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SECTION **STC**

STEERING CONTROL SYSTEM

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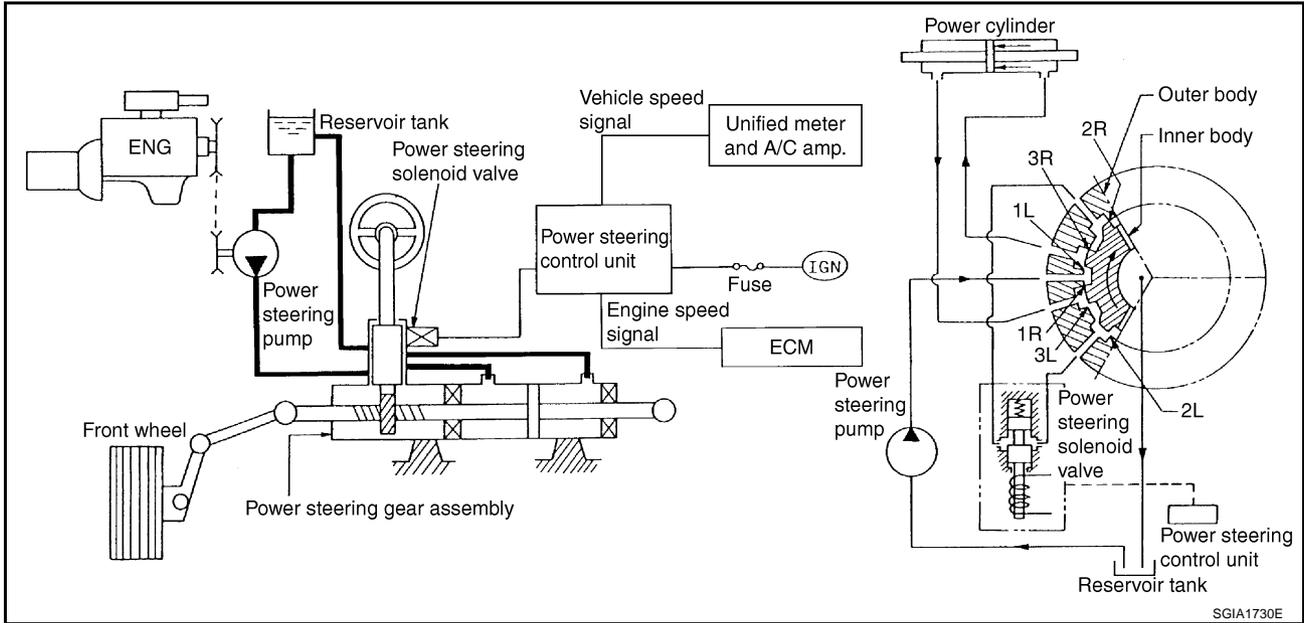
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SYSTEM DESCRIPTION

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Components

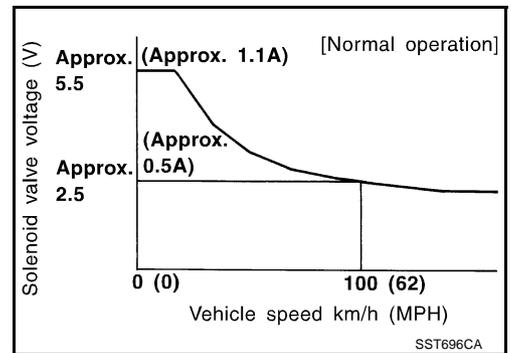
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Electronically Controlled Power Steering System Function

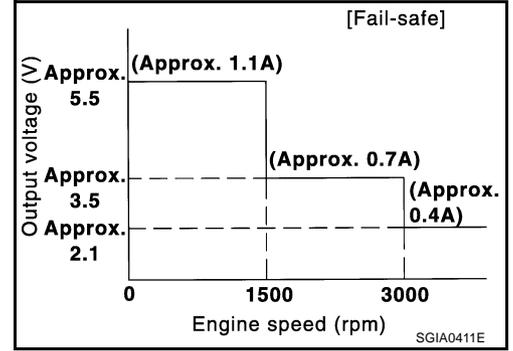
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Vehicle speed sensing electronically controlled power steering (that properly controls the steering force by the vehicle speed) has been adopted. When it is normal, it controls the power steering solenoid valve according to the vehicle speed as shown in the figure and makes the steering force proper.



Fail-Safe Function

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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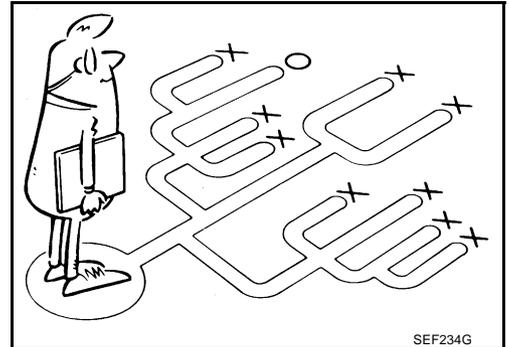
TROUBLE DIAGNOSIS

How to Perform Trouble Diagnosis 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.

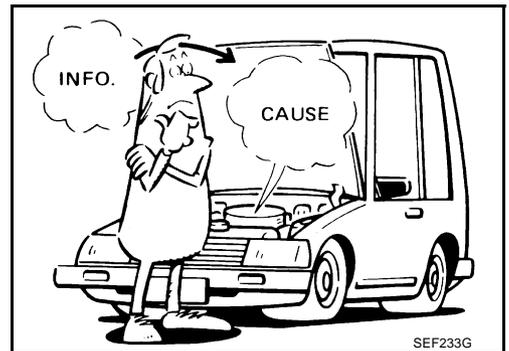
CAUTION:

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



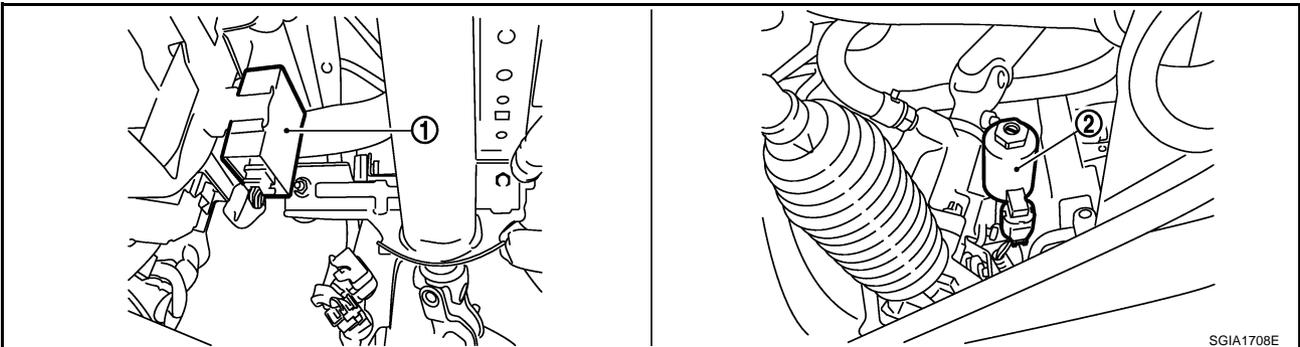
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- It is essential to check symptoms right from beginning in order to repair a malfunction completely.
For an intermittent malfunction, it is important to reproduce symptom based on interview with customer and past examples. Do not perform inspection 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 Precautions"](#) .



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Component Parts Location



SGIA1708E

1. Power steering control unit

2. Power steering solenoid valve

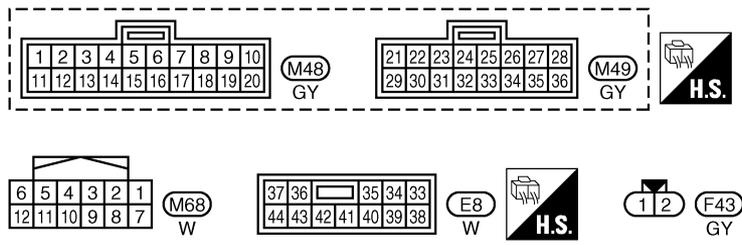
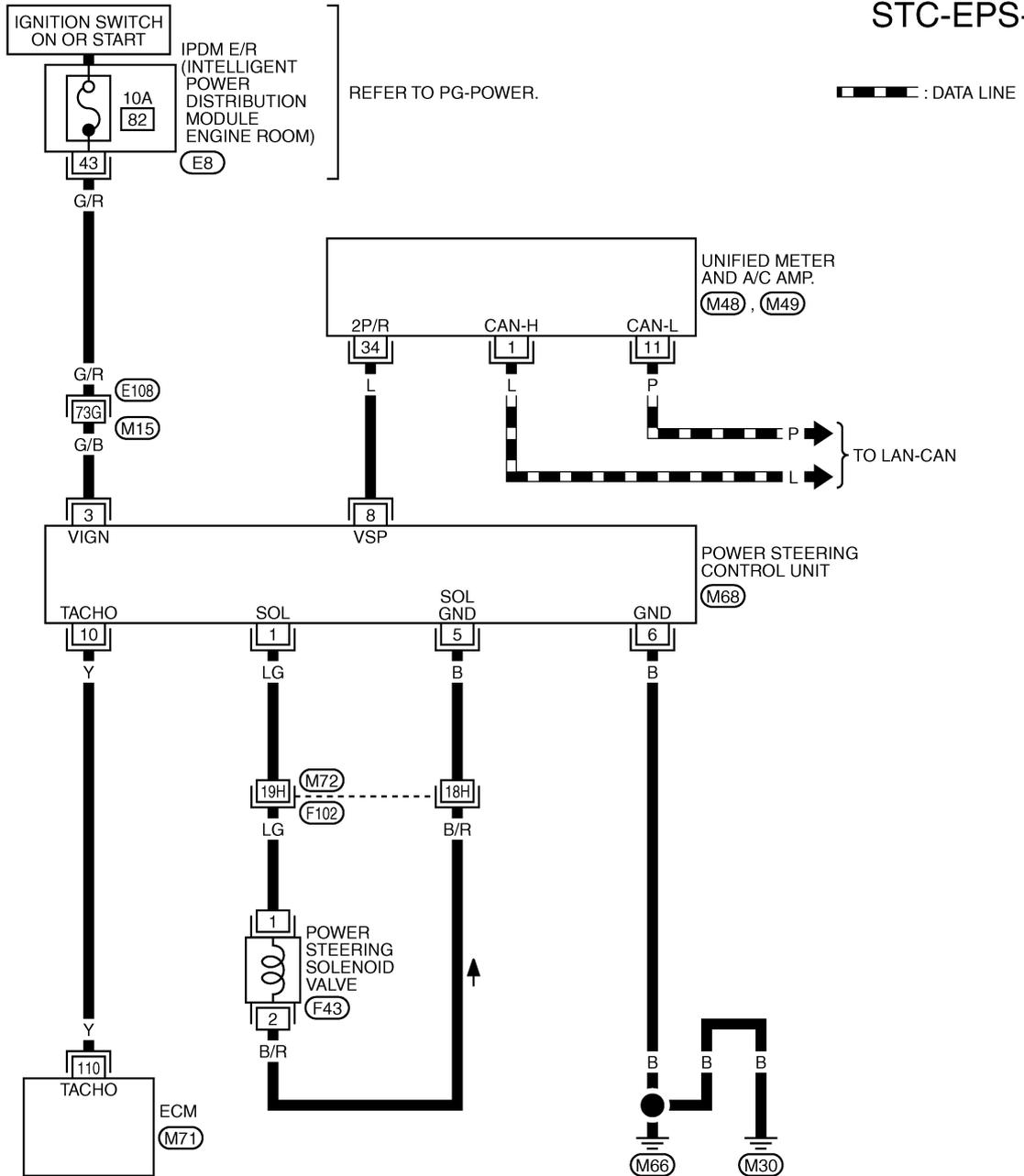
TROUBLE DIAGNOSIS

[EPS]

Wiring Diagram — EPS —

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STC-EPS-01



REFER TO THE FOLLOWING.

(E108), (F102) -SUPER MULTIPLE JUNCTION (SMJ)

(M71) -ELECTRICAL UNITS

TGWT0084E

TROUBLE DIAGNOSIS

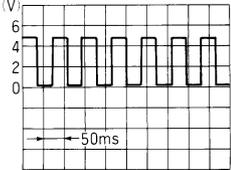
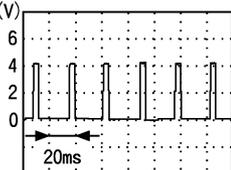
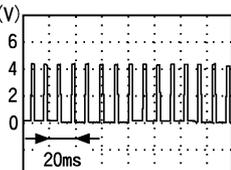
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Control Unit Input/Output Signal Standard STANDARD BY CIRCUIT TESTER AND OSCILLOSCOPE

CAUTION:

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

Terminal		Measuring point	Measuring condition		Standard
+	-				
1 (LG)	Ground	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
3 (G/B)	IGN	Ignition switch ON.	Battery voltage (Approx. 12 V)		
5 (B)	Solenoid ground	Always	Approx. 0 V		
6 (B)	Ground	Always	Approx. 0 V		
8 (L)	Ground	Vehicle speed signal (2-pulse)	At 40 km/h (25MPH)	 <p style="text-align: right; font-size: small;">ELF1080D</p>	
10 (Y)	Ground	Engine speed signal	At idle after warming up	 <p style="text-align: right; font-size: small;">PBIA3654J</p>	
			At approx. 2,000 rpm	 <p style="text-align: right; font-size: small;">PBIA3655J</p>	

For Fast and Accurate Trouble Diagnosis

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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-6, "POWER STEERING FLUID"](#) .
- Is the fluid level proper? Refer to [PS-6, "POWER STEERING FLUID"](#) .
- Is the wheel alignment adjusted properly? Refer to [FSU-6, "Wheel Alignment Inspection"](#) .
- 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?

Basic Inspection

POWER SUPPLY CIRCUIT TERMINAL LOOSENESS AND BATTERY

NGS0007E

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

NGS0007F

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

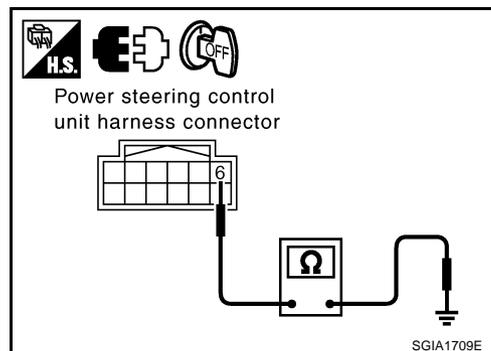
Disconnect power steering control unit harness connector M68, and then check continuity between power steering control unit harness connector M68 terminal 6 and ground.

Terminal 6 – Ground : Continuity exist.

OK or NG

OK >> GO TO 3.

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



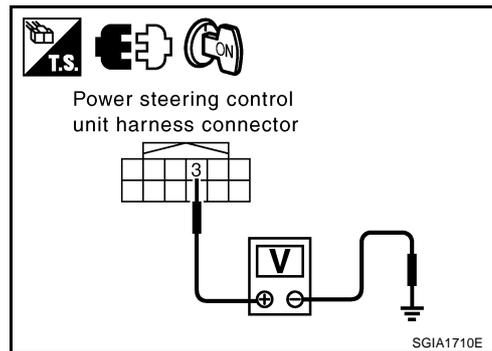
3. CHECK POWER STEERING CONTROL UNIT POWER SUPPLY CIRCUIT

Turn ignition switch ON, and then check voltage between power steering control unit harness connector M68 and ground.

Terminal 3 – 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

NGS0007G

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

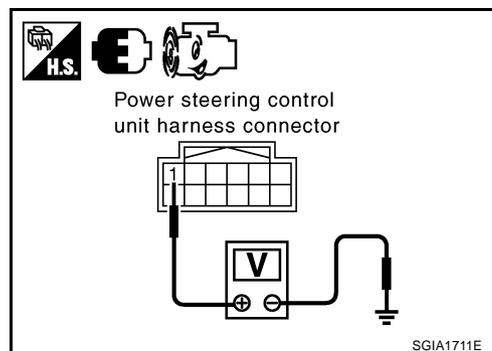
1. POWER STEERING SOLENOID VALVE SIGNAL INSPECTION 1

1. Start engine.
2. 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 M68 and ground.

Terminal 1 – 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.



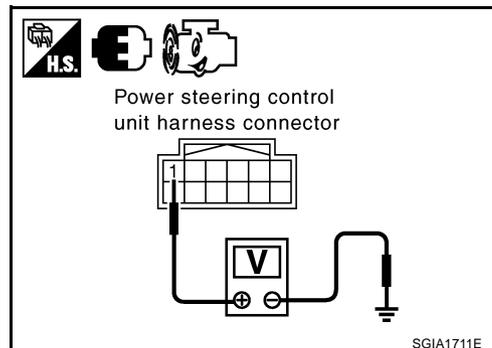
2. POWER STEERING SOLENOID VALVE SIGNAL INSPECTION 2

1. Activate fail-safe function by running the engine speed at 1,500 rpm or higher for 10 seconds with the vehicle stopped.
2. 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 M68 and ground.

Terminal 1 – 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

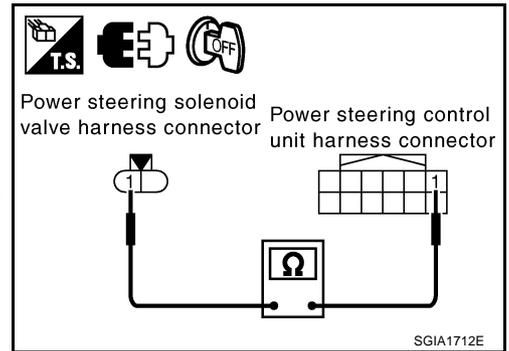
Check continuity between power steering control unit harness connector M68 and power steering solenoid valve harness connector F43.

Power steering control unit	Power steering solenoid valve	Continuity
Terminal 1	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

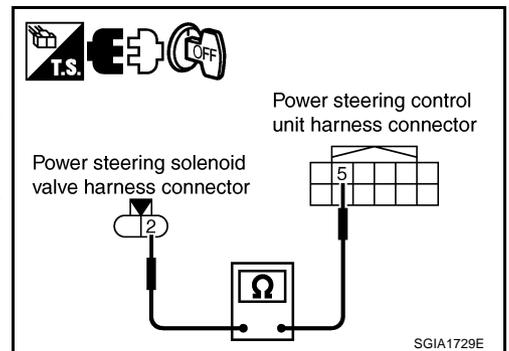
Check continuity between power steering control unit harness connector M68 and power steering solenoid valve harness connector F43.

Power steering control unit	Power steering solenoid valve	Continuity
Terminal 5	Terminal 2	Yes

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

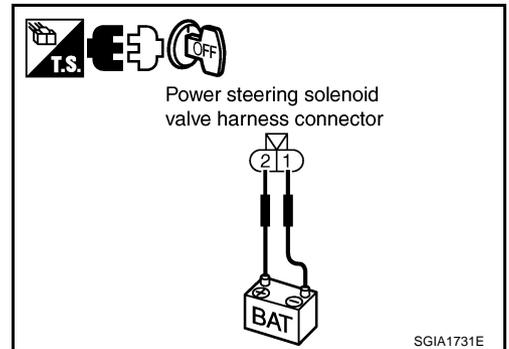
Apply voltage power steering solenoid valve connector, and then make sure that the operating sound (clicking sound) is heard.

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

OK or NG

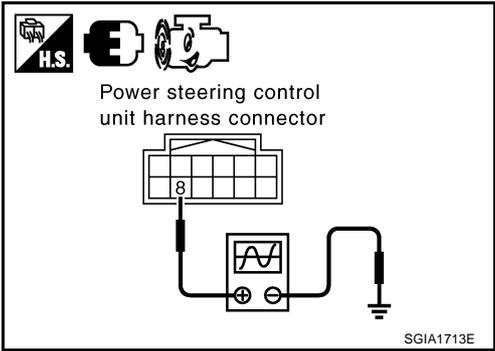
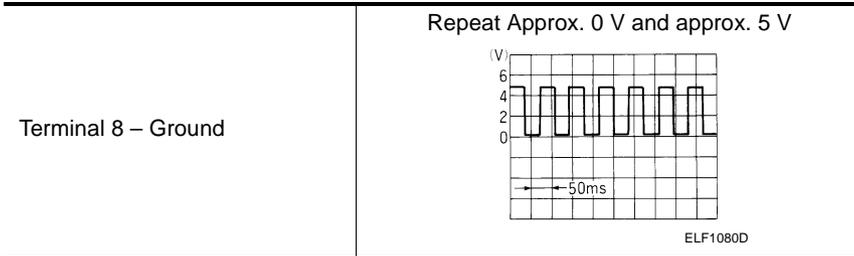
OK >> Perform steering turning torque inspection. Refer to [PS-7. "CHECKING STEERING WHEEL TURNING FORCE"](#).

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 M68 and ground.

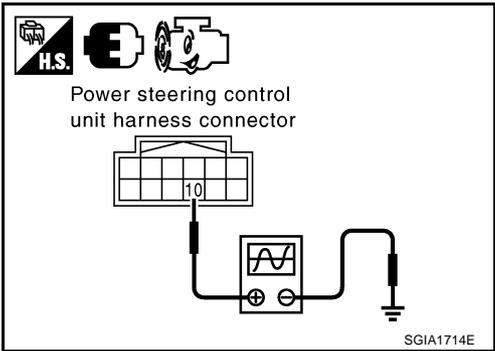
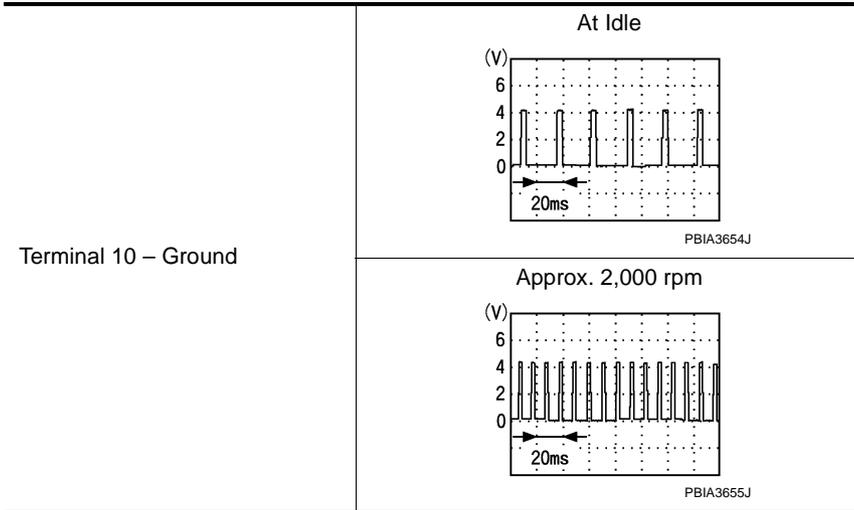


OK or NG

- OK >> Power steering control unit is inoperative. Replace.
- 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-44, "UNIFIED METER AND A/C AMP"](#) .

8. CHECK ENGINE SPEED SIGNAL CIRCUIT

Warm up the engine, and then check voltage waveform between power steering control unit harness connector M68 and ground when the engine speed is the idling and at approximately 2,000 rpm.



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-116, "CONSULT-III Function \(ENGINE\)"](#) .