self-diagnosis results

VEHICLE SPEED SEN [NO SIGNAL] [C1919]

Without CONSULT-III

DTC (warning lamp blinks)

21

Is above displayed on self-diagnosis display?

- YES >> RAS control unit malfunction. Replace RAS control unit.
NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

Inspection 5 Steering Angle Signal Malfunction

INFOID:000000003302557

1. CHECK CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector and steering angle sensor harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

With CONSULT-III

Self-diagnosis results

STEERING ANGLE SEN [NO CHANGE] [C1923]

STEERING ANGLE SEN [NO NEUT STATE] [C1924]

STEERING ANGLE SEN [NO SIGNAL] [C1920]

STEERING ANGLE SEN [C1926]

Without CONSULT-III

DTC (warning lamp blinks)

22

Is above displayed on self-diagnosis display?

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

- YES >> GO TO 2.
 NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2. ADJUST NEUTRAL POSITION OF STEERING ANGLE SENSOR

Adjust the steering angle sensor neutral position, and then perform self-diagnosis again. Refer to [BRC-8, "Adjustment of Steering Angle Sensor Neutral Position"](#).

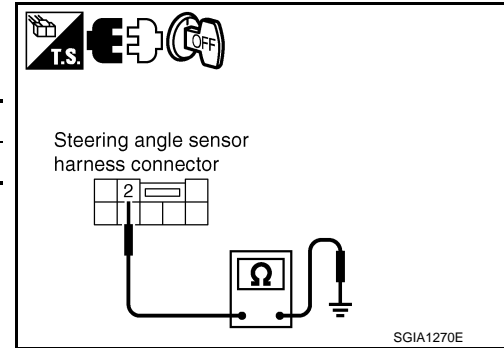
Is the result of self-diagnosis normal?

- OK >> Inappropriate neutral position adjustment of steering angle sensor.
 NG >> GO TO 3.

3. CHECK STEERING ANGLE SENSOR POWER SUPPLY AND GROUND CIRCUIT

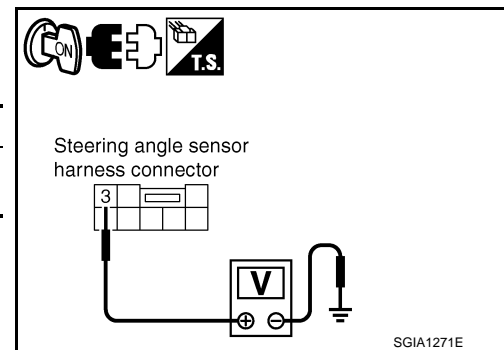
- Turn ignition switch OFF, and disconnect steering angle sensor harness connector M47.
- Check continuity steering angle sensor harness connector M47 and ground.

Steering angle sensor	Ground	Continuity
Terminal 2	—	Yes



- Turn ignition switch ON, and then check voltage steering angle sensor harness connector M47 and ground.

Steering angle sensor	Ground	Continuity
Terminal 3	—	Battery voltage (approx. 12V)



OK or NG

- OK >> GO TO 4.
 NG >> Steering angle sensor power supply and ground circuit open or shorted. Repair or replace the applicable malfunctioning circuit.

4. DATA MONITOR

- Connect steering angle sensor harness connector.
- Select "DATA MONITOR" on "STEERING ANG" mode, and then check the steering angle.

Steering condition	DATA MONITOR
Straight-ahead position	- 3.5 - +3.5°
Turn wheel to the right by 90°	Approx. R 90°
Turn wheel to the left by 90°	Approx. R 90°

OK or NG

- OK >> RAS control unit malfunction. Replace RAS control unit.
 NG >> Replace steering angle sensor and adjust neutral position of steering angle sensor. Refer to [BRC-8, "Adjustment of Steering Angle Sensor Neutral Position"](#).

Inspection 6 Rear Main Signal and Rear Sub Signal Malfunction

INFOID:000000003302558

1. CHECK RAS CONTROL UNIT CONNECTOR

- Turn ignition switch OFF, disconnect RAS control unit harness connector and rear wheel steering angle sensor harness connector, and check terminal for deformation, disconnection, looseness, etc.
- Reconnect harness connector securely, and perform self-diagnosis.

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

 With CONSULT-III

Self-diagnosis results


RR ST ANGLE SENSOR [MAIN SIGNAL] [C1915]

RR ST ANGLE SENSOR [SUB SIGNAL] [C1916]

RR ST ANGLE SENSOR [OFFSET SIG1] [C1917]

RR ST ANGLE SENSOR [OFFSET SIG2] [C1918]

RR ST ANGLE SENSOR [ABNORMAL VOL] [C1914]

 Without CONSULT-III

DTC (warning lamp blinks)

24

25

Is above displayed on self-diagnosis display?

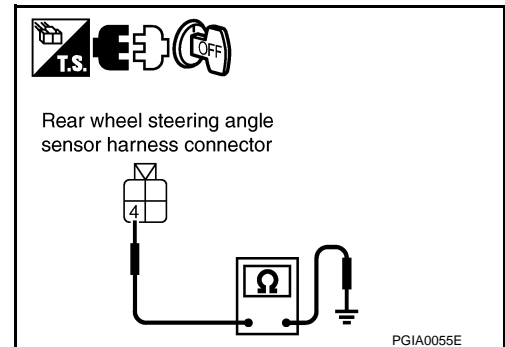
YES >> GO TO 2.

NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2.CHECK (1): REAR WHEEL STEERING ANGLE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF, and disconnect rear wheel steering angle sensor harness connector B487.
2. Check continuity rear wheel steering angle sensor harness connector B487 and ground.

Terminal 4 – Ground : Continuity should exist.



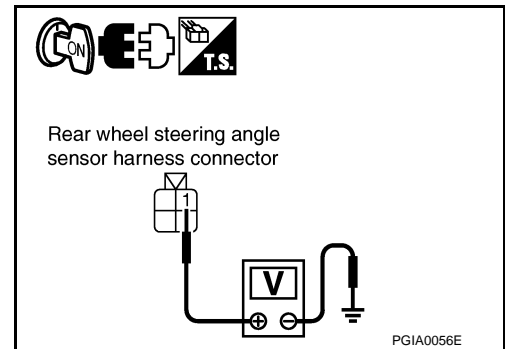
3. Turn ignition switch ON, and then check voltage rear wheel steering angle sensor harness connector B487 and ground.

Terminal 1 – Ground : Approx. 5 V

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.



3.CHECK (2): REAR WHEEL STEERING ANGLE SENSOR POWER SUPPLY AND GROUND CIRCUIT

1. Turn ignition switch OFF, disconnect rear wheel steering angle sensor harness connector B487 and RAS control unit harness connector B476.

TROUBLE DIAGNOSIS

[RAS]

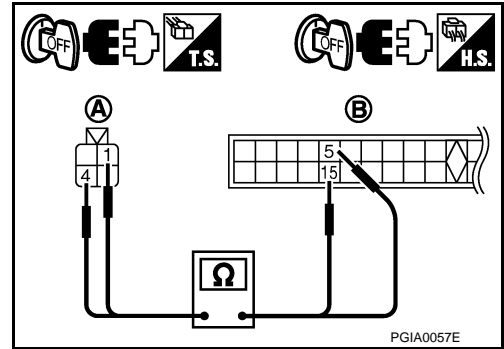
< SERVICE INFORMATION >

- Check continuity each harness connector of rear wheel steering angle sensor harness connector B487 (A) and RAS control unit harness connector B476 (B).

Rear wheel steering angle sensor	RAS control unit	Continuity
Terminal 1	Terminal 5	Yes
Terminal 4	Terminal 15	Yes

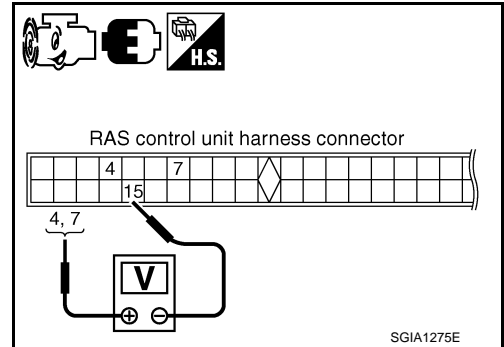
OK or NG

- OK >> RAS control unit malfunction. Replace RAS control unit.
- NG >> Harness between rear wheel steering angle sensor and RAS control unit open or shorted. Repair or replace harness.



4. CHECK REAR WHEEL STEERING ANGLE SENSOR OUTPUT SIGNAL

- Connect rear wheel steering angle sensor harness connector B487.
- Check voltage RAS control unit harness connector B476 when starting the engine and turning the steering wheel from neutral position clockwise/counterclockwise by 180°.



Steering condition	Rear wheel steering angle sensor	
	Rear main output Terminal 4 (+) - 15 (-)	Rear sub output Terminal 7 (+) - 15 (-)
Straight-ahead (neutral position)	Approx. 2.4 V	Approx. 2.4 V
Turn wheel to the right by 180°	Approx. 4.4 V	Approx. 4.4 V
Turn wheel to the left by 180°	Approx. 0.4 V	Approx. 0.4 V

CAUTION:

There is approximately 1 V or more difference between main output and sub output at straight-ahead position, inspection results are "NG".

OK or NG

- OK >> RAS control unit malfunction. Replace RAS control unit.
- NG >> GO TO 5.

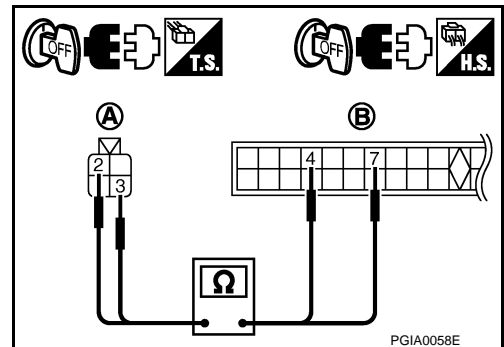
5. CHECK REAR WHEEL STEERING ANGLE SENSOR OUTPUT SIGNAL CIRCUIT

- Turn ignition switch OFF, disconnect rear wheel steering angle sensor harness connector B487 and RAS control unit harness connector B476.
- Check continuity between each harness connector of rear wheel steering angle sensor harness connector B487 (A) and RAS control unit harness connector B476 (B).

Rear wheel steering angle sensor	RAS control unit	Continuity
Terminal 2	Terminal 7	Yes
Terminal 3	Terminal 4	Yes

OK or NG

- OK >> Rear wheel steering angle sensor malfunction. Replace rear wheel steering angle sensor.



TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

NG >> Harness between rear wheel steering angle sensor and RAS control unit open or shorted. Repair or replace harness.

Inspection 7 VDC Malfunction

INFOID:000000003302559

1. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector and rear wheel steering angle sensor harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

With CONSULT-III

Self-diagnosis results

VDC [C1929]

Without CONSULT-III

DTC (warning lamp blinks)

26

Is above displayed on self-diagnosis display?

YES >> GO TO 2.

NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

2. CHECK SELF-DIAGNOSTIC RESULTS

Perform VDC self-diagnosis. Refer to [BRC-30, "CONSULT-III Function \(ABS\)"](#).

OK or NG

OK >> RAS control unit malfunction. Replace RAS control unit.

NG >> Repair or replace indicated part. After that, perform RAS self-diagnosis again to make sure that there is no malfunction.

NOTE:

- If VDC is malfunction, there is not only "RAS CIRCUIT" but also other DTC in VDC self-diagnosis.
- If RAS is malfunction, there is not only "VDC" but also other DTC in RAS self-diagnosis.

Inspection 8 Engine Speed Signal Malfunction

INFOID:000000003302560

1. CHECK SPEEDOMETER

Start the engine, and then check the combination meter (tachometer) operation.

Does it operate normally?

YES >> GO TO 2.

NO >> Combination meter. Refer to [DI-18, "Trouble Diagnosis"](#).

2. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform self-diagnosis.

With CONSULT-III

Self-diagnostic results

MOTOR OUTPUT [C1921]

Without CONSULT-III

DTC (warning lamp blinks)

33

Is above displayed on self-diagnosis display?

YES >> RAS control unit malfunction. Replace RAS control unit.

NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

TROUBLE DIAGNOSIS

< SERVICE INFORMATION >

[RAS]

Inspection 9 CAN Communication System Malfunction

INFOID:000000003302561

1. CHECK RAS CONTROL UNIT CONNECTOR

1. Turn ignition switch OFF, disconnect RAS control unit harness connector and rear wheel steering angle sensor harness connector, and check terminal for deformation, disconnection, looseness, etc.
2. Reconnect harness connector securely, and perform CONSULT-III self-diagnosis.

Self-diagnostic results
CAN COMM CIRCUIT [U1000]
CONTROL UNIT (CAN) [U1010]

Is above displayed on self-diagnosis display?

- YES >> • If "CAN COMM [U1000]" is displayed, print out self-diagnosis. And then, go to [LAN-20. "Trouble Diagnosis Flow Chart"](#).
 • Replace RAS control unit if "CONTROL UNIT [CAN] [U1010]" is displayed.
- NO >> Connector terminal connection is loose, damaged, open, or shorted. Repair or replace the terminal.

Inspection 10 Stop Lamp Switch Harness

INFOID:000000003302562

1. CHECK STOP LAMP SWITCH SIGNAL

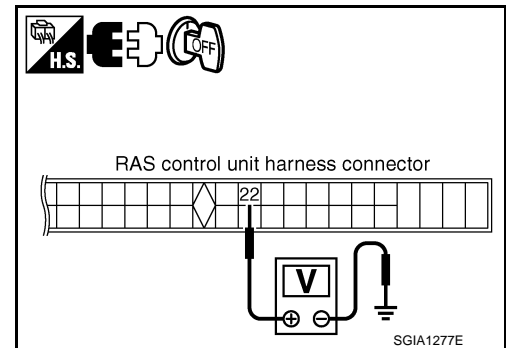
With CONSULT-III

Select "STOP LAMP SW" on DATA MONITOR, and then check the stop lamp switch.

Measuring condition	Data monitor
Brake pedal depressed	ON
Brake pedal released	OFF

Without CONSULT-III

1. Turn ignition switch OFF, disconnect RAS control unit harness connector B476.
2. Operate brake pedal, and then check voltage between RAS control unit harness connector B476 and ground.



RAS C/U	Ground	Measuring condition	Voltage
Terminal 22	—	Brake pedal depressed	Battery voltage (approx. 12 V)
		Brake pedal released	Approx. 0 V

OK or NG

- OK >> Stop lamp switch harness is normal.
 NG >> Stop lamp switch harness malfunction. Repair circuit.

Inspection 11 RAS Warning Lamp Harness

INFOID:000000003302563

1. CHECK RAS WARNING LAMP SIGNAL

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

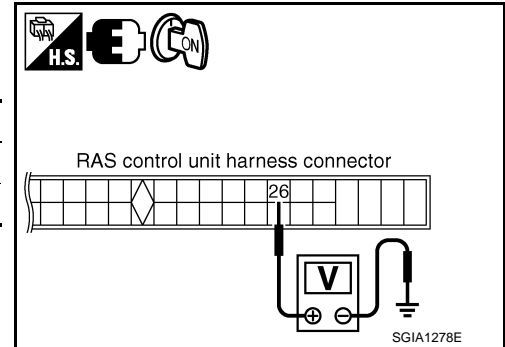
Turn ignition switch ON, and then check voltage between RAS control unit harness connector B476 and ground.

RAS control unit	Ground	Voltage
Terminal 26	—	Warning lamp OFF : Approx. 2.8 V or more
		Warning lamp ON : Approx. 1.4 V or less

OK or NG

OK >> Perform self-diagnosis. Refer to [STC-25, "CONSULT-III Function \(RAS/HICAS\)"](#).

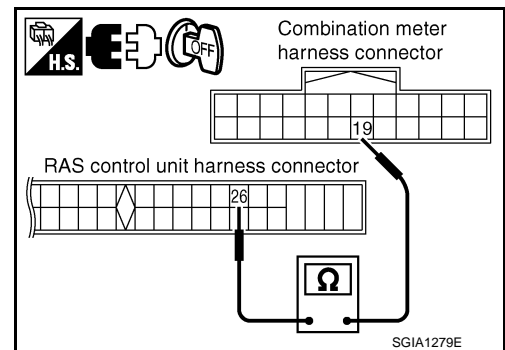
NG >> GO TO 2.



2. CHECK RAS WARNING LAMP HARNESS

- Turn ignition switch OFF, disconnect RAS control unit harness connector B476 and combination meter harness connector M52.
- Check continuity between RAS control unit harness connector B476 and combination meter harness connector M52.

Terminal 26 – 19 : Continuity should exist.



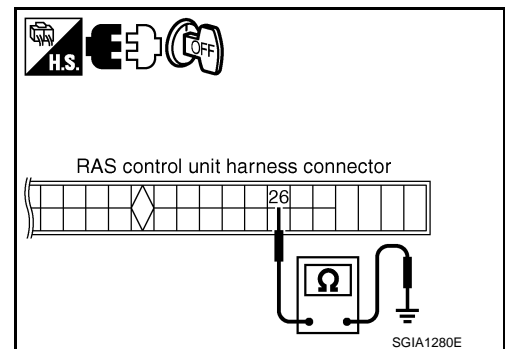
- Check continuity between RAS control unit harness connector B476 and ground.

Terminal 26 – Ground : Continuity should not exist.

OK or NG

OK >> Go to combination meter power supply circuit.

NG >> Harness between RAS control unit and combination meter open or shorted. Repair or replace harness.



Diagnosis Chart by Symptom 1

INFOID:000000003302564

1. CHECK SELF-DIAGNOSTIC RESULTS

Perform RAS self-diagnosis.

- With CONSULT-III: [STC-25, "CONSULT-III Function \(RAS/HICAS\)"](#).
- Without CONSULT-III: [STC-27, "Diagnosis Procedure with Self-Diagnosis Function \(Without CONSULT-III\)"](#).

Are malfunctioning items displayed in self-diagnosis results?

YES >> Repair or replace any malfunctioning items.

NO >> GO TO 2.

2. CHECK RAS STATIC/DYNAMIC CHARACTERISTICS

Check RAS static/dynamic characteristics. Refer to [STC-42, "Check RAS Static/Dynamic Characteristics"](#).

Is the malfunction corrected?

YES >> INSPECTION END

NO >> Perform the following check, and then check the symptom again.

- Adjust neutral position of steering angle sensor. Refer to [BRC-8, "Adjustment of Steering Angle Sensor Neutral Position"](#).
- Steering angle sensor mounting condition. Refer to [BRC-64, "Removal and Installation"](#).

TROUBLE DIAGNOSIS

[RAS]

< SERVICE INFORMATION >

Diagnosis Chart by Symptom 2

INFOID:000000003302565

The steering force does not change smoothly according to the vehicle speed (Heavy steering force with the vehicle stopped/Light handle operation during high-speed driving)

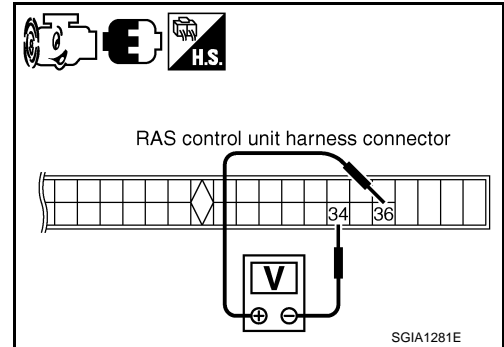
1.CHECK (1): POWER STEERING SOLENOID VALVE SIGNAL

1. Start engine.
2. Change the vehicle speed from 0 to 100 km/h (0 to 62 MPH) slowly, and then check voltage RAS control unit harness connector B476.

Terminal 36 – 34 : The voltage has changed from approximately 4.4 - 6.6 V to approximately 2.4 - 3.6 V.

OK or NG

- OK >> GO TO 2.
NG >> GO TO 7.



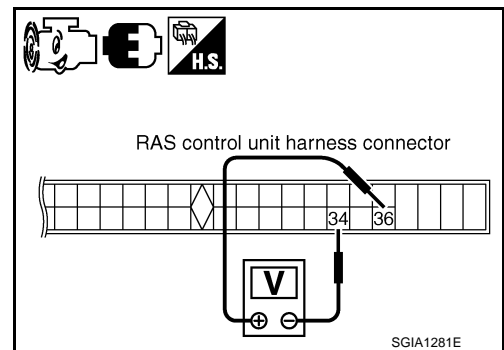
2.CHECK (2): POWER STEERING SOLENOID VALVE SIGNAL

1. Activate fail-safe function by running engine speed at 1,500 rpm or higher for 10 seconds with the vehicle stopped.
2. Change the engine speed to the idling speed, approx. 1,600 rpm, and approximately 3,000 rpm slowly, and then check voltage RAS control unit harness connector B476.

Terminal 36 – 34 : The voltage is changed from approximately 5.5 V to approximately 2.1 V step-by-step.

OK or NG

- OK >> GO TO 3.
NG >> GO TO 7.



3.CHECK POWER STEERING SOLENOID VALVE CONNECTOR

Turn ignition switch OFF, disconnect power steering solenoid valve harness connector, and check terminal for deformation, disconnection, looseness, etc.

OK or NG

- OK >> GO TO 4.
NG >> Harness or connector open or shorted. Repair or replace any inoperative parts.

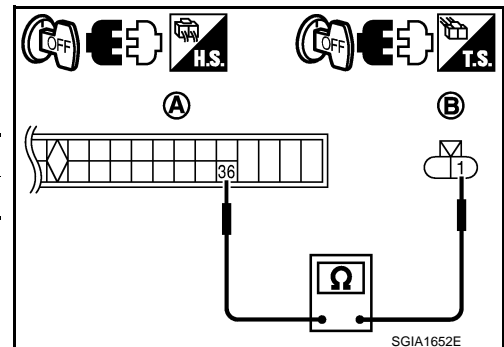
4.CHECK POWER STEERING SOLENOID VALVE POWER SUPPLY CIRCUIT

Check continuity between RAS control unit harness connector B476 (A) and power steering solenoid valve harness connector F25 (VQ35DE), E211 (VK45DE) (B).

RAS C/U	Power steering solenoid valve	Continuity
Terminal 36	Terminal 1	Yes

OK or NG

- OK >> GO TO 5.
NG >> Open or short in harness. Repair or replace any inoperative parts.



5.CHECK POWER STEERING SOLENOID VALVE GROUND CIRCUIT

TROUBLE DIAGNOSIS

[RAS]

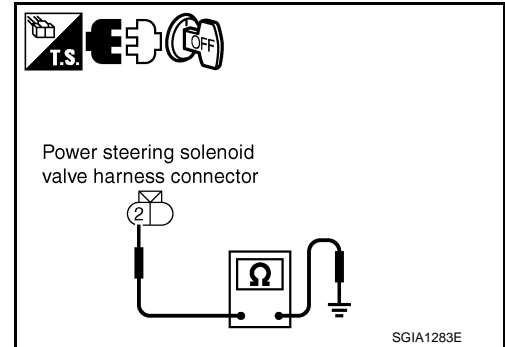
< SERVICE INFORMATION >

Check continuity between power steering solenoid valve harness connector F25 (VQ35DE), E211 (VK45DE) and ground.

Terminal 2 – Ground : Continuity should exist.

OK or NG

- OK >> GO TO 6.
- NG >> Open or short in harness. Repair or replace any inoperative parts.



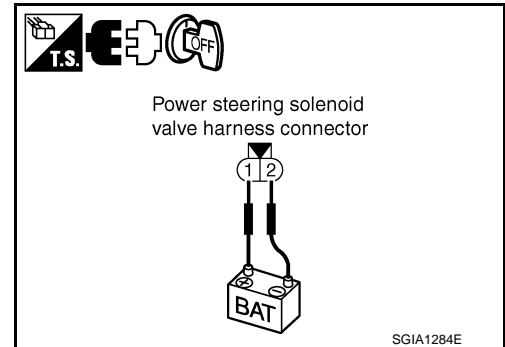
6.CHECK POWER STEERING SOLENOID VALVE

Apply voltage power steering solenoid valve connector F25 (VQ35DE), E211 (VK45DE) and then make sure that the operating sound (clicking sound) is heard.

Terminal 1 (+) - 2 (-) : Operating sound is heard.

OK or NG

- OK >> Perform steering wheel turning force inspection. Refer to [PS-9. "On-Vehicle Inspection and Service"](#).
- NG >> Power steering solenoid valve is inoperating. Replace it.



7.CHECK SELF-DIAGNOSIS RESULTS

Perform RAS self-diagnosis.

- With CONSULT-III: [STC-25. "CONSULT-III Function \(RAS/HICAS\)"](#).
- Without CONSULT-III: [STC-27. "Diagnosis Procedure with Self-Diagnosis Function \(Without CONSULT-III\)"](#).

Are malfunctioning items displayed in self-diagnosis results?

- YES >> Repair or replace any malfunctioning items.
- NO >> RAS control unit malfunction. Replace it.

Check RAS Static/Dynamic Characteristics

INFOID:000000003302566

1.CHECK (1): RAS ACTUATOR STROKE

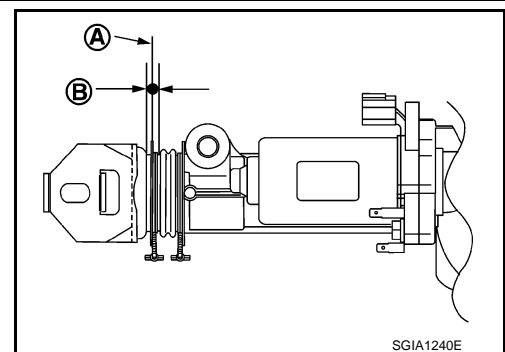
Perform CONSULT-III "ACTIVE TEST", and then check the actuator stroke when turning the steering wheel clockwise or counterclockwise by 180° or more.

Neutral position (A)

Actuator stroke (B) : 2.8 - 3.0 mm (0.110 - 0.118 in)

OK or NG

- OK >> GO TO 2.
- NG >> GO TO 3.



2.CHECK (2): RAS ACTUATOR STROKE

TROUBLE DIAGNOSIS

[RAS]

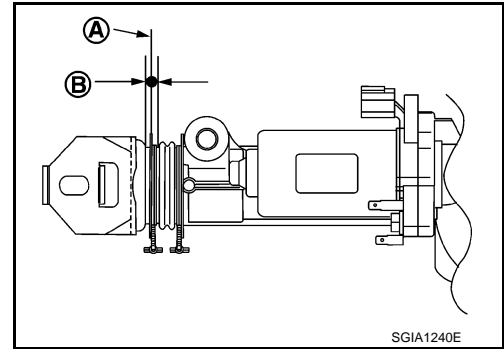
< SERVICE INFORMATION >

Perform CONSULT-III "ACTIVE TEST". When turning the steering wheel in neutral position (A), the rear wheel turns clockwise/counter-clockwise periodically. At that time, check actuator stroke (B).

Actuator stroke (B) : 2.3 - 2.5 mm (0.091 - 0.098 in)

OK or NG

- OK >> RAS static/dynamic characteristics inspection is completed.
- NG >> GO TO 3.



3. CHECK RAS MOTOR

Check RAS motor itself separated from other parts. Refer to [STC-43, "Component Inspection"](#).

OK or NG

- OK >> GO TO 4.
- NG >> RAS motor malfunction. Check the stroke again after replacing.

4. CHECK REAR WHEEL STEERING ANGLE SENSOR

Check rear wheel steering angle sensor separated from other parts. Refer to [STC-43, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Rear wheel steering angle sensor malfunction. Check the stroke again after replacing.

5. CHECK RAS CONTROL UNIT

Replace RAS control unit. Check the symptom of malfunction again.

Is the malfunction corrected?

- YES >> RAS control unit malfunction
- NO >> GO TO 6.

6. REPLACE RAS ACTUATOR ASSEMBLY

Replace RAS actuator assembly. Check the symptom of malfunction again.

Is the malfunction corrected?

- YES >> RAS actuator malfunction
- NO >> Check rear suspension components. Refer to [RSU-7, "Component"](#).

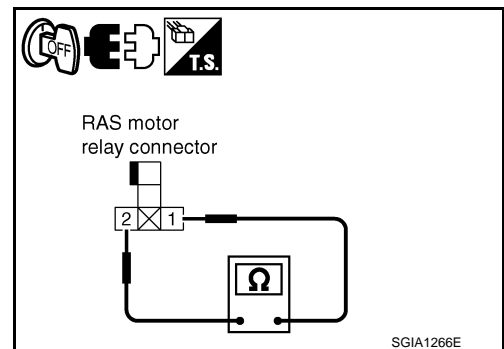
Component Inspection

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RAS MOTOR RELAY

1. Check the resistance between RAS motor relay connector B480.

Terminal 1 - 2 : Approx. 74 Ω



TROUBLE DIAGNOSIS

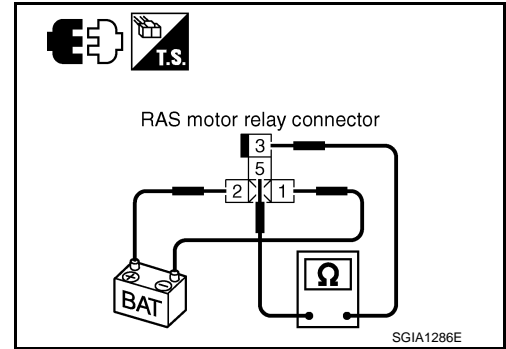
[RAS]

< SERVICE INFORMATION >

- When applying or not supplying approximately 12 V between RAS motor relay connector, check continuity RAS motor relay connector B480.

Terminal 3 – 5 : When applying 12 V voltage: Continuity exist.

: When not applying 12 V voltage: Continuity not exist.



RAS MOTOR

- Check the resistance RAS motor connector B463.

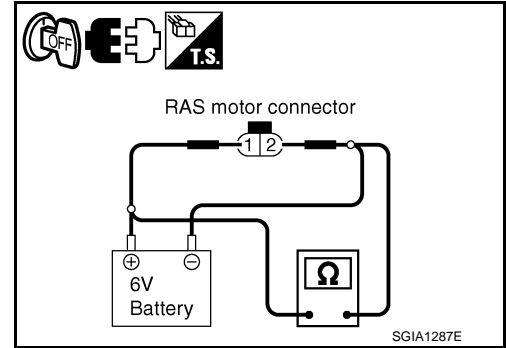
Terminal 1 – 2 : Approx. 0.6 Ω

- Remove RAS motor from RAS actuator, and then turn the motor by 6 V battery.

If it is normal, it turns.

CAUTION:

Do not apply 12 V (battery voltage) to the RAS motor terminal because RAS motor might be damaged.



REAR WHEEL STEERING ANGLE SENSOR

- Disconnect rear wheel steering angle sensor harness connector B487.
- Check resistance of rear wheel steering angle sensor connectors B487.

Terminal 2 – 4	: Approx. 1 kΩ
Terminal 3 – 4	
Terminal 1 – 4	: Approx. 1.25 kΩ

