

C1109 POWER AND GROUND SYSTEM

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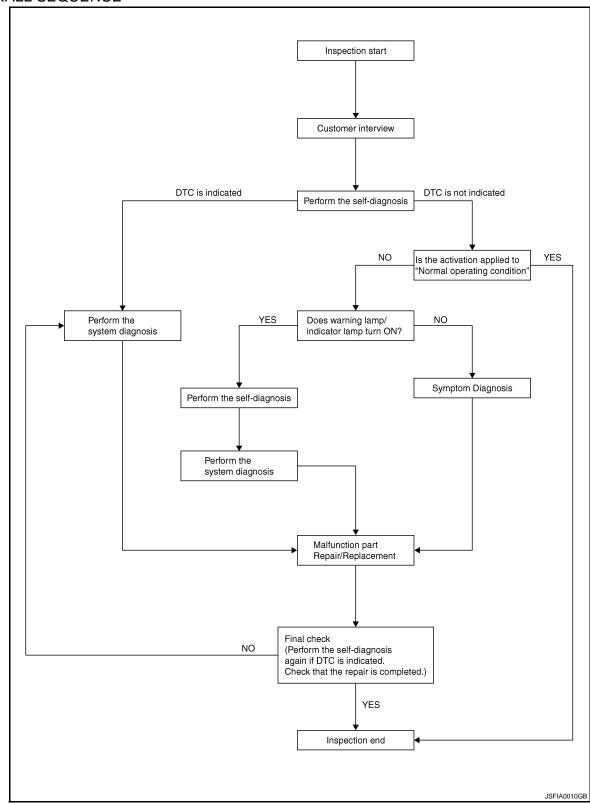
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# **BASIC INSPECTION**

# DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

#### **OVERALL SEQUENCE**



#### **DIAGNOSIS AND REPAIR WORKFLOW**

[ABS] < BASIC INSPECTION > 1. COLLECT THE INFORMATION FROM THE CUSTOMER Α Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the diagnosis worksheet. Refer to BRC-8, "Diagnostic Work Sheet". В >> GO TO 2. 2.PERFORM THE SELF-DIAGNOSIS Check the DTC display with the self-diagnosis function. Refer to BRC-17, "CONSULT-III Function (ABS)". Is there any DTC displayed? YES >> GO TO 3. D NO >> GO TO 4.  $oldsymbol{3}$  .PERFORM THE SYSTEM DIAGNOSIS Perform the diagnosis applicable to the displayed DTC. Refer to BRC-57, "DTC No. Index". >> GO TO 7. **BRC** f 4.CHECK THE SYMPTOM THAT IS NOT CONSIDERED A SYSTEM MALFUNCTION Check that the symptom is a normal operation that is not considered a system malfunction. Refer to BRC-63. "Description". Is the symptom is a normal operation? >> INSPECTION END YES NO >> GO TO 5. Н  ${f 5.}$ CHECK THE WARNING LAMP FOR ILLUMINATION Check that the warning lamp illuminate. ABS warning lamp: Refer to <u>BRC-49</u>, "<u>Description</u>". Brake warning lamp: Refer to <u>BRC-50</u>, "<u>Description</u>". Is ON/OFF timing normal? YES >> GO TO 6. NO >> GO TO 2. 6.PERFORM THE DIAGNOSIS BY SYMPTOM Perform the diagnosis applicable to the symptom. >> GO TO 7.  $7.\mathtt{REPAIR}$  OR REPLACE THE MALFUNCTIONING PARTS Repair or replace the specified malfunctioning parts. M >> GO TO 8. 8. FINAL CHECK Ν Perform the self-diagnosis again, and check that the malfunction is repaired completely. After checking, erase the self-diagnosis memory. Refer to BRC-17, "CONSULT-III Function (ABS)". Is any DTC indicated? YES >> GO TO 3. NO >> INSPECTION END Р

## **DIAGNOSIS AND REPAIR WORKFLOW**

# < BASIC INSPECTION >

[ABS]

# **Diagnostic Work Sheet**

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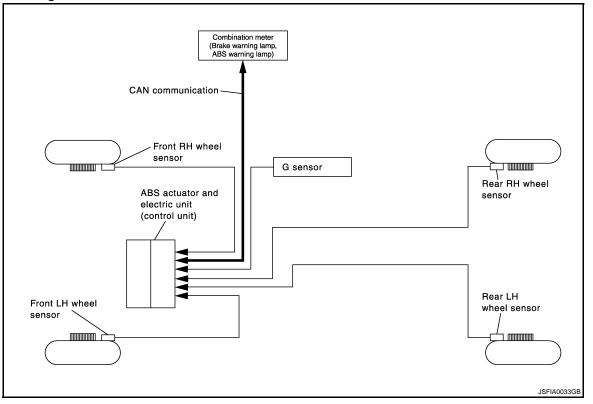
Customer name MR/MS	Model & Year		VIN	
Engine #	Trans.		Mileage	
Incident Date	Manuf. Date		In Service Dat	е
Symptoms	□ Noise and vibration (from engine compartment) □ Noise and vibration (from axle) □ Warning / Indicator activate			☐ Firm pedal operation Large stroke pedal operation
	□ ABS does not work (Wheels lock when braking) □ Lack of sense of acceleration			
Engine conditions	☐ When starting ☐ After starting			
Road conditions	□ Low friction road (□Snow □Gravel □Other) □ Bumps / potholes			
Driving conditions	☐ Full-acceleration ☐ High speed cornering ☐ Vehicle speed: Greater than 10 km/h (6 MPH) ☐ Vehicle speed: 10 km/h (6 MPH) or less ☐ Vehicle is stopped			
Applying brake conditions	☐ Suddenly ☐ Gradually			
Other conditions	☐ Operation of electrical equipment ☐ Shift change ☐ Other descriptions			

SFIA3264E

# **FUNCTION DIAGNOSIS**

**ABS** 

System Diagram



System Description

Anti-Lock Braking System is a function that detects wheel revolution while braking, electronically controls
braking force, and prevents wheel locking during sudden braking. It improves handling stability and maneuverability for avoiding obstacles.

• Electrical system diagnosis by CONSULT-III is available.

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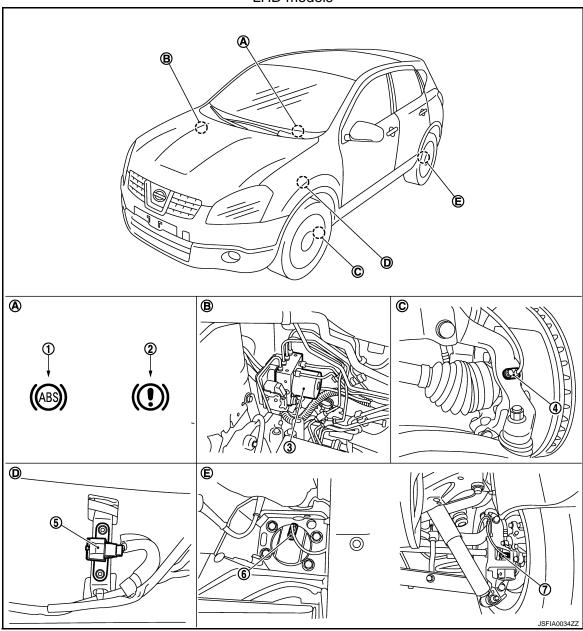
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# **Component Parts Location**

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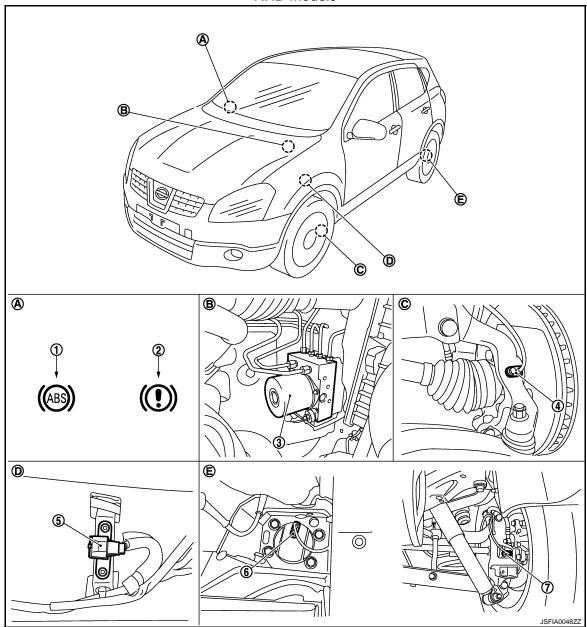
#### LHD models



- 1. ABS warning lamp
- 4. Front wheel sensor
- 7. Rear wheel sensor (4WD models)
- A. Combination meter
- D. Lower instrument cover RH
- 2. Brake warning lamp
- 5. G sensor
- B. Engine room (right side)
- E. Rear axle

- 3. ABS actuator and electric unit (control unit)
- 6. Rear wheel sensor (2WD models)
- C. Steering knuckle





- 1. ABS warning lamp
- 4. Front wheel sensor
- 7. Rear wheel sensor (4WD models)
- A. Combination meter
- D. Lower instrument cover RH
- 2. Brake warning lamp
- 5. G sensor
- B. Engine room (left side)
- E. Rear axle

- 3. ABS actuator and electric unit (control unit)
- 6. Rear wheel sensor (2WD models)
- C. Steering knuckle

# **Component Description**

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Component parts		Reference
ABS actuator and electric unit (control unit)	Pump	BRC-29, "Description"
	Motor	BRC-29, Description
	Actuator relay (Main relay)	BRC-33, "Description"
	Solenoid valve	BRC-40, "Description"
Wheel sensor		BRC-20, "Description"

# **ABS**

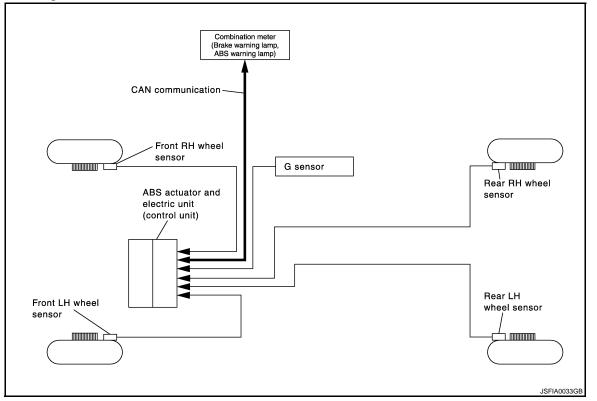
< FUNCTION DIAGNOSIS >

[ABS]

Component parts	Reference
ABS warning lamp	BRC-49, "Description"
Brake warning lamp	BRC-50, "Description"

### **EBD**

System Diagram



# System Description

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• Electric Brake force Distribution is a following function. ABS actuator and electric unit (control unit) detects subtle slippages between the front and rear wheels during braking. Then is electronically controls the rear braking force (brake fluid pressure) to reducing and reduces rear wheel slippage. Accordingly it improves vehicle stability.

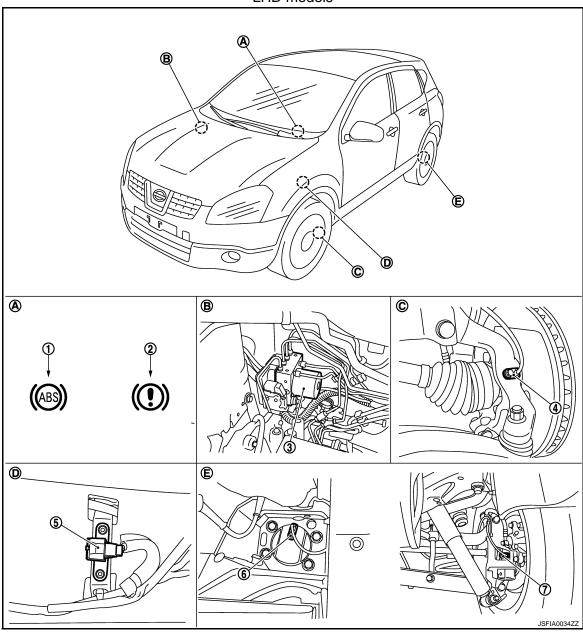
• Electrical system diagnosis by CONSULT-III is available.

**BRC-13** 

# **Component Parts Location**

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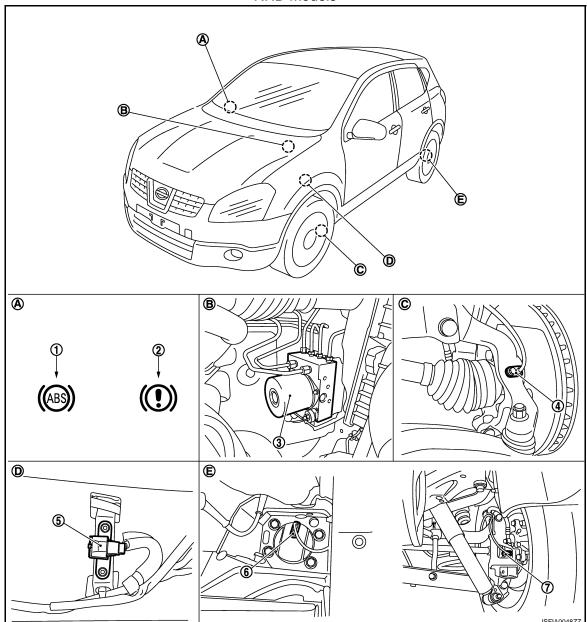
#### LHD models



- 1. ABS warning lamp
- 4. Front wheel sensor
- 7. Rear wheel sensor (4WD models)
- A. Combination meter
- D. Lower instrument cover RH
- 2. Brake warning lamp
- 5. G sensor
- B. Engine room (right side)
- E. Rear axle

- ABS actuator and electric unit (control unit)
- 6. Rear wheel sensor (2WD models)
- C. Steering knuckle

## RHD models



- 1. ABS warning lamp
- 4. Front wheel sensor
- 7. Rear wheel sensor (4WD models)
- A. Combination meter
- D. Lower instrument cover RH
- 2. Brake warning lamp
- 5. G sensor
- B. Engine room (left side)
- E. Rear axle

- 3. ABS actuator and electric unit (control unit)
- 6. Rear wheel sensor (2WD models)
- C. Steering knuckle

# **Component Description**

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Component parts		Reference	
ABS actuator and electric unit (control unit)	Pump	BRC-29, "Description"	
	Motor	BIC-29, Description	
	Actuator relay (Main relay)	BRC-33, "Description"	
	Solenoid valve	BRC-40, "Description"	
Wheel sensor		BRC-20, "Description"	

# **EBD**

< FUNCTION DIAGNOSIS >

[ABS]

Component parts	Reference
ABS warning lamp	BRC-49, "Description"
Brake warning lamp	BRC-50, "Description"

# DIAGNOSIS SYSTEM [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

< FUNCTION DIAGNOSIS > [ABS]

# DIAGNOSIS SYSTEM [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

CONSULT-III Function (ABS)

INFOID:0000000001181618

#### **FUNCTION**

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

Diagnostic test mode	Function
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the ABS actuator and electric unit (control unit) can be read.
Active test	Diagnostic test mode is which CONSULT-III drives some actuators apart from the ABS actuator and electric unit (control unit) and also shifts some parameters in a specified range.
ECU part number	ABS actuator and electric unit (control unit) part number can be read.
Function test	Performed by CONSULT-III instead of a technician to determine whether each system is "OK" or "NG".
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.

#### SELF-DIAG RESULTS MODE

#### Operation Procedure

1. Before performing the self-diagnosis, start engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute.

#### How to Erase Self-diagnosis Results

 After erasing DTC memory, start engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute as the final inspection, and make sure that the ABS warning lamp and brake warning lamp turn OFF.

#### **CAUTION:**

# If memory cannot be erased, perform applicably diagnosis. NOTE:

- When the wheel sensor malfunctions, after inspecting the wheel sensor system, the ABS warning lamp and brake warning lamp will not turn OFF even when the system is normal unless the vehicle is driving at approximately 30 km/h (19 MPH) or more for approximately 1 minute.
- Brake warning lamp will turn ON in case of parking brake operation (when switch is ON) or of brake fluid level switch operation (when brake fluid is insufficient).

Display Item List

Refer to BRC-57, "DTC No. Index".

#### DATA MONITOR MODE

Display Item List

x: Applicable □: Optional item

	SELECT MONITOR ITEM		
Monitor item (Unit)	ECU INPUT SIG- NALS	MAIN SIGNLAS	Remarks
FR LH SENSOR [km/h (MPH)]	×	×	
FR RH SENSOR [km/h (MPH)]	×	×	Wheel speed
RR LH SENSOR [km/h (MPH)]	×	×	wileer speed
RR RH SENSOR [km/h (MPH)]	×	×	
STOP LAMP SW (On/Off)	×	×	Stop lamp switch signal status

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# DIAGNOSIS SYSTEM [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

[ABS]

#### < FUNCTION DIAGNOSIS >

	SELECT MC	NITOR ITEM	
Monitor item (Unit)	ECU INPUT SIG- NALS	MAIN SIGNLAS	Remarks
BATTERY VOLT (V)	×	×	Battery voltage supplied to the ABS actuator and electric unit (control unit)
DECEL G SENSOR (On/Off) NOTE 1	×	×	Vehicle on level surface or on slope
FR RH IN SOL (On/Off)	٠	×	
FR RH OUT SOL (On/Off)	٠	×	
FR LH IN SOL (On/Off)	٠	×	
FR LH OUT SOL (On/Off)	٥	×	Operation status of each solenoid valve
RR RH IN SOL (On/Off)	٥	×	Operation status of each solehold valve
RR RH OUT SOL (On/Off)	٥	×	
RR LH IN SOL (On/Off)	٥	×	
RR LH OUT SOL (On/Off)	۵	×	
MOTOR RELAY (On/Off)	٠	×	Motor and motor relay operation
ACTUATOR RLY (On/Off) NOTE 2		×	Actuator relay operation
ABS WARN LAMP (On/Off)		×	ABS warning lamp
EBD SIGNAL (On/Off)	٠	۵	EBD operation
ABS SIGNAL (On/Off)	٠	۵	ABS operation
EBD FAIL SIG (On/Off)	۵	۵	EBD fail-safe signal
ABS FAIL SIG (On/Off)	٠	۵	ABS fail-safe signal

#### NOTE:

- 1: Only 4WD models
- 2: Every 20 seconds momentary switch to OFF.

#### **ACTIVE TEST MODE**

#### **CAUTION:**

- Do not perform active test while driving vehicle.
- Make sure to completely bleed air from brake system.
- The active test cannot be performed with the ABS warning lamp and brake warning lamp are ON.
- ABS warning lamp and brake warning lamp are ON during active test.

#### NOTE:

- When active test is performed while depressing the pedal, the pedal depression amount will change. This is normal. (Only solenoid valve and ABS motor.)
- "TEST IS STOPPED" is displayed 10 seconds after operation start.
- After "TEST IS STOPPED" is displayed, to perform test again.

Test Item

ABS SOLENOID VALVE

# DIAGNOSIS SYSTEM [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

#### < FUNCTION DIAGNOSIS >

[ABS]

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• For ABS solenoid valve, touch "UP", "KEEP", and "DOWN". Then use screen monitor to check that solenoid valve operates as shown in solenoid valve operation chart.

Solenoid valve operation chart

Test item	Display item	Display		
iest item	Display item	UP	KEEP	DOWN
FR RH SOL	FR RH IN SOL	OFF	ON	ON
FR KH SOL	FR RH OUT SOL	OFF	OFF	ON*
FR LH SOL	FR LH IN SOL	OFF	ON	ON
	FR LH OUT SOL	OFF	OFF	ON*
RR RH SOL	RR RH IN SOL	OFF	ON	ON
	RR RH OUT SOL	OFF	OFF	ON*
RR LH SOL	RR LH IN SOL	OFF	ON	ON
	RR LH OUT SOL	OFF	OFF	ON*

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

#### **ABS MOTOR**

• Touch "ON" and "OFF" on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Display	
rest item	ызріаў ітепі	ON	OFF
ABS MOTOR	MOTOR RELAY	ON	OFF
ABS WOTOR	ACTUATOR RLY NOTE	ON	ON

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

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[ABS]

# COMPONENT DIAGNOSIS

C1101, C1102, C1103, C1104 WHEEL SENSOR-1

Description INFOID:0000000001181619

When the sensor rotor rotates, the magnetic field changes. The sensor converts the magnetic field changes to current signals (rectangular wave) and transmits them to the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1101	RR RH SENSOR-1	Circuit of rear RH wheel circuit is open or short circuit. Current signal from sensor is outside limits.	
C1102	RR LH SENSOR-1	Circuit of rear LH wheel circuit is open or short circuit. Current signal from sensor is outside limits.	Harness or connector     Wheel sensor
C1103	FR RH SENSOR-1	Circuit of front RH wheel circuit is open or short circuit. Current signal from sensor is outside limits.	ABS actuator and electric unit (control unit)
C1104	FR LH SENSOR-1	Circuit of front LH wheel circuit is open or short circuit. Current signal from sensor is outside limits.	

#### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
RR RH SENSOR-1
RR LH SENSOR-1
FR RH SENSOR-1
FR LH SENSOR-1

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to BRC-20, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181621

#### **CAUTION:**

Do not check between wheel sensor terminals.

#### INSPECTION PROCEDURE

### 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- · Check wheel sensor for damage, disconnection or looseness.

#### Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

# 2. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.

#### C1101, C1102, C1103, C1104 WHEEL SENSOR-1

#### < COMPONENT DIAGNOSIS >

[ABS]

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Reconnect connectors and then perform the self-diagnosis. Refer to BRC-17, "CONSULT-III Function (ABS)".

Is any item indicated on the self-diagnosis display?

>> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3. CHECK WHEEL SENSOR HARNESS

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Disconnect malfunctioning wheel sensor connector.
- 4. Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and el	ectric unit (control unit)	Wheel sensor		Continuity
Connector	Terminal	Connector	Terminal	Continuity
	9	E39 (Front RH)		
E34	16	E22 (Front LH)	2	Existed
□34	8	B41 (Rear RH)		Existed
	6	B44 (Rear LH)		

Measurement terminal for signal circuit

ABS actuator and el	ectric unit (control unit)	Wheel	Wheel sensor Continuity	
Connector	Terminal	Connector	Terminal	Continuity
	10	E39 (Front RH)	4	
E34	5	E22 (Front LH)		Existed
⊏34	19	19 B41 (Rear RH)	I	Existed
	17	B44 (Rear LH)		

Measurement terminal for ground circuit

ABS actuator and electric unit (control unit)			ABS actuator and electric unit (control unit)  Continuity	
Connector	Terminal	Connector	Terminal	Continuity
	9, 10	E34		Not existed
E34	16, 5		4.4	
⊏34	8, 19		1, 4	
	6, 17			

Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

## f 4.CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel	sensor	— Voltage	
Connector	Terminal		voltage
E39 (Front RH)			
E22 (Front LH)	LH)	Ground 8 V or r	9 V or more
B41 (Rear RH)	2		8 v oi more
B44 (Rear LH)			

Is the inspection result normal?

**BRC-21** 

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# C1101, C1102, C1103, C1104 WHEEL SENSOR-1

#### < COMPONENT DIAGNOSIS >

[ABS]

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

# Component Inspection

INFOID:0000000001181622

# 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SENSOR", and check the vehicle speed.

Wheel sensor	Vehicle speed (DATA MONITOR)
FR LH SENSOR	
FR RH SENSOR	Nearly matches the speedometer dis-
RR LH SENSOR	play (±10% or less)
RR RH SENSOR	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-20">BRC-20</a>, "Diagnosis Procedure".

[ABS]

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# C1105, C1106, C1107, C1108 WHEEL SENSOR-2

Description INFOID:0000000001181623

ABS unit continually monitors wheel speed sensors to detect abnormal signals.

DTC Logic INFOID:0000000001181624

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1105	RR RH SENSOR-2	Signal from rear RH wheel sensor does not match other 3 wheel speed signals.	<ul><li>Sensor not installed correctly</li><li>Sensor rotor or encoder dam-</li></ul>
C1106	RR LH SENSOR-2	Signal from rear LH wheel sensor does not match other 3 wheel speed signals.	aged Sensor rotor loose on axle Electrical interference
C1107	FR RH SENSOR-2	Signal from front RH wheel sensor does not match other 3 wheel speed signals.	Wheel not turning - e.g. vehi- cle driven on 2WD dyno
C1108	FR LH SENSOR-2	Signal from front LH wheel sensor does not match other 3 wheel speed signals.	Sensor damaged     ABS unit damaged

DTC CONFIRMATION PROCEDURE

### 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
RR RH SENSOR-2
RR LH SENSOR-2
FR RH SENSOR-2
FR LH SENSOR-2

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-23">BRC-23</a>, "Diagnosis Procedure".

>> INSPECTION END NO

### Diagnosis Procedure

**CAUTION:** 

Do not check between wheel sensor terminals.

INSPECTION PROCEDURE

# 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- Check wheel sensor for damage, disconnection or looseness.

Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

# 2.CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- Disconnect malfunctioning wheel sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors and then perform the self-diagnosis. Refer to BRC-17, "CONSULT-III Function (ABS)".

Is any item indicated on the self-diagnosis display?

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INFOID:0000000001181625

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### < COMPONENT DIAGNOSIS >

[ABS]

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3.CHECK WHEEL SENSOR HARNESS

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- 4. Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and electric unit (control unit)		Wheel sensor		Continuity
Connector	Terminal	Connector	Terminal	Continuity
	9	E39 (Front RH)		
E34	16	E22 (Front LH)	2	Existed
L34	8	B41 (Rear RH)	2	LXISteu
	6	B44 (Rear LH)		

Measurement terminal for signal circuit

ABS actuator and el	ectric unit (control unit)	Wheel	sensor	Continuity
Connector	Terminal	Connector	Terminal	Continuity
	10	E39 (Front RH)		
E34	5	E22 (Front LH)		Existed
⊏34	19	B41 (Rear RH)		Existed
	17	B44 (Rear LH)		

Measurement terminal for ground circuit

Wedsdrenent termina		ectric unit (control unit)		0 - 45 - 5
Connector	Terminal	Connector	Terminal	Continuity
	9, 10	- E34	1, 4	Not existed
E34	16, 5			
⊏34	8, 19			
	6, 17			

5. Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

### 4. CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel	sensor		Voltage
Connector	Terminal	_	voltage
E39 (Front RH)			
E22 (Front LH)	2	Ground	8 V or more
B41 (Rear RH)	2	Giodila	8 v oi more
B44 (Rear LH)			

#### Is the inspection result normal?

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

# C1105, C1106, C1107, C1108 WHEEL SENSOR-2

# < COMPONENT DIAGNOSIS >

[ABS]

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# **Component Inspection**

INFOID:0000000001181626

# 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SENSOR", and check the vehicle speed.

Wheel sensor	Vehicle speed (DATA MONITOR)
FR LH SENSOR	
FR RH SENSOR	Nearly matches the speedometer dis-
RR LH SENSOR	play (±10% or less)
RR RH SENSOR	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-35">BRC-35</a>, "Diagnosis Procedure".

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#### < COMPONENT DIAGNOSIS >

#### C1109 POWER AND GROUND SYSTEM

Description INFOID:000000001181627

Power is supply from the battery to ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1109	BATTERY VOLTAGE [ABNORMAL]	When the ABS actuator and electric unit (control unit) power supply is lower than normal and vehicle speed is greater than 6 km/h (4 MPH). Power supply is greater than normal limits.	Harness or connector     ABS actuator and electric unit (control unit)     Fuse     Vehicle electrical power system

#### DTC CONFIRMATION PROCEDURE

### 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
BATTERY VOLTAGE [ABNORMAL]

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-26">BRC-26</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181629

#### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <a href="BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 2.CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Turn ignition switch ON or OFF and check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and electric unit (control unit)			Condition	Voltage	
Connector	Terminal			vollage	
E34	18	Ground	Ignition switch: ON	Battery voltage	
LJ4	10	Giodila	Ignition switch: OFF	Approx. 0 V	

<sup>4.</sup> Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 3.

### C1109 POWER AND GROUND SYSTEM

# < COMPONENT DIAGNOSIS >

NO >> Repair or replace malfunctioning components.

# 3.abs power supply check (under load conditions)

- 1. Use 12V lamp (normal rating 10 to 20W) connected between E34 terminals 18 and 4. With ignition switch ON check bulb illuminates correctly.
- 2. Check ABS motor supply under loaded condition (connector E34 terminals 1 and 2).

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

# 4. CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and electric unit (control unit)			Continuity
Connector	Terminal		Continuity
E34	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Check battery for terminal looseness, low voltage, etc. if any malfunction is found, repair malfunctioning parts.

NO >> Repair or replace malfunctioning components (check ABS earth bolt for tightness and corrosion).

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**BRC-27** 

# C1110, C1153 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

< COMPONENT DIAGNOSIS >

[ABS]

# C1110, C1153 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Description INFOID:000000001181630

ABS unit is continuously monitoring ECU hardware and software for correct operation.

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1110	CONTROLLER FAILURE	Possible internal failure of control unit components.	Internal failure of control unit components     ABS solenoid valve or motor power supply/ground abnormality
C1153	EMERGENCY BRAKE	Continuous ABS/EBD control for more than 60 seconds.	ABS control unit software failure     Wheel speed sensor input abnormality

#### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

- 1. Check both ABS solenoid valve and motor supply and ground circuits using a suitable electrical load.
- Check wheel speed sensor inputs.
- 3. Check the self-diagnosis results.

Self-diagnosis results
CONTROLLER FAILURE
EMERGENCY BRAKE

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to BRC-28, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181632

#### INSPECTION PROCEDURE

1.REPLACE ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

#### CAUTION:

Replace ABS actuator and electric unit (control unit) when self-diagnostic result shows items other than those applicable.

>> Replace ABS actuator and electric unit (control unit).

#### C1111 ABS MOTOR, MOTOR RELAY SYSTEM

< COMPONENT DIAGNOSIS >

[ABS]

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## C1111 ABS MOTOR, MOTOR RELAY SYSTEM

Description INFOID:0000000001181633

**PUMP** 

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The pump returns the brake fluid stored in the reservoir to the master cylinder by reducing the pressure.

#### **MOTOR**

The motor drives the pump according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1111	C1111 PUMP MOTOR	During the actuator motor operating with ON, when the actuator motor turns OFF, or when the control line for actuator motor relay is open.	Harness or connector     ABS actuator and electric unit
CIIII	POWE WOTOK	During the actuator motor operating with OFF, when the actuator motor turns ON, or when the control line for relay is shorted to ground.	(control unit)

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#### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
PUMP MOTOR

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-29">BRC-29</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181635

#### INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check terminal for deformation, disconnect, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <a href="BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.CHECK ABS MOTOR AND MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check voltage between the ABS actuator and electric unit (control unit) harness connector terminal and ground.

#### < COMPONENT DIAGNOSIS >

ABS actuator and ele	ectric unit (control unit)		Voltage
Connector Terminal		_	voltage
E34	2	Ground	Battery voltage

Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.abs power supply check (under load conditions)

Use 12V lamp (normal rating 10 to 20W) connected between E34 terminals 1 and 2. With ignition switch ON check bulb illuminates correctly.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

# ${f 4.}$ CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and ele	ectric unit (control unit)	_	Continuity
Connector Terminal			Continuity
E34	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components. (Check ABS each bolt for tightness and corrosion).

# Component Inspection

INFOID:0000000001181636

# 1. CHECK ACTIVE TEST

- 1. On "ACTIVE TEST", select "ABS MOTOR".
- 2. Touch "ON" and "OFF" on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Display	
		ON	OFF
ABS MOTOR	MOTOR RELAY	ON	OFF
	ACTUATOR RLY NOTE	ON	ON

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to BRC-29, "Diagnosis Procedure".

[ABS]

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### C1113 G SENSOR

Description INFOID:0000000001181637

G sensor detects G affecting the vehicle, and transmits the data to the ABS actuator and electric unit (control unit) as an analog voltage signal.

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1113	G SENSOR	G sensor is malfunctioning, or signal line of G sensor is open or shorted.	Harness or connector     ABS actuator and electric unit (control unit)     G sensor     Electrical interference     Vehicle driven on 4WD rolling road

#### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
G SENSOR

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-31">BRC-31</a>, "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

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#### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect G sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-17</u>, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.CHECK G SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect G sensor connector.
- Turn ignition switch ON or OFF and check voltage between G sensor harness connector terminal and ground.

G sensor		_	Condition	Voltage
Connector	Terminal		Condition	voltage
M71 3	Ground	Ignition switch: ON	Battery voltage	
1417 1	3	Ground	Ignition switch: OFF	Approx. 0 V

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#### < COMPONENT DIAGNOSIS >

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.check $_{ m G}$ sensor ground circuit

Check continuity between G sensor harness connector terminal and ground.

G se	ensor	_	Continuity
Connector Terminal			Continuity
M71	1	Ground	Existed

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

# 4. CHECK G SENSOR HARNESS

- 1. Disconnect ABS actuator and electric unit (control unit) connector.
- 2. Check continuity between G sensor harness connector terminals and ABS actuator and electric unit (control unit) harness connector terminals.

ABS actuator and el	ABS actuator and electric unit (control unit)		G sensor	
Connector	Terminal	Connector	Terminal	Continuity
	14		1	
E34	21	M71	2	Existed
	24		3	

#### Is the inspection result normal?

YES >> Replace G sensor.

NO >> Repair or replace malfunctioning components.

# Component Inspection

INFOID:0000000001181640

# 1. CHECK DATA MONITOR

Select "DECEL G SENSOR", in "DATA MONITOR" and check G sensor signal.

Monitor item	DATA MONITOR	
DECEL G SENSOR	ON/OFF	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

[ABS]

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### C1114 ACTUATOR RELAY SYSTEM

Description INFOID:0000000001181641

Activates or deactivates each solenoid valve according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic INFOID:0000000001181642

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1114 MAIN RELAY	During the actuator relay operating with OFF, when the actuator relay turns ON, or when the control line for the relay is shorted to the ground.	Harness or connector     ABS actuator and electric unit	
01114	WAIN INLEAT	During the actuator relay operating with ON, when the actuator relay turns ON, or when the control line for the relay is open.	(control unit)

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results MAIN RELAY

Is above displayed on the self-diagnosis display?

>> Proceed to diagnosis procedure. Refer to <a href="BRC-33">BRC-33</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

1. Turn ignition switch OFF.

- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to BRC-17, "CONSULT-III Function (ABS)".

Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

>> Poor connection of connector terminal. Replace or repair connector. NO

## 2.CHECK ACTUATOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)		Voltage
Connector Terminal		_	voltage
E34	3	Ground	Battery voltage

Reconnect ABS actuator and electric unit (control unit) connector.

Is the inspection result normal?

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#### C1114 ACTUATOR RELAY SYSTEM

### < COMPONENT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.abs power supply check (under load conditions)

Use 12V lamp (normal rating 10 to 20W) connected between E34 terminals 1 and 3. With ignition switch ON check bulb illuminates correctly.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

# ${f 4.}$ CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and ele	ectric unit (control unit)	_	Continuity
Connector Terminal			Continuity
E34	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components. (Check ABS each bolt for tightness and corrosion).

### Component Inspection

INFOID:0000000001181644

[ABS]

# 1. CHECK ACTIVE TEST

- 1. On "ACTIVE TEST", select "ABS MOTOR".
- 2. Touch "ON" and "OFF" on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Display	
		ON	OFF
ABS MOTOR	MOTOR RELAY	ON	OFF
	ACTUATOR RLY NOTE	ON	ON

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-33">BRC-33</a>, "Diagnosis Procedure".

#### C1115 WHEEL SENSOR

Description INFOID:0000000001181645

When the sensor rotor rotates, the magnetic field changes. The sensor converts the magnetic field changes to current signals (rectangular wave) and transmits them to the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1115	ABS SENSOR [ABNORMAL SIGNAL]	Miss-match between the 4 wheel speed sensor signals.	Harness or connector not a possible cause.     Other possible causes     Tire radius (due to wrong size or pressure) interference.

#### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
ABS SENSOR [ABNORMAL SIGNAL]

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-35">BRC-35</a>, "Diagnosis Procedure".

NO >> INSPECTION END

#### **Diagnosis Procedure**

CAUTION:

Do not check between wheel sensor terminals.

**INSPECTION PROCEDURE** 

# 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- Check wheel sensor for damage, disconnection or looseness.

Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

# 2. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- 4. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-17</u>, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3.CHECK WHEEL SENSOR HARNESS

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.

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INFOID:0000000001181647

#### [ABS]

#### < COMPONENT DIAGNOSIS >

Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and electric unit (control unit)		Wheel sensor		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	9	E39 (Front RH)	2	Existed	
E34	16	E22 (Front LH)			
L3 <del>4</del>	8	B41 (Rear RH)			
	6	B44 (Rear LH)			

Measurement terminal for signal circuit

ABS actuator and electric unit (control unit)		Wheel sensor		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	10	E39 (Front RH)	1	Existed	
E34	5	E22 (Front LH)			
E34	19	B41 (Rear RH)			
	17	B44 (Rear LH)			

Measurement terminal for ground circuit

ABS actuator and electric unit (control unit)				Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	9, 10	E34	1, 4	Not existed	
E34	16, 5				
E34	8, 19				
	6, 17				

Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

### f 4.CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel	sensor		Voltage
Connector	Terminal	_	
E39 (Front RH)		Ground	8 V or more
E22 (Front LH)	2		
B41 (Rear RH)			
B44 (Rear LH)			

#### Is the inspection result normal?

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

### Component Inspection

# 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SEN-SOR", and check the vehicle speed.

**BRC-36** 

INFOID:0000000001181648

# **C1115 WHEEL SENSOR**

## < COMPONENT DIAGNOSIS >

[ABS]

Wheel sensor	Vehicle speed (DATA MONITOR)	A
FR LH SENSOR		
FR RH SENSOR	Nearly matches the speedometer dis-	В
RR LH SENSOR	play (±10% or less)	
RR RH SENSOR		
Is the inspection result normal?		С
YES >> INSPECTION END		
NO >> Go to diagnosis proce	edure. Refer to <u>BRC-35, "Diagnosis</u>	<u>Procedure"</u> .
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### C1116 STOP LAMP SWITCH

Description INFOID:000000001181649

The stop lamp switch transmits the stop lamp switch signal (ON/OFF) to the ABS actuator and electric unit (control unit).

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1116	STOP LAMP SW	When stop lamp switch circuit is open.	Harness or connector     Stop lamp switch     ABS actuator and electric unit (control unit)

### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis r	results
STOP LAMP	SW

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-38</u>. "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000001181651

### INSPECTION PROCEDURE

## 1. CHECK STOP LAMP ILLUMINATE

Press brake pedal and check stop lamp illuminate.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning components.

# 2. CHECK CONNECTOR

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect stop lamp switch connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors securely.
- Start engine.
- 7. Repeat pumping brake pedal carefully several times, and perform self-diagnosis.

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 3.CHECK STOP LAMP SWITCH

- 1. Turn ignition switch OFF.
- Disconnect stop lamp switch connector.
- Check continuity between stop lamp switch connector terminals.

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Stop lamp switch	Condition	Continuity
Terminal	Condition	
1 – 2	Release stop lamp switch (When brake pedal is depressed.)	Existed
1 – 2	Push stop lamp switch (When brake pedal is released.)	Not existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace stop lamp switch.

# 4. CHECK STOP LAMP SWITCH CIRCUIT

- 1. Disconnect ABS actuator and electric unit (control unit) connector.
- 2. Connect stop lamp switch connector.

3. Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)	- Condition Voltage	
Connector	Terminal	Condition	voitage
E34	20	Brake pedal is depressed	Battery voltage
Ľ3 <del>4</del>		Brake pedal is released	Approx. 0 V

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# Component Inspection

# 1. CHECK STOP LAMP SWITCH

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch connector.

3. Check continuity between stop lamp switch connector terminals.

Stop lamp switch	Condition	Continuity
Terminal		
1 – 2	Release stop lamp switch (When brake pedal is depressed.)	Existed
1 – 2	Push stop lamp switch (When brake pedal is released.)	Not existed

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

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# C1120, C1122, C1124, C1126 IN ABS SOL

Description INFOID:000000001181653

The solenoid valve increases, holds or decreases the fluid pressure of each brake caliper according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1120	FR LH IN ABS SOL	When the control unit detects a malfunction in the front LH inlet solenoid circuit.	
C1122	FR RH IN ABS SOL	When the control unit detects a malfunction in the front RH inlet solenoid circuit.	ABS actuator and electric unit (control unit)
C1124	RR LH IN ABS SOL	When the control unit detects a malfunction in the rear LH inlet solenoid circuit.	
C1126	RR RH IN ABS SOL	When the control unit detects a malfunction in the rear RH inlet solenoid circuit.	

### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
FR LH IN ABS SOL
FR RH IN ABS SOL
RR LH IN ABS SOL
RR RH IN ABS SOL

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-40">BRC-40</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181655

### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <a href="BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

## 2.CHECK ACTUATOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)	– Voltage	
Connector	Terminal	_	voitage
E34	3	Ground	Battery voltage

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Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

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# 3.CHECK ACUATOR RELAY GROUND CIRCUIT

Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

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ABS actuator and ele	ectric unit (control unit)	— Continuity	Continuity
Connector	Terminal		Continuity
E34	1, 4	Ground	Existed

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### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# Component Inspection

INFOID:0000000001181656

# 1. CHECK ACTIVE TEST

1. Select each test menu item on "ACTIVE TEST".

2. On the display, touch "UP", "KEEP", and "DOWN", and check that the system operates as shown in the table below.

Display Test item Display item UP KEEP **DOWN** FR RH IN SOL OFF ON ON FR RH SOL OFF FR RH OUT SOL OFF ON\* FR LH IN SOL OFF ON ON FR LH SOL FR LH OUT SOL OFF OFF ON\* RR RH IN SOL **OFF** ON ON RR RH SOL RR RH OUT SOL **OFF OFF** ON\* RR LH IN SOL OFF ON ON RR LH SOL RR LH OUT SOL OFF OFF ON\*

### Is the inspection result normal?

YES >> INSPECTION END

NO

>> Go to diagnosis procedure. Refer to BRC-40, "Diagnosis Procedure".

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<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

# C1121, C1123, C1125, C1127 OUT ABS SOL

Description INFOID:000000001181657

The solenoid valve increases, holds or decreases the fluid pressure of each brake caliper according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause	
C1121	FR LH OUT ABS SOL	When the control unit detects a malfunction in the front LH outlet solenoid circuit.		
C1123	FR RH OUT ABS SOL	When the control unit detects a malfunction in the front RH outlet solenoid circuit.	ABS actuator and electric unit (control unit)	
C1125	RR LH OUT ABS SOL	When the control unit detects a malfunction in the rear LH outlet solenoid circuit.		
C1127	RR RH OUT ABS SOL	When the control unit detects a malfunction in the rear RH outlet solenoid circuit.		

### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
FR LH OUT ABS SOL
FR RH OUT ABS SOL
RR LH OUT ABS SOL
RR RH OUT ABS SOL

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-42">BRC-42</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181659

### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <a href="BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

## 2.CHECK ACTUATOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)		Voltage
Connector	Terminal	_	voltage
E34	3	Ground	Battery voltage

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Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

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3.CHECK ACUATOR RELAY GROUND CIRCUIT

Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

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ABS actuator and ele	ectric unit (control unit)		Continuity
Connector	Terminal	_	Continuity
E34	1, 4	Ground	Existed

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Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# Component Inspection

INFOID:0000000001181660

1. CHECK ACTIVE TEST

1. Select each test menu item on "ACTIVE TEST".

2. On the display, touch "UP", "KEEP", and "DOWN", and check that the system operates as shown in the table below.

Test item	Display item	Display		
rest item	Display item	UP	KEEP	DOWN
FR RH SOL	FR RH IN SOL	OFF	ON	ON
FR KH SOL	FR RH OUT SOL	OFF	OFF	ON*
FR LH SOL	FR LH IN SOL	OFF	ON	ON
	FR LH OUT SOL	OFF	OFF	ON*
RR RH SOL	RR RH IN SOL	OFF	ON	ON
KK KH SUL	RR RH OUT SOL	OFF	OFF	ON*
RR LH SOL	RR LH IN SOL	OFF	ON	ON
	RR LH OUT SOL	OFF	OFF	ON*

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <u>BRC-42</u>, "<u>Diagnosis Procedure</u>".

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## U1000 CAN COMM CIRCUIT

Description INFOID:000000001181661

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

DTC Logic INFOID:000000001181662

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	When ABS actuator and electric unit (control unit) is not transmitting or receiving CAN communication signal for 2 seconds or more.	CAN communication line     ABS actuator and electric unit (control unit)

## Diagnosis Procedure

INFOID:0000000001181663

### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and perform self-diagnosis.

Self-diagno	osis results
CAN COM	M CIRCUIT

### Is above displayed on the self-diagnosis display?

YES >> Go to LAN-13. "Trouble Diagnosis Flow Chart".

NO >> INSPECTION END

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## BRAKE FLUID LEVEL SWITCH

Description INFOID:000000001181664

The brake fluid level switch converts the brake fluid level to an electric signal and transmits it to the ABS actuator and electric unit (control unit).

## Component Function Check

# 1. CHECK BRAKE FLUID LEVEL SWITCH OPERATION

Operate the brake fluid level switch. Then check that the brake warning lamp in the combination meter turns ON/OFF correctly.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-45">BRC-45</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001181666

INFOID:0000000001181665

### INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect brake fluid level switch connector and combination meter connector.
- 3. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors and then perform component function check. Refer to <u>BRC-45</u>, "Component Function Check".

### Is the inspection result normal?

YES >> Poor connection of connector terminal. Replace or repair connector.

NO >> GO TO 2.

# 2. CHECK BRAKE FLUID LEVEL SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect brake fluid level switch connector.
- 3. Check continuity between brake fluid level switch connector terminals.

Brake fluid	Brake fluid level switch Condition		Continuity
Connector	Terminal	Condition	Continuity
E37	1 – 2	When brake fluid is full in the reservoir tank.	Not existed
LJI	1-2	When brake fluid is empty in the reservoir tank.	Existed

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Brake fluid level switch is malfunction. Replace reservoir tank.

## 3.CHECK BRAKE FLUID LEVEL SWITCH CIRCUIT

- Disconnect combination meter connector.
- 2. Check continuity between brake fluid level switch harness connector terminals and combination meter harness connector terminal and/or ground.

Combina	Combination meter		Brake fluid level switch	
Connector	Terminal	Connector	Terminal	Continuity
M34	27	E37	1	Existed

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Combina	tion meter	_	Continuity
Connector	Terminal		Community
M34	27	Ground	Not existed
Brake fluid level switch		_	Continuity
Connector	Terminal		Continuity
E37	2	Ground	Existed

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace malfunctioning components.

# Component Inspection

INFOID:0000000001181667

# 1. CHECK BRAKE FLUID LEVEL SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect brake fluid level switch connector.
- 3. Check continuity between brake fluid level switch connector terminals.

Brake fluid level switch		Condition	Continuity
Connector	Terminal	Condition	Continuity
E37	1 – 2	When brake fluid is full in the reservoir tank.	Not existed
L37	1-2	When brake fluid is empty in the reservoir tank.	Existed

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace reservoir tank.

### PARKING BRAKE SWITCH

Description INFOID:0000000001181668

The parking brake switch converts the status of the parking brake pedal to an electric signal and transmits it to the ABS actuator and electric unit (control unit).

Diagnosis Procedure

INFOID:0000000001181669

# 1. CHECK COMBINATION METER INPUT SIGNAL

1. Turn ignition switch ON.

Check voltage between combination meter harness connector terminal 26 and ground.

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26 - Ground

Parking brake ON : Approx. 0 V
Parking brake OFF : Approx. 5 V

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### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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# 2.check parking brake switch signal circuit

Turn ignition switch OFF.

2. Disconnect combination meter connector and parking brake switch connector.

3. Check continuity between combination meter harness connector terminal 26 and parking brake switch harness connector terminal 1.

26 – 1 : Continuity should exist.

4. Check continuity between combination meter harness connector terminal 26 and ground.

: Continuity should not exist.

Is the inspection result normal?

26 - Ground

YES >> INSPECTION END

NO >> Repair harness or connector.

INFOID:0000000001181670

# Component Function Check

# 1.CHECK PARKING BRAKE SWITCH OPERATION

Operate the parking brake pedal. Then check that the brake warning lamp in the combination meter turns on/off correctly.

Condition Brake warning lamp illumination status

When the parking brake switch is operation

When the parking brake switch is not operation.

ON

OFF

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### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <u>BRC-47</u>, "<u>Diagnosis Procedure</u>".

P INFOID:000000001181671

# Component Inspection

## INSPECTION PROCEDURE

# 1. CHECK PARKING BRAKE SWITCH

- Turn ignition switch OFF.
- 2. Disconnect parking brake switch connector.

## **PARKING BRAKE SWITCH**

## < COMPONENT DIAGNOSIS >

[ABS]

3. Check continuity between parking brake switch terminal and ground.

Parking brake switch			Condition	Continuity
Connector	Terminal		Conducti	Continuity
M103	1	Ground	When the parking brake switch is operated.	Existed
WITOS	ľ	Ground	When the parking brake switch is not operated.	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace parking brake switch.

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## **ABS WARNING LAMP**

Description INFOID:000000001181672

×: ON –: OFF

Condition	ABS warning lamp
Ignition switch OFF	-
For 1 second after turning ON ignition switch	×
1 second later after turning ON ignition switch	-
ABS function is malfunctioning.	×
EBD function is malfunctioning.	×

# Component Function Check

INFOID:0000000001181673

# 1. CHECK ABS WARNING LAMP OPERATION

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-49">BRC-49</a>, "Diagnosis Procedure".

### INFOID:0000000001181674

# Diagnosis Procedure

INFOID:0000000001181674

# 1. CHECK SELF-DIAGNOSIS

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Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-17, "CONSULT-III Function (ABS)"</u>.

### Is the inspection result normal?

YES >> GO TO 2.

NO

NO >> Check items displayed by self-diagnosis.

# 2. CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

>> Repair or replace combination meter.

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### **BRAKE WARNING LAMP**

Description INFOID:000000001181675

×: ON -: OFF

Condition	Brake warning lamp NOTE 1
Ignition switch OFF	-
For 1 second after turning ON ignition switch	× NOTE 2
1 second later after turning ON ignition switch	× NOTE 2
EBD function is malfunctioning.	×

#### NOTE:

- 1: Brake warning lamp will turn on in case of parking brake operation (when switch is ON) or of brake fluid level switch operation (when brake fluid is insufficient).
- 2: After starting engine, brake warning lamp is turned off.

### Component Function Check

INFOID:0000000001181676

# 1.BRAKE WARNING LAMP OPERATION CHECK 1

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

## Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to diagnosis procedure. Refer to <a href="BRC-50">BRC-50</a>, "Diagnosis Procedure".

## 2.BRAKE WARNING LAMP OPERATION CHECK 2

Check that the brake warning lamp in the combination meter turns ON/OFF correctly when operating the parking brake pedal.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check parking brake switch. Refer to <a href="BRC-47">BRC-47</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001181677

# 1. CHECK PARKING BRAKE SWITCH

Check that the brake warning lamp in the combination meter turns ON/OFF correctly when operating the parking brake pedal.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check parking brake switch. Refer to <u>BRC-47</u>, "<u>Diagnosis Procedure</u>".

## 2. CHECK SELF-DIAGNOSIS

Perform ABS actuator and electric unit (control unit) self-diagnosis.

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Check items displayed by self-diagnosis.

### 3. CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

# ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

< ECU DIAGNOSIS > [ABS]

# **ECU DIAGNOSIS**

# ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Reference Value

### VALUES ON THE DIAGNOSIS TOOL

### **CAUTION:**

The display shows the control unit calculation data, so a normal value might be displayed even in the event the output circuit (harness) is open or short-circuited.

Monitor item	Conditi	on	Value/Status
		Vehicle stopped	0 [km/h (MPH)]
FR LH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
FR RH SENSOR	Wheel speed	Vehicle stopped	0 [km/h (MPH)]
		Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
	Wheel speed	Vehicle stopped	0 [km/h (MPH)]
RR LH SENSOR		Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
		Vehicle stopped	0 [km/h (MPH)]
RR RH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
STOD LAMD SW	On the second state of the second sec	When brake pedal is depressed	On
STOP LAMP SW	Stop lamp switch signal status	When brake pedal is not depressed	Off
BATTERY VOLT	Battery voltage supplied to the ABS actuator and electric unit (control unit)	Ignition switch ON	10 – 16 V
DECEL G SENSOR NOTE 2	Decel G detected by decel G sensor	Vehicle on level surface or on slope	On/Off
FR RH IN SOL	Operation status of front RH inlet solenoid valve	Actuator (solenoid valve) is active ("AC-TIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
FR RH OUT SOL	Operation status of front RH outlet solenoid valve	Actuator (solenoid valve) is active ("AC-TIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
FR LH IN SOL	Operation status of front LH inlet solenoid valve	Actuator (solenoid valve) is active ("AC-TIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off

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# ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

< ECU DIAGNOSIS > [ABS]

Monitor item	Condit	Value/Status	
FR LH OUT SOL	Operation status of front LH outlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
RR RH IN SOL	Operation status of rear RH inlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
RR RH OUT SOL	Operation status of rear RH outlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
RR LH IN SOL	Operation status of rear LH inlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
RR LH OUT SOL	Operation status of rear LH outlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	On
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	Off
MOTOR RELAY	Motor and motor relay operation	When the motor relay and motor are operating	On
		When the motor relay and motor are not operating	Off
ACTUATOR RLY	Actuator relay operation	When the actuator relay is operating	On
NOTE 3		When the actuator relay is not operating	Off
ABS WARN LAMP	ABS warning lamp NOTE 4	When ABS warning lamp is ON	On
C	7.55 warring lamp	When ABS warning lamp is OFF	Off
EBD SIGNAL	EBD operation	EBD is active	On
LDD SIGNAL		EBD is inactive	Off
ABS SIGNAL	ABS operation	ABS is active	On
		ABS is inactive	Off
EBD FAIL SIG	EBD fail-safe signal	In EBD fail-safe	On
		EBD is normal	Off
ABS FAIL SIG	ABS fail-safe signal	In ABS fail-safe	On
		ABS is normal	Off

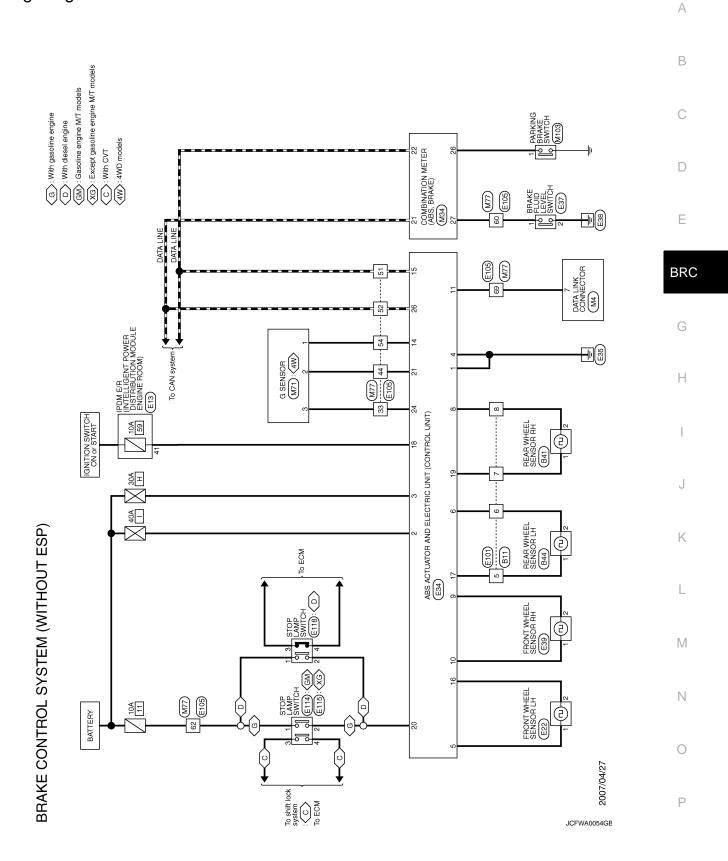
### NOTE:

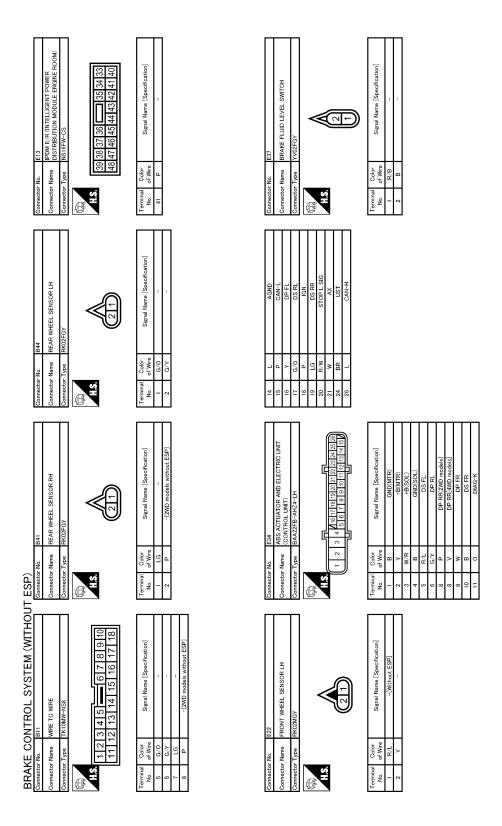
- 1: Confirm tire pressure is normal.
- 2: Only 4WD models.
- 3: Every 20 seconds momentary switch to OFF.
- 4: On and off timing for warning lamp and indicator lamp. Refer to BRC-49, "Description".

Wiring Diagram - BRAKE CONTROL SYSTEM -

INFOID:0000000001181679

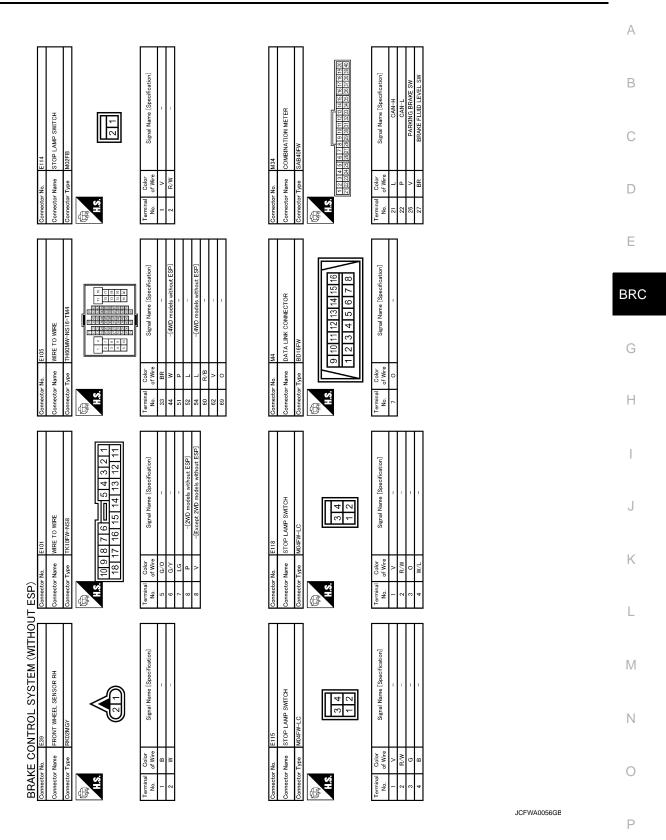
[ABS]

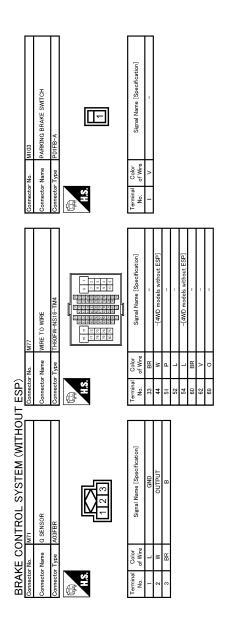




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< ECU DIAGNOSIS > [ABS]





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# Fail-Safe

### ABS, EBD SYSTEM

In case of electrical malfunctions with the ABS, ABS warning lamp will turn ON. In case of electrical malfunctions with the EBD, brake warning lamp, ABS warning lamp will turn ON. Simultaneously, the ABS become one of the following conditions of the fail-safe function.

## ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

[ABS] < ECU DIAGNOSIS >

• For malfunction of ABS, only the EBD is activated and the condition of vehicle is the same condition of vehicles without ABS system.

### NOTE:

ABS self-diagnosis sound may be heard. That is a normal condition because a self-diagnosis for "Ignition switch ON" and "The first starting" are being performed.

• For malfunction of EBD, EBD and ABS become inoperative, and the condition of vehicle is the same as the condition of vehicles without ABS, EBD system.

DTC No. Index INFOID:0000000001181681

DTC	Items (CONSULT screen terms)	Reference	
C1101	RR RH SENSOR-1		_ D
C1102	RR LH SENSOR-1	BRC-20, "Description"	
C1103	FR RH SENSOR-1	BRC-20, Description	Е
C1104	FR LH SENSOR-1		
C1105	RR RH SENSOR-2		DDO
C1106	RR LH SENSOR-2	BRC-23, "Description"	BRC
C1107	FR RH SENSOR-2	BRC-23. Description	
C1108	FR LH SENSOR-2		G
C1109	BATTERY VOLTAGE [ABNORMAL]	BRC-26, "Description"	<del>_</del>
C1110	CONTROLLER FAILURE	BRC-28, "Description"	_
C1111	PUMP MOTOR	BRC-29, "Description"	- Н
C1113	G SENSOR	BRC-31, "Description"	<del>_</del>
C1114	MAIN RELAY	BRC-33, "Description"	_
C1115	ABS SENSOR [ABNORMAL SIGNAL]	BRC-35, "Description"	_
C1116	STOP LAMP SW	BRC-38, "Description"	<del>_</del>
C1120	FR LH IN ABS SOL	BRC-40, "Description"	J
C1121	FR LH OUT ABS SOL	BRC-42, "Description"	<del></del>
C1122	FR RH IN ABS SOL	BRC-40, "Description"	_ _ K
C1123	FR RH OUT ABS SOL	BRC-42, "Description"	_
C1124	RR LH IN ABS SOL	BRC-40, "Description"	<del>_</del>
C1125	RR LH OUT ABS SOL	BRC-42, "Description"	L
C1126	RR RH IN ABS SOL	BRC-40, "Description"	<del>_</del>
C1127	RR RH OUT ABS SOL	BRC-42, "Description"	D /I
C1153	EMERGENCY BRAKE	BRC-28, "Description"	- M
U1000	CAN COMM CIRCUIT	BRC-44, "Description"	_

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# SYMPTOM DIAGNOSIS

## **EXCESSIVE ABS FUNCTION OPERATION FREQUENCY**

## Diagnosis Procedure

INFOID:0000000001181682

## 1.CHECK START

Check front and rear brake force distribution using a brake tester. Refer to <u>BR-49, "General Specifications"</u> (LHD models), <u>BR-96, "General Specifications"</u> (RHD models).

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check brake system.

# 2.CHECK FRONT AND REAR AXLE

Make sure that there is no excessive play in the front and rear axles.

- Front: FAX-7, "Inspection" (2WD models), FAX-59, "Inspection" (4WD models)
- Rear: RAX-3, "Inspection" (2WD models), RAX-9, "Inspection" (4WD models)

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.check wheel sensor and sensor rotor

### Check the following.

- Wheel sensor installation for damage.
- Sensor rotor installation for damage.
- · Wheel sensor connector connection.
- Wheel sensor harness inspection.

### Is the inspection result normal?

YES >> GO TO 4.

NO >> • Replace wheel sensor or sensor rotor.

Repair harness.

## 4. CHECK ABS WARNING LAMP DISPLAY

Make sure that the ABS warning lamp is turned off after the ignition switch is turned ON or when driving. Is the ABS warning lamp illuminated?

YES >> Perform self-diagnosis. Refer to <a href="https://example.com/BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

NO >> INSPECTION END

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## **UNEXPECTED PEDAL REACTION**

# Diagnosis Procedure

#### INFOID:0000000001181683

## 1. CHECK BRAKE PEDAL STROKE

Check brake pedal stroke. Refer to <u>BR-8</u>, "<u>Inspection and Adjustment</u>" (LHD models), <u>BR-55</u>, "<u>Inspection and Adjustment</u>" (RHD models).

## Is the stroke too large?

YES >> • Bleed air from brake tube and hose. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).

- Check brake pedal, brake booster, and master cylinder for mount play, looseness, brake system fluid leakage, etc.
- Brake pedal: <u>BR-17</u>, "Exploded View" (LHD models), <u>BR-64</u>, "Exploded View" (RHD models).
- Brake booster: <u>BR-30</u>, "Exploded View" (LHD models), <u>BR-77</u>, "Exploded View" (RHD models).
- Brake master cylinder: <u>BR-27</u>, "<u>Exploded View</u>" (LHD models), <u>BR-74</u>, "<u>Exploded View</u>" (RHD models).
- Brake fluid: <u>BR-11</u>, "Inspection" (LHD models), <u>BR-58</u>, "Inspection" (RHD models).

NO >> GO TO 2.

## 2. CHECK FUNCTION

Disconnect ABS actuator and electric unit (control unit) connector to deactivate ABS. Check if braking force is normal in this condition. Connect connector after inspection.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check brake system.

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### THE BRAKING DISTANCE IS LONG

[ABS] < SYMPTOM DIAGNOSIS >

## THE BRAKING DISTANCE IS LONG

# Diagnosis Procedure

INFOID:0000000001181684

### **CAUTION:**

The stopping distance on slippery road surfaces might be longer with the ABS operating than when the ABS is not operating.

1. CHECK FUNCTION

Turn ignition switch OFF and disconnect ABS actuator and electric unit (control unit) connector to deactivate ABS. In this condition, check stopping distance. After inspection, connect connector.

Is the inspection result normal?

>> INSPECTION END YES

NO >> Check brake system.

**ABS FUNCTION DOES NOT OPERATE** [ABS] < SYMPTOM DIAGNOSIS > ABS FUNCTION DOES NOT OPERATE Α Diagnosis Procedure INFOID:0000000001181685 **CAUTION:** В ABS does not operate when speed is 10 km/h (6 MPH) or lower. 1. CHECK ABS WARNING LAMP DISPLAY C Make sure that the ABS warning lamp turns OFF after ignition switch is turned ON or when driving. Is the inspection result normal? YES >> INSPECTION END D >> Perform self-diagnosis. Refer to <a href="mailto:BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)". NO Е BRC Н

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INFOID:0000000001181686

### PEDAL VIBRATION OR ABS OPERATION SOUND OCCURS

## Diagnosis Procedure

### CAUTION:

Under the following conditions, ABS is activated and vibration is felt when brake pedal is lightly depressed (just place a foot on it). However, this is normal.

- When shifting gears
- When driving on slippery road
- During cornering at high speed
- When passing over bumps or grooves [at approximately 50 mm (1.97 in) or more]
- When pulling away just after starting engine [at approximately 10 km/h (6 MPH) or higher]

### 1.SYMPTOM CHECK 1

Check that there are pedal vibrations when the engine is started.

### Do vibrations occur?

YES >> GO TO 2.

NO >> Inspect the brake pedal.

# 2.SYMPTOM CHECK 2

Check that there are ABS operation noises when the engine is started.

### Do the operation noises occur?

YES >> GO TO 3.

NO >> Perform self-diagnosis. Refer to <a href="https://example.com/BRC-17">BRC-17</a>, "CONSULT-III Function (ABS)".

# 3.SYMPTOM CHECK 3

Check symptoms when electrical component (headlamps, etc.) switches are operated.

### Do symptoms occur?

YES >> Check if there is a radio, antenna, antenna lead wire, or wiring close to the control unit. If there is, move it farther away.

NO >> INSPECTION END

## **NORMAL OPERATING CONDITION**

< SYMPTOM DIAGNOSIS > [ABS]

# NORMAL OPERATING CONDITION

Description INFOID:000000001181687

Symptom	Result	
Slight vibrations are felt on the brake pedal and the operation noises occur, when ABS is activated.	This is a normal condition due to the ABS activation.	
Stopping distance is longer than that of vehicles without ABS when the vehicle drives on rough, gravel, or snow-covered (fresh, deep snow) roads.		
The brake pedal vibrates and motor operation noises occur from the engine room, after the engine starts and just after the vehicle starts.	This is a normal, and it is caused by the ABS operation check.	

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< PRECAUTION > [ABS]

# **PRECAUTION**

## **PRECAUTIONS**

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SRS AIRBAG" and "SEAT BELT" of this Service Manual.

### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIRBAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

## Precaution for Brake System

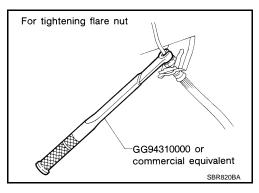
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#### **WARNING:**

Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.

- Only use DOT 3 brake fluid. Refer to MA-27, "Fluids and Lubricants".
- Never to reuse drained brake fluid.
- Never to spill or splash brake fluid on painted surfaces. Brake fluid may seriously damage paint. Wipe it off immediately and wash with water if it gets on a painted surface.
- Never to use mineral oils such as gasoline or light oil. They may damage rubber parts and cause improper operation.
- Always loosen the brake tube flare nut with a flare nut wrench.
- Tighten the brake tube flare nut to the specified torque with a flare nut torque wrench.
- Always conform the specified tightening torque when installing the brake pipes.
- Brake system is an important safety part. If a brake fluid leak is detected, always disassemble the affected part. If a malfunction is detected, replace part with a new one.
- Turn the ignition switch OFF and disconnect the ABS actuator and electric unit (control unit) connector or the battery negative terminal before performing the work.



### Precaution for Brake Control

Just after starting vehicle after ignition switch ON, brake pedal may vibrate or motor operating noise may be heard from engine compartment. This is normal condition.

- heard from engine compartment. This is normal condition.

   When an error is indicated by ABS or another warning lamp, collect all necessary information from customer (what symptoms are present under what conditions) and check for simple causes before starting diagnostic servicing. Besides electrical system inspection, check brake booster operation, brake fluid level, and oil
- If tire size and type are used in an improper combination, or brake pads are not Genuine NISSAN parts, stopping distance or steering stability may deteriorate.
- ABS might be out of order or malfunctions by putting a radio (wiring inclusive), an antenna and a lead-in wire near the control unit.
- If aftermarket parts (car stereo, CD player, etc.) have been installed, check for incidents such as harness pinches, open circuits, and improper wiring.

### **PREPARATION**

	PREPARATION		
< PREPARATION >		[ABS]	
PREPARATION			А
PREPARATION			
Special Service Tool		INFOID:000000001181691	В
Tool number Tool name		Description	С
GG94310000 Flare nut torque wrench a: 10 mm (0.39 in)/ 12 mm (0.47 in)		Installing each brake piping	D
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	S-NT406		

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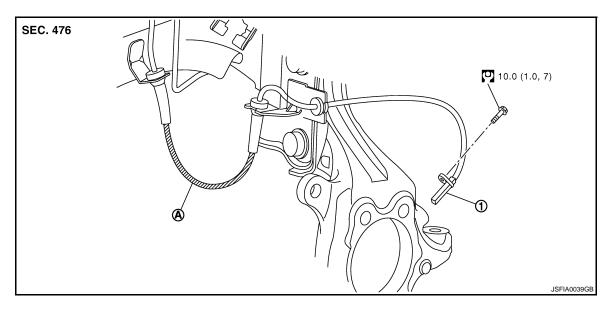
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# ON-VEHICLE REPAIR

WHEEL SENSOR FRONT WHEEL SENSOR

FRONT WHEEL SENSOR: Exploded View



- 1. Front LH wheel sensor
- A. White line (slant line)

Refer to GI section GI-4, "Components" for symbols in the figure.

#### NOTE:

The above figure (front side) shows left side. Right side is the mirror image.

FRONT WHEEL SENSOR: Removal and Installation

### **REMOVAL**

Pay attention to the following when removing sensor.

### **CAUTION:**

- Do not twist sensor harness as much as possible, when removing it. Pull sensors out without pulling on sensor harness.
- Take care to avoid damaging sensor edges or rotor teeth. Remove wheel sensor first before removing front or rear wheel hub. This is to avoid damage to sensor wiring and loss of sensor function.
- When you see the harness of the wheel sensor from the front side of the vehicle ensure that the white lines (A) are not twisted.

### INSTALLATION

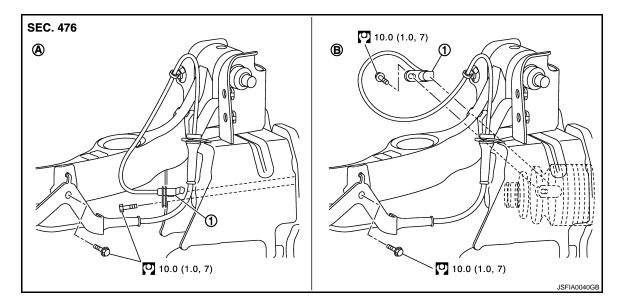
Pay attention to the following when installing wheel sensor. Tighten installation bolts to the specified torques. Refer to <u>BRC-66</u>, "FRONT WHEEL SENSOR: Exploded View".

- When installing, make sure there is no foreign material such as iron chips on and in the mounting hole of the wheel sensor. Make sure no foreign material has been caught in the sensor rotor. Remove any foreign material and clean the mount.
- When installing wheel sensor, be sure to press rubber grommets in until they lock at locations shown above in the figure. When installed, harness must not be twisted.

### REAR WHEEL SENSOR

## REAR WHEEL SENSOR: Exploded View

INFOID:0000000001181694



1. Rear LH wheel sensor

A. 2WD models

B. 4WD models

Refer to GI section GI-4, "Components" for symbols in the figure.

#### NOTE:

The above figure (front side) shows left side. Right side is the mirror image.

### REAR WHEEL SENSOR: Removal and Installation

### REMOVAL

Pay attention to the following when removing sensor.

#### CAUTION:

- Do not twist sensor harness as much as possible, when removing it. Pull sensors out without pulling on sensor harness.
- Take care to avoid damaging sensor edges or rotor teeth. Remove wheel sensor first before removing front or rear wheel hub. This is to avoid damage to sensor wiring and loss of sensor function.

### INSTALLATION

Pay attention to the following when installing wheel sensor. Tighten installation bolts to the specified torques. Refer to <a href="mailto:BRC-67">BRC-67</a>, "REAR WHEEL SENSOR: Exploded View".

- When installing, make sure there is no foreign material such as iron chips on and in the mounting hole of the wheel sensor. Make sure no foreign material has been caught in the sensor rotor. Remove any foreign material and clean the mount.
- When installing wheel sensor, be sure to press rubber grommets in until they lock at locations shown above in the figure. When installed, harness must not be twisted.

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### SENSOR ROTOR

FRONT SENSOR ROTOR

FRONT SENSOR ROTOR: Exploded View

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Refer to FAX-9, "Exploded View" (2WD models), FAX-61, "Exploded View" (4WD models).

FRONT SENSOR ROTOR: Removal and Installation

INFOID:0000000001181697

### **REMOVAL**

Sensor rotor cannot be disassembled. Remove the sensor rotor together with wheel hub and bearing assembly. Refer to <u>FAX-9</u>, "Removal and Installation" (2WD models), <u>FAX-61</u>, "Removal and Installation" (4WD models).

### **INSTALLATION**

Sensor rotor cannot be disassembled. Installation the sensor rotor together with wheel hub and bearing assembly. Refer to <u>FAX-9</u>, "Removal and Installation" (2WD models), <u>FAX-61</u>, "Removal and Installation" (4WD models).

REAR SENSOR ROTOR

REAR SENSOR ROTOR: Exploded View

INFOID:0000000001181698

Refer to RAX-4, "Exploded View" (2WD models), RAX-13, "Exploded View" (4WD models).

REAR SENSOR ROTOR: Removal and Installation

INFOID:0000000001181699

### **2WD MODELS**

#### Removal

Sensor rotor cannot be disassembled. Remove the sensor rotor together with wheel hub and bearing assembly. Refer to RAX-4, "Removal and Installation".

#### Installation

Sensor rotor cannot be disassembled. Installation the sensor rotor together with wheel hub and bearing assembly. Refer to RAX-4, "Removal and Installation".

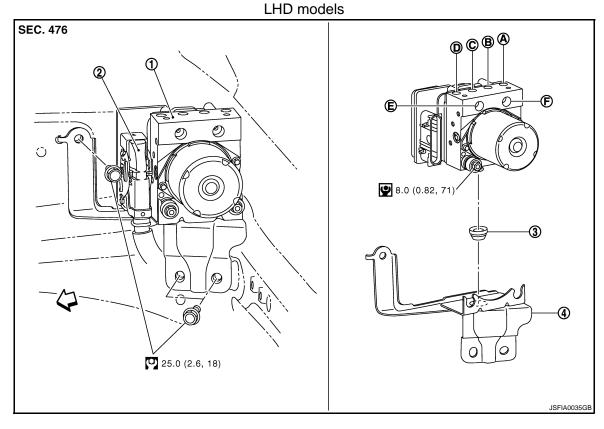
### **4WD MODELS**

For removal and installation of sensor rotor, refer to <a href="RAX-14">RAX-14</a>, "Disassembly and Assembly".

[ABS] < ON-VEHICLE REPAIR >

# ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Α **Exploded View** INFOID:0000000001181700



- 1. ABS actuator and electric unit (control 2. unit)
- Connector

Bushing

- **Bracket** 4.
- A. To front LH brake caliper
- B. To rear RH brake caliper
- C. To Rear LH brake caliper

- D. To front RH brake caliper
- E.
- From master cylinder secondary side F. From master cylinder primary side

<;□: Vehicle front

Refer to GI section GI-4, "Components" for symbols in the figure.

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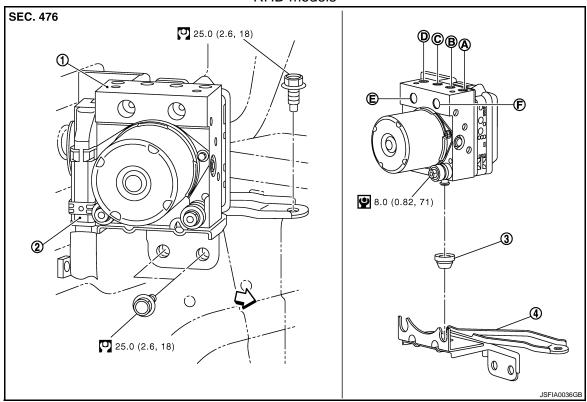
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### RHD models



- ABS actuator and electric unit (control 2. 1. unit)
- Connector

Bushing

- **Bracket** 4.
- A. To front LH brake caliper
- B. To rear RH brake caliper
- C. To Rear LH brake caliper

- D. To front RH brake caliper
- E.
- From master cylinder secondary side F. From master cylinder primary side

< \□: Vehicle front

Refer to GI section GI-4, "Components" for symbols in the figure.

### Removal and Installation

INFOID:0000000001181701

### LHD MODELS

### Removal

### **CAUTION:**

- . Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to BR-12, "Bleeding Brake System" (LHD models), <u>BR-59</u>, "<u>Bleeding Brake System</u>" (RHD models).
- Remove cowl top cover. Refer to EXT-19, "Exploded View". 1.
- Remove exhaust manifold.
  - HR16DE: <u>EX-5</u>, "Exploded View".
  - MR20DE: EX-10, "Exploded View".
  - K9K: EX-15, "Exploded View".
  - M9R: EM-369, "Exploded View".
- 3. Disconnect ABS actuator and electric unit (control unit) connector.
- Loosen brake tube flare nuts, then remove brake tubes from ABS actuator and electric unit (control unit).
- 5. Remove ABS actuator and electric unit (control unit) bracket mounting nut.
- Remove ABS actuator and electric unit (control unit) from vehicle.

## ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

< ON-VEHICLE REPAIR > [ABS]

#### Installation

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

#### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- After installing harness connector in the ABS actuator and electric unit (control unit), make sure connector is securely locked.

### RHD MODELS

Removal

#### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- 1. Remove cowl top cover. Refer to EXT-19, "Exploded View".
- Remove air cleaner and air duct.
  - HR16DE: EM-28, "Exploded View".
  - MR20DE: EM-145, "Exploded View".
  - K9K: EM-266, "Exploded View".
  - M9R: EM-354, "Exploded View".
- 3. Disconnect ABS actuator and electric unit (control unit) connector.
- 4. Loosen brake tube flare nuts, then remove brake tubes from ABS actuator and electric unit (control unit).
- Remove ABS actuator and electric unit (control unit) bracket mounting nut.
- 6. Remove ABS actuator and electric unit (control unit) from vehicle.

Installation

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

### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- After installing harness connector in the ABS actuator and electric unit (control unit), make sure connector is securely locked.

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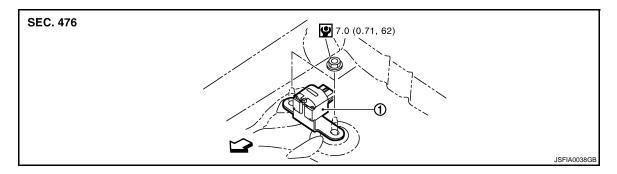
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# **G** SENSOR

Exploded View



1. G sensor

<□: Vehicle front

Refer to GI section GI-4, "Components" for symbols in the figure.

### Removal and Installation

INFOID:0000000001181703

### **REMOVAL**

### **CAUTION:**

- Do not drop or strike G sensor, because it has little endurance to impact.
- Do not use power tool etc., because G sensor is sensitive for the impact.
- Remove lower instrument cover RH. Refer to <u>IP-11, "Exploded View"</u>.
- Disconnect G sensor harness connector.
- 3. Remove mounting nuts. Remove G sensor.

### **INSTALLATION**

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

### **CAUTION:**

- Do not drop or strike G sensor, because it has little endurance to impact.
- Do not use power tool etc., because G sensor is sensitive for the impact.

### **DIAGNOSIS AND REPAIR WORKFLOW**

< BASIC INSPECTION > [ESP/TCS/ABS]

# **BASIC INSPECTION**

## DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

#### PRECAUTIONS FOR DIAGNOSIS

If steering angle sensor, steering system parts, suspension system parts, ABS actuator and electric unit (control unit) or tires have been replaced, or if wheel alignment has been adjusted, be sure to adjust neutral position of steering angle sensor before driving. Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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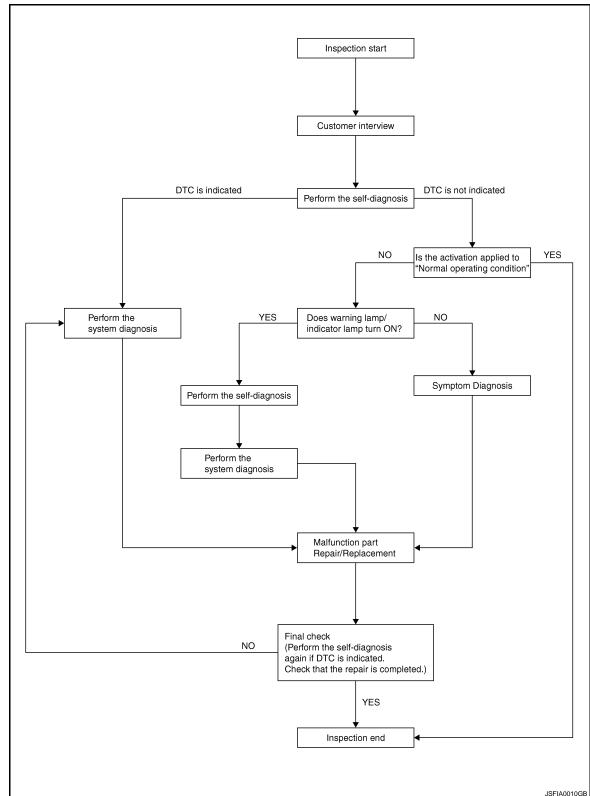
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#### **OVERALL SEQUENCE**



### **DETAIED FLOW**

# 1. COLLECT THE INFORMATION FROM THE CUSTOMER

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the diagnosis worksheet. Refer to <a href="BRC-76">BRC-76</a>, "Diagnostic Work Sheet".

## **DIAGNOSIS AND REPAIR WORKFLOW**

RASIC INSPECTION > [ESP/TCS/ABS]  2. PERFORM THE SELF-DIAGNOSIS  Check the DTC display with the self-diagnosis function. Refer to BRC-95, "CONSULT-III Function (ABS)". Is there any DTC displayed? YES >> GO TO 3. NO >> GO TO 4.  3. PERFORM THE SYSTEM DIAGNOSIS  Perform the diagnosis applicable to the displayed DTC. Refer to BRC-159, "DTC No. Index".  >> GO TO 7.  4. CHECK THE SYMPTOM THAT IS NOT CONSIDERED A SYSTEM MALFUNCTION  Check that the symptom is a normal operation that is not considered a system malfunction. Refer to BRC-167. "Description".  Is the symptom is a normal operation? YES >> INSPECTION END NO >> GO TO 5.  5. CHECK THE WARNING LAMP AND INDICATOR LAMP FOR ILLUMINATION  Check that the warning lamp and indicator lamp illuminate.  • ABS warning lamp: Refer to BRC-149, "Description". • ESP OFF indicator lamp: Refer to BRC-149, "Description". • SLIP indicator lamp: Refer to BRC-151. "Description".  • SLIP indicator lamp: Refer to BRC-151. "Description".  • SUNOYFF timing normal? YES >> GO TO 6. NO >> GO TO 2.  6. PERFORM THE DIAGNOSIS BY SYMPTOM  Perform the diagnosis applicable to the symptom.  >> GO TO 7.  7. REPAIR OR REPLACE THE MALFUNCTIONING PARTS  Repair or replace the specified malfunctioning parts.
Check the DTC display with the self-diagnosis function. Refer to BRC-95, "CONSULT-III Function (ABS)". Is there any DTC displayed?  YES >> GO TO 3.  NO >> GO TO 4.  3. PERFORM THE SYSTEM DIAGNOSIS  Perform the diagnosis applicable to the displayed DTC. Refer to BRC-159, "DTC No. Index".  >> GO TO 7.  4. CHECK THE SYMPTOM THAT IS NOT CONSIDERED A SYSTEM MALFUNCTION  Check that the symptom is a normal operation that is not considered a system malfunction. Refer to BRC-167, "Description".  Is the symptom is a normal operation?  YES >> INSPECTION END  NO >> GO TO 5.  5. CHECK THE WARNING LAMP AND INDICATOR LAMP FOR ILLUMINATION  Check that the warning lamp: Refer to BRC-148, "Description".  Brake warning lamp: Refer to BRC-149, "Description".  ESP OFF indicator lamp: Refer to BRC-151, "Description".  Is ON/OFF timing normal?  YES >> GO TO 2.  6. PERFORM THE DIAGNOSIS BY SYMPTOM  Perform the diagnosis applicable to the symptom.  >> GO TO 7.  7. REPAIR OR REPLACE THE MALFUNCTIONING PARTS
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>> GO TO 8.
8. FINAL CHECK
Perform the self-diagnosis again, and check that the malfunction is repaired completely. After checking, erase
the self-diagnosis memory. Refer to BRC-95, "CONSULT-III Function (ABS)".
Is any DTC indicated?
YES >> GO TO 3.
NO >> INSPECTION END

## **DIAGNOSIS AND REPAIR WORKFLOW**

## < BASIC INSPECTION >

[ESP/TCS/ABS]

# **Diagnostic Work Sheet**

INFOID:0000000001181705

Customer name MR/MS	Model & Year			
Engine #	Trans.		Mileage	
Incident Date	Manuf. Date		In Service Date	е
Symptoms	□ Noise and vibration (from engine compartment) □ Noise and vibration (from axle)	☐ Warning / Indicator activate		☐ Firm pedal operation Large stroke pedal operation
	☐ TCS does not work (Rear wheels slip when accelerating)	☐ ABS does not work (Wheels lock when braking)		☐ Lack of sense of acceleration
Engine conditions	☐ When starting ☐ After starting			
Road conditions	☐ Low friction road (☐Snow ☐Gravel☐ Bumps / potholes	□Other)		
Driving conditions	☐ Full-acceleration ☐ High speed cornering ☐ Vehicle speed: Greater than 10 km/h ☐ Vehicle speed: 10 km/h (6 MPH) or le ☐ Vehicle is stopped			
Applying brake conditions	☐ Suddenly ☐ Gradually			
Other conditions	☐ Operation of electrical equipment☐ Shift change☐ Other descriptions			

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< BASIC INSPECTION > [ESP/TCS/ABS]

# INSPECTION AND ADJUSTMENT ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Description

INFOID:0000000001181706

After replacing the ABS actuator and electric unit (control unit), perform the neutral position adjustment for the steering angle sensor.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement

1.PERFORM THE NEUTRAL POSITION ADJUSTMENT FOR THE STEERING ANGLE SENSOR

Perform the neutral position adjustment for the steering angle sensor.

>> Refer to <u>BRC-77</u>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : <u>Special Repair Requirement</u>".

# ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description

In case of doing work that applies to the list below, make sure to adjust neutral position of steering angle sensor before running vehicle.

x: Required -: Not required

	- 4
Situation	Adjustment of steering angle sensor neutral position
Removing/Installing ABS actuator and electric unit (control unit)	_
Replacing ABS actuator and electric unit (control unit)	×
Removing/Installing steering angle sensor	×
Replacing steering angle sensor	×
Removing/Installing steering components	×
Replacing steering components	×
Removing/Installing suspension components	×
Replacing suspension components	×
Change tires to new ones	-
Tire rotation	_
Adjusting wheel alignment	×

# ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Special Repair Requirement

# ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION CAUTION:

To adjust neutral position of steering angle sensor, make sure to use CONSULT-III. (Adjustment cannot be done without CONSULT-III).

1. ALIGN THE VEHICLE STATUS

Stop vehicle with front wheels in straight-ahead position.

>> GO TO 2.

## 2. PERFORM THE NEUTRAL POSITION ADJUSTMENT FOR THE STEERING ANGLE SENSOR

- On the CONSULT-III screen, touch "WORK SUPPORT" and "ST ANG SENS ADJUSTMENT" in order.
- 2. Touch "START".

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### **INSPECTION AND ADJUSTMENT**

< BASIC INSPECTION > [ESP/TCS/ABS]

#### **CAUTION:**

Do not touch steering wheel while adjusting steering angle sensor.

3. After approximately 10 seconds, touch "END".

#### NOTE:

After approximately 60 seconds, it ends automatically.

4. Turn ignition switch OFF, then turn it ON again.

#### **CAUTION:**

Be sure to perform above operation.

>> GO TO 3.

# 3. CHECK DATA MONITOR

- 1. Run vehicle with front wheels in straight-ahead position, then stop.
- Select "DATA MONITOR". Then make sure "STR ANGLE SIG" is within 0±2.5°.

#### Is the steering angle within the specified range?

YES >> GO TO 4.

NO >> Perform the neutral position adjustment for the steering angle sensor again, GO TO 1.

## 4. ERASE THE SELF-DIAGNOSIS MEMORY

Erase the self-diagnosis memories of the ABS actuator and electric unit (control unit) and ECM.

- ABS actuator and electric unit (control unit): Refer to <u>BRC-95, "CONSULT-III Function (ABS)"</u>.
- ECM
- HR16DE (With EURO-OBD): ECH-89, "CONSULT-III Function".
- HR16DE (Without EURO-OBD): ECH-419, "CONSULT-III Function".
- MR20DE (With EURO-OBD): ECM-91, "CONSULT-III Function".
- MR20DE (Without EURO-OBD): ECM-425, "CONSULT-III Function".
- K9K: ECK-63, "Diagnosis Description".
- M9R: ECR-101, "CONSULT-III Function".

#### Are the memories erased?

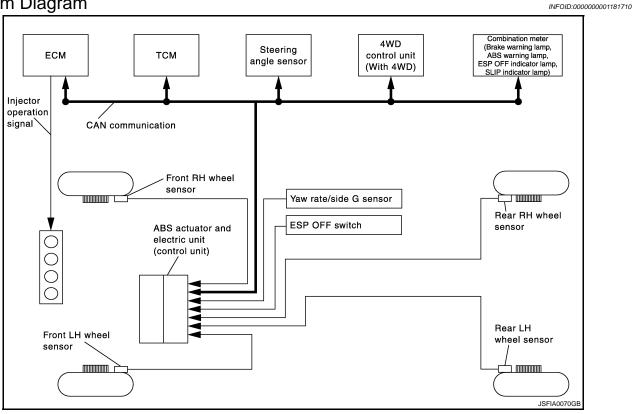
YES >> INSPECTION END

NO >> Check the items indicated by the self-diagnosis.

# **FUNCTION DIAGNOSIS**

**ESP** 

System Diagram



## System Description

 Electronic Stability Program system detects driver's steering operation amount and brake pedal travel from steering angle sensor and pressure sensor. Using information from yaw rate sensor, G sensor and wheel sensor, ESP judges driving condition (conditions of under steer and over steer) to improve vehicle driving stability by controlling brake application to 4 wheels and engine output.

During ESP operation, it informs driver of system operation by flashing SLIP indicator lamp.

Electrical system diagnosis by CONSULT-III is available.

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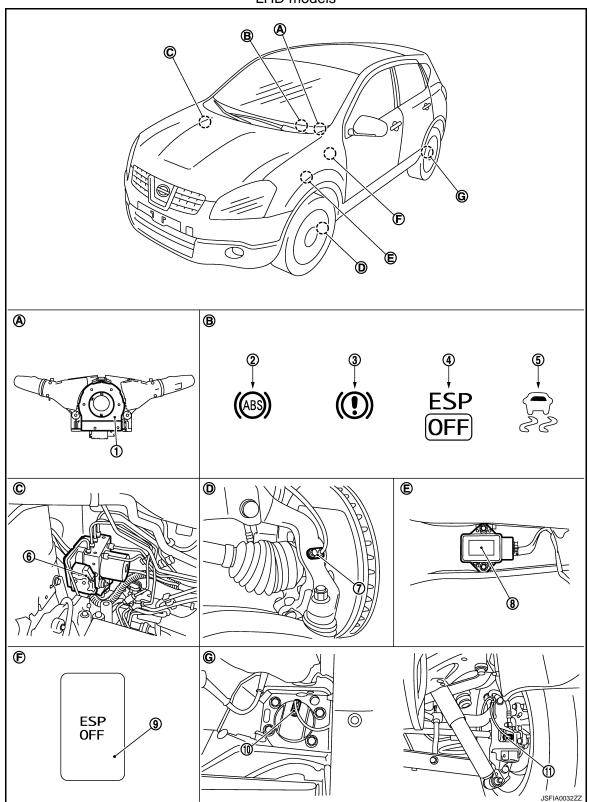
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# Component Parts Location

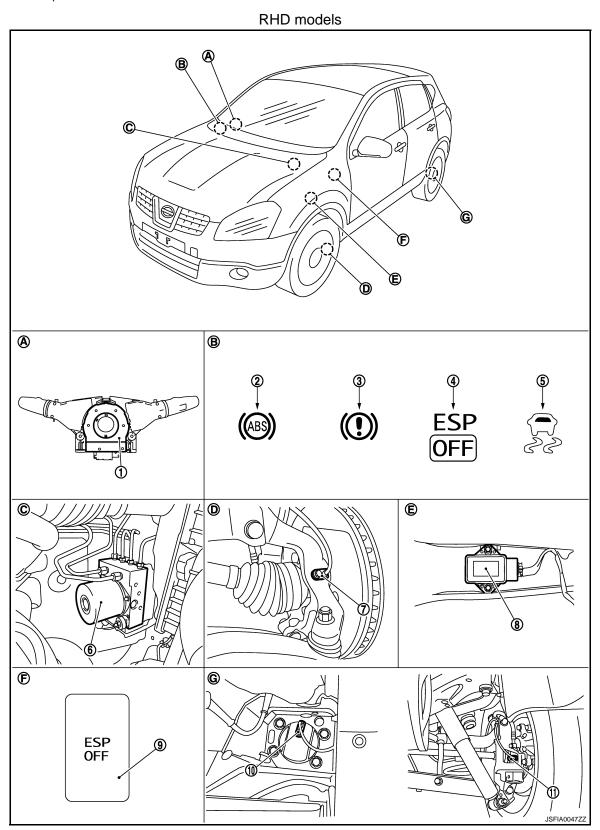
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## LHD models



- 1. Steering angle sensor
- 4. ESP OFF indicator lamp
- 7. Front wheel sensor
- 2. ABS warning lamp
- 5. SLIP indicator lamp
- 8. Yaw rate/side G sensor
- 3. Brake warning lamp
- 6. ABS actuator and electric unit (control unit)
- 9. ESP OFF switch

- 10. Rear wheel sensor (2WD models)
- A. Back of spiral cable assembly
- D. Steering knuckle
- G. Rear suspension arm
- 11. Rear wheel sensor (4WD models)
- B. Combination meter
- E. Lower instrument cover RH
- C. Right side in engine room
- F. Instrument driver lower panel



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1.	Steering angle sensor	2.	ABS warning lamp	3.	Brake warning lamp
4.	ESP OFF indicator lamp	5.	SLIP indicator lamp	6.	ABS actuator and electric unit (control unit)
7.	Front wheel sensor	8.	Yaw rate/side G sensor	9.	ESP OFF switch
10.	Rear wheel sensor (2WD models)	11.	Rear wheel sensor (4WD models)		
A.	Back of spiral cable assembly	B.	Combination meter	C.	Left side in engine room
D.	Steering knuckle	E.	Lower instrument cover RH	F.	Instrument driver lower panel

# Component Description

G. Rear suspension arm

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Compo	nent parts	Reference
Pump		PPC 100 "Description"
	Motor	BRC-109, "Description"
	Actuator relay (Main relay)	BRC-112, "Description"
ABS actuator and electric unit (control unit)	Solenoid valve	BRC-120, "Description"
	Pressure sensor	BRC-127, "Description"
	ESP switch-over valve (USV1, USV2, HSV1, HSV2)	BRC-137, "Description"
Wheel sensor		BRC-99, "Description"
Yaw rate sensor		BRC-132, "Description"
G sensor		BRC-135, "Description"
Steering angle sensor		BRC-129, "Description"
ESP OFF switch		BRC-146, "Description"
ABS warning lamp	BRC-148, "Description"	
Brake warning lamp	BRC-149, "Description"	
ESP OFF indicator lamp	BRC-150, "Description"	
SLIP indicator lamp	BRC-151, "Description"	

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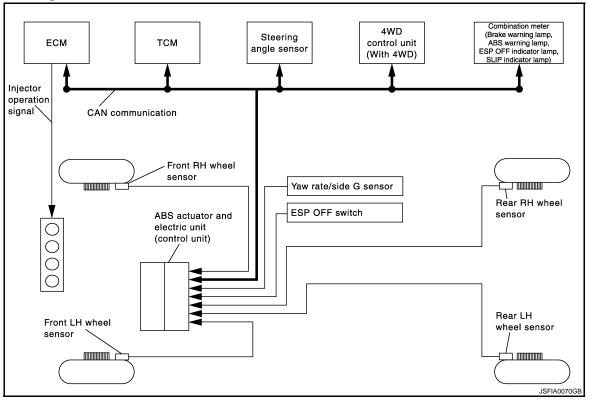
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System Diagram



## System Description

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- Traction Control System is a function that electronically controls engine torque, brake fluid pressure and gear ratio (except M/T) to ensure the optimum slippage ratio at drive wheels by computing wheel speed signals from 4 wheel sensors. When ABS actuator and electric unit (control unit) detects a spin at drive wheels (rear wheels), it compares wheel speed signals from all 4 wheels. At this time, LH and RH rear brake fluid pressure are controlled, while fuel being cut to engine and throttle valve being closed to reduce engine torque by the control unit. Further more, throttle position is continuously controlled to ensure the optimum engine torque at all times.
- During TCS operation, it informs driver of system operation by flashing SLIP indicator lamp.
- Electrical system diagnosis by CONSULT-III is available.

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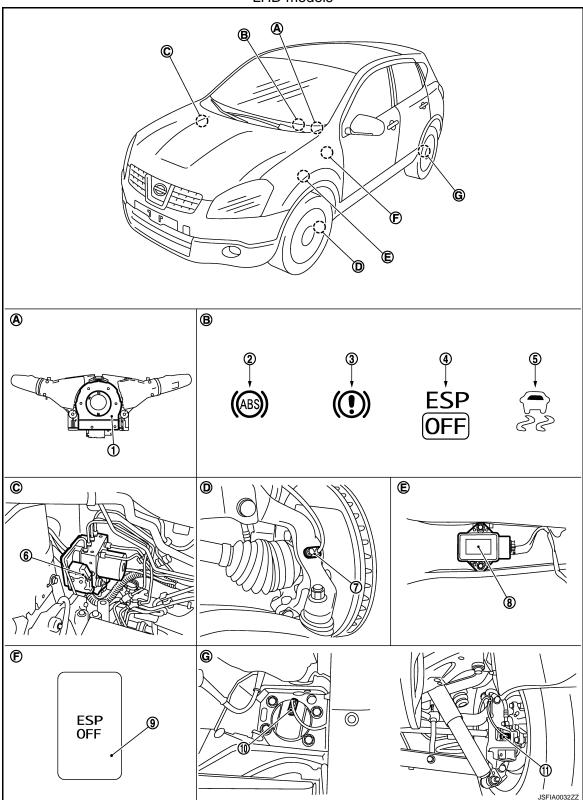
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# Component Parts Location

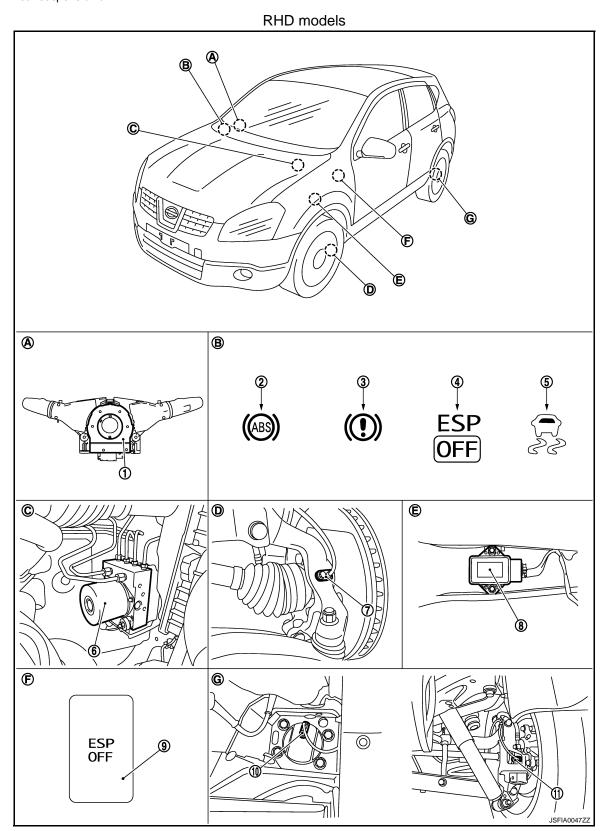
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### LHD models



- 1. Steering angle sensor
- 4. ESP OFF indicator lamp
- 7. Front wheel sensor
- 2. ABS warning lamp
- 5. SLIP indicator lamp
- 8. Yaw rate/side G sensor
- 3. Brake warning lamp
- 6. ABS actuator and electric unit (control unit)
- 9. ESP OFF switch

- 10. Rear wheel sensor (2WD models)
- A. Back of spiral cable assembly
- D. Steering knuckle
- G. Rear suspension arm
- 11. Rear wheel sensor (4WD models)
- B. Combination meter
- E. Lower instrument cover RH
- C. Right side in engine room
- F. Instrument driver lower panel



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1.	Steering angle sensor	2.	ABS warning lamp	3.	Brake warning lamp
4.	ESP OFF indicator lamp	5.	SLIP indicator lamp	6.	ABS actuator and electric unit (control unit)
7.	Front wheel sensor	8.	Yaw rate/side G sensor	9.	ESP OFF switch
10.	Rear wheel sensor (2WD models)	11.	Rear wheel sensor (4WD models)		
A.	Back of spiral cable assembly	B.	Combination meter	C.	Left side in engine room
D.	Steering knuckle	F.	Lower instrument cover RH	F.	Instrument driver lower panel

## **Component Description**

G. Rear suspension arm

INFOID:0000000001181717

Compo	nent parts	Reference
Pump		PDC 100 "Description"
	Motor	BRC-109, "Description"
	Actuator relay (Main relay)	BRC-112, "Description"
ABS actuator and electric unit (control unit)	Solenoid valve	BRC-120, "Description"
	Pressure sensor	BRC-127, "Description"
	ESP switch-over valve (USV1, USV2, HSV1, HSV2)	BRC-137, "Description"
Wheel sensor		BRC-99, "Description"
Yaw rate sensor		BRC-132, "Description"
G sensor		BRC-135, "Description"
Steering angle sensor		BRC-129, "Description"
ESP OFF switch	BRC-146, "Description"	
ABS warning lamp	BRC-148, "Description"	
Brake warning lamp	BRC-149, "Description"	
ESP OFF indicator lamp		BRC-150, "Description"
SLIP indicator lamp	BRC-151, "Description"	

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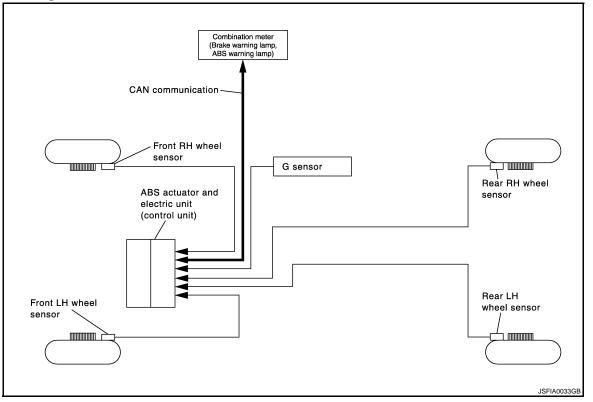
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## **ABS**

System Diagram



## System Description

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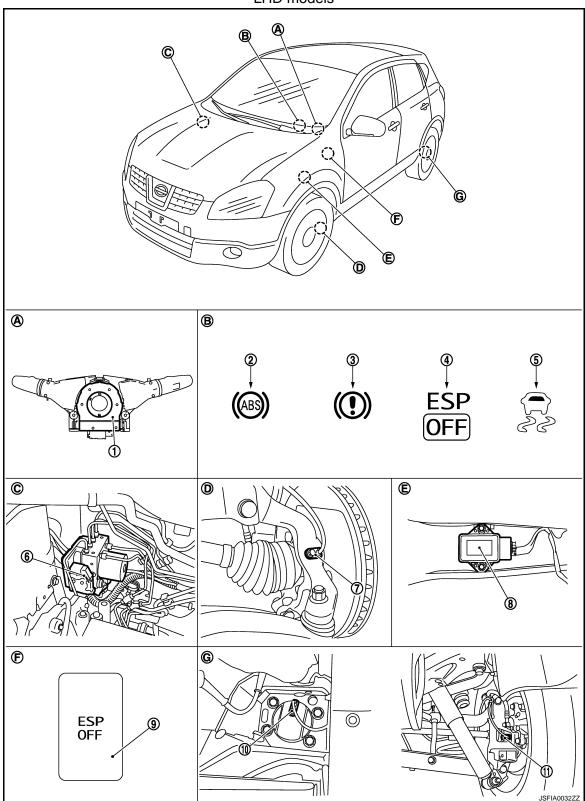
 Anti-Lock Braking System is a function that detects wheel revolution while braking, electronically controls braking force, and prevents wheel locking during sudden braking. It improves handling stability and maneuverability for avoiding obstacles.

• Electrical system diagnosis by CONSULT-III is available.

# Component Parts Location

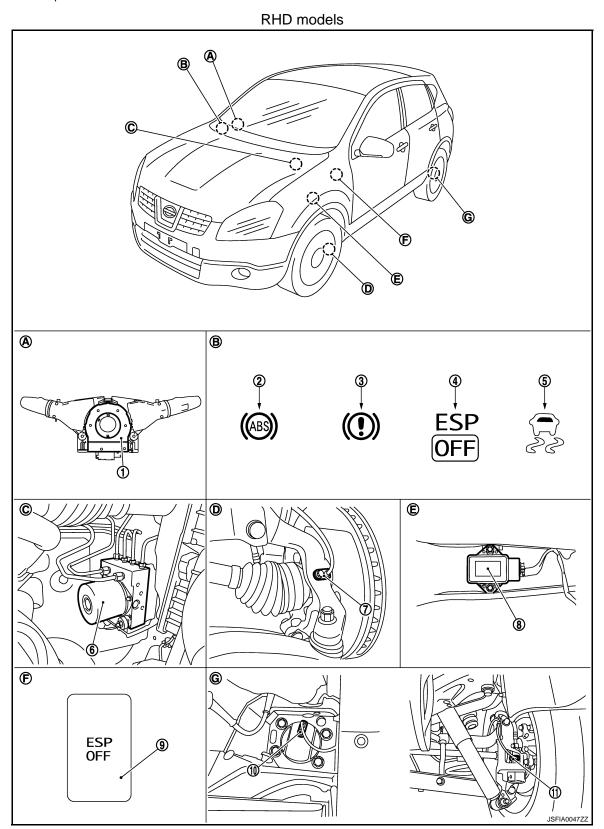
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## LHD models



- 1. Steering angle sensor
- 4. ESP OFF indicator lamp
- 7. Front wheel sensor
- 2. ABS warning lamp
- 5. SLIP indicator lamp
- 8. Yaw rate/side G sensor
- 3. Brake warning lamp
- 6. ABS actuator and electric unit (control unit)
- 9. ESP OFF switch

- 10. Rear wheel sensor (2WD models)
- A. Back of spiral cable assembly
- D. Steering knuckle
- G. Rear suspension arm
- 11. Rear wheel sensor (4WD models)
- B. Combination meter
- E. Lower instrument cover RH
- C. Right side in engine room
- F. Instrument driver lower panel



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1.	Steering angle sensor	2.	ABS warning lamp	3.	Brake warning lamp
4.	ESP OFF indicator lamp	5.	SLIP indicator lamp	6.	ABS actuator and electric unit (control unit)
7.	Front wheel sensor	8.	Yaw rate/side G sensor	9.	ESP OFF switch
10.	Rear wheel sensor (2WD models)	11.	Rear wheel sensor (4WD models)		
A.	Back of spiral cable assembly	B.	Combination meter	C.	Left side in engine room
D.	Steering knuckle	E.	Lower instrument cover RH	F.	Instrument driver lower panel
G.	Rear suspension arm				

# Component Description

INFOID:0000000001181721

Component parts		Reference
	Pump	BRC-109, "Description"
450	Motor	BRC-109, Description
ABS actuator and electric unit (control unit)	Actuator relay (Main relay)	BRC-112, "Description"
	Solenoid valve	BRC-120, "Description"
Wheel sensor		BRC-99, "Description"
ABS warning lamp		BRC-148, "Description"
Brake warning lamp		BRC-149, "Description"

[ESP/TCS/ABS]

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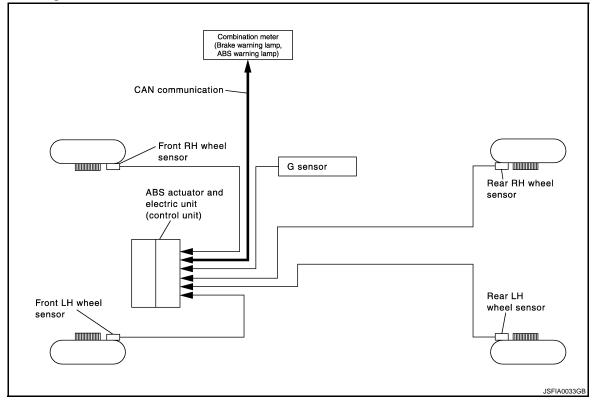
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## **EBD**

System Diagram



System Description

INFOID:0000000001181723

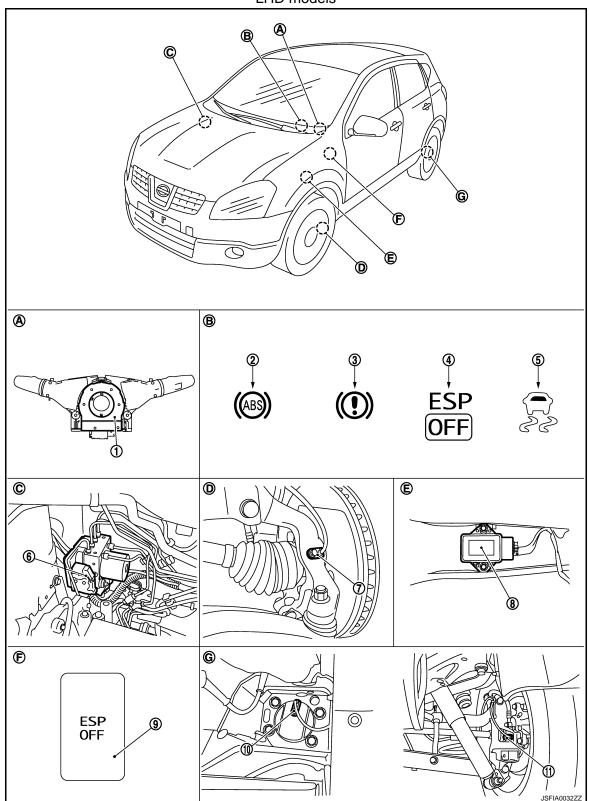
 Electric Brake force Distribution is a following function. ABS actuator and electric unit (control unit) detects subtle slippages between the front and rear wheels during braking. Then is electronically controls the rear braking force (brake fluid pressure) to reducing and reduces rear wheel slippage. Accordingly it improves vehicle stability.

• Electrical system diagnosis by CONSULT-III is available.

# Component Parts Location

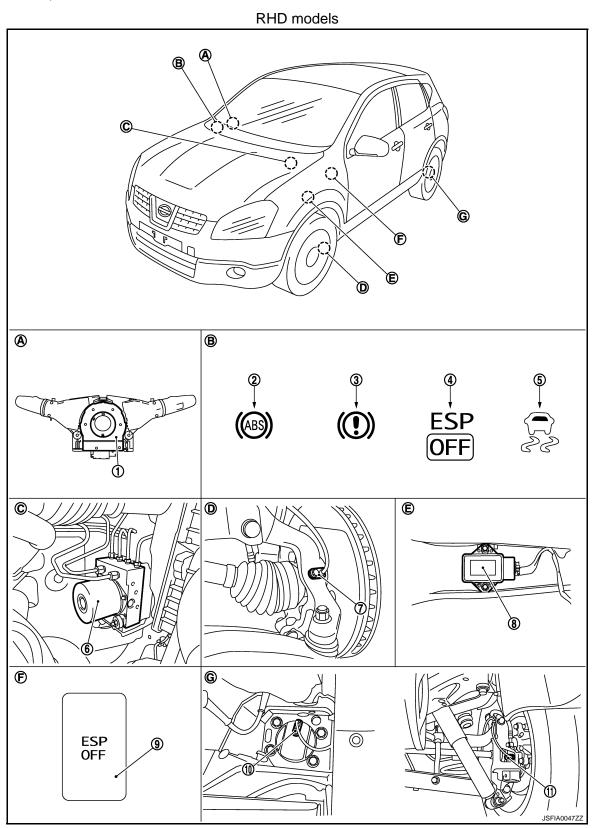
INFOID:0000000001181724

## LHD models



- 1. Steering angle sensor
- 4. ESP OFF indicator lamp
- 7. Front wheel sensor
- 2. ABS warning lamp
- 5. SLIP indicator lamp
- 8. Yaw rate/side G sensor
- 3. Brake warning lamp
- 6. ABS actuator and electric unit (control unit)
- 9. ESP OFF switch

- 10. Rear wheel sensor (2WD models)
- A. Back of spiral cable assembly
- D. Steering knuckle
- G. Rear suspension arm
- 11. Rear wheel sensor (4WD models)
- B. Combination meter
- E. Lower instrument cover RH
- C. Right side in engine room
- F. Instrument driver lower panel



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1.	Steering angle sensor	2.	ABS warning lamp	3.	Brake warning lamp
4.	ESP OFF indicator lamp	5.	SLIP indicator lamp	6.	ABS actuator and electric unit (control unit)
7.	Front wheel sensor	8.	Yaw rate/side G sensor	9.	ESP OFF switch
10.	Rear wheel sensor (2WD models)	11.	Rear wheel sensor (4WD models)		
A.	Back of spiral cable assembly	B.	Combination meter	C.	Left side in engine room
D.	Steering knuckle	E.	Lower instrument cover RH	F.	Instrument driver lower panel

# Component Description

G. Rear suspension arm

INFOID:0000000001181725

Component parts		Reference
	Pump	BRC-109, "Description"
ADO actuatos and alcatric unit (control unit)	Motor	BRC-109, Description
ABS actuator and electric unit (control unit)	Actuator relay (Main relay)	BRC-112, "Description"
	Solenoid valve	BRC-120, "Description"
Wheel sensor		BRC-99, "Description"
ABS warning lamp		BRC-148, "Description"
Brake warning lamp		BRC-149, "Description"

### < FUNCTION DIAGNOSIS >

[ESP/TCS/ABS]

# DIAGNOSIS SYSTEM [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

CONSULT-III Function (ABS)

INFOID:0000000001181726

#### **FUNCTION**

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

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT-III.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the ABS actuator and electric unit (control unit) can be read.
Active test	Diagnostic test mode is which CONSULT-III drives some actuators apart from the ABS actuator and electric unit (control unit) and also shifts some parameters in a specified range.
ECU part number	ABS actuator and electric unit (control unit) part number can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.

#### SELF-DIAG RESULTS MODE

Operation Procedure

 Before performing the self-diagnosis, start engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute.

How to Erase Self-diagnosis Results

 After erasing DTC memory, start engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute as the final inspection, and make sure that the ABS warning lamp, ESP OFF indicator lamp, SLIP indicator lamp and brake warning lamp turn OFF.

#### **CAUTION:**

# If memory cannot be erased, perform applicably diagnosis. NOTE:

- When the wheel sensor malfunctions, after inspecting the wheel sensor system, the ABS warning lamp, ESP OFF indicator lamp, SLIP indicator lamp and brake warning lamp will not turn OFF even when the system is normal unless the vehicle is driving at approximately 30 km/h (19 MPH) or more for approximately 1 minute.
- Brake warning lamp will turn ON in case of parking brake operation (when switch is ON) or of brake fluid level switch operation (when brake fluid is insufficient).
- ESP OFF switch should not stay "ON" position.

Display Item List

Refer to BRC-159, "DTC No. Index".

DATA MONITOR MODE

Display Item List

X: Applicable ☐: Optional item

	SELECT MONITOR ITEM		
Monitor item (Unit)	ECU INPUT SIG- NALS	MAIN SIGNLAS	Remarks
FR LH SENSOR [km/h (MPH)]	×	×	
FR RH SENSOR [km/h (MPH)]	×	×	Wheel speed
RR LH SENSOR [km/h (MPH)]	×	×	wileer speed
RR RH SENSOR [km/h (MPH)]	×	×	

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## < FUNCTION DIAGNOSIS >

[ESP/TCS/ABS]

	SELECT MC	NITOR ITEM	
Monitor item (Unit)	ECU INPUT SIG- NALS	MAIN SIGNLAS	Remarks
STOP LAMP SW (On/Off)	×	×	Stop lamp switch signal status
BATTERY VOLT (V)	×	×	Battery voltage supplied to the ABS actuator and electric unit (control unit)
GEAR	×	×	Gear position determined by TCM
SLCT LVR POSI	×	×	Selector lever position (except M/T)
OFF SW (On/Off)	۵	×	ESP OFF switch
YAW RATE SEN (°/s)	×	×	Yaw rate detected by yaw rate/side G sensor
ACCEL POS SIG (%)	×	۵	Throttle actuator opening/closing is displayed (Linked with accelerator pedal)
SIDE G-SENSOR (m/s <sup>2</sup> )	×	ū	Transverse G detected by yaw rate/side G sensor
STR ANGLE SIG	×		Steering angle detected by steering angle sensor
PRESS SENSOR (bar)	×	ū	Brake fluid pressure detected by pressure sensor
ENGINE RPM [tr/min (rpm)]	×	۵	Engine speed
FLUID LEV SW (On/Off)	×	۵	Brake fluid level switch signal status
PARK BRAKE SW (On/Off)	×	٥	Parking brake switch signal status
FR RH IN SOL (On/Off)	٥	×	
FR RH OUT SOL (On/Off)		×	
FR LH IN SOL (On/Off)	٥	×	
FR LH OUT SOL (On/Off)	۵	×	Operation status of each solenoid valve
RR RH IN SOL (On/Off)	٠	×	Operation status of each solellold valve
RR RH OUT SOL (On/Off)	٥	×	
RR LH IN SOL (On/Off)	٥	×	
RR LH OUT SOL (On/Off)	٥	×	
MOTOR RELAY (On/Off)	٥	×	Motor and motor relay operation
ACTUATOR RLY NOTE (On/Off)	٥	×	Actuator relay operation
ABS WARN LAMP (On/Off)	٥	×	ABS warning lamp
OFF LAMP (On/Off)	٥	×	ESP OFF indicator lamp
SLIP LAMP (On/Off)		×	SLIP indicator lamp

# < FUNCTION DIAGNOSIS > [ESP/TCS/ABS]

#### NOTE:

Every 20 seconds momentary switch to OFF.

#### **ACTIVE TEST MODE**

#### **CAUTION:**

- Do not perform active test while driving vehicle.
- · Make sure to completely bleed air from brake system.
- The active test cannot be performed with the ABS warning lamp, ESP OFF indicator lamp, SLIP indicator lamp and brake warning lamp are on.
- ABS warning lamp, ESP OFF indicator lamp, SLIP indicator lamp and brake warning lamp are on during active test.
- Erase memory of ICC system after implementing active test.

#### NOTE:

- When active test is performed while depressing the pedal, the pedal depression amount will change. This is normal. (Only solenoid valve and ABS motor.)
- "TEST IS STOPPED" is displayed 10 seconds after operation start.
- After "TEST IS STOPPED" is displayed, to perform test again.

#### Test Item

#### ABS SOLENOID VALVE

• For ABS solenoid valve, touch "UP", "KEEP" and "DOWN". Then use screen monitor to check that solenoid valve operates as shown in the table below.

Test item	Dianlayitan	Display		
	Display item	UP	KEEP	DOWN
	FR RH IN SOL	OFF	ON	ON
ED DIL COL	FR RH OUT SOL	OFF	OFF	ON*
FR RH SOL	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF
	FR LH IN SOL	OFF	ON	ON
FR LH SOL	FR LH OUT SOL	OFF	OFF	ON*
	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
	RR RH IN SOL	OFF	ON	ON
RR RH SOL	RR RH OUT SOL	OFF	OFF	ON*
KK KH SUL	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
RR LH SOL	RR LH IN SOL	OFF	ON	ON
	RR LH OUT SOL	OFF	OFF	ON*
	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is malfunction because it is an operation for checking.

#### ABS SOLENOID VALVE (ACT)

• For ABS solenoid valve (ACT), touch "UP", "ACT UP" and "ACT KEEP". Then use screen monitor to check that solenoid valve operates as shown in the table below.

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< FUNCTION DIAGNOSIS >

[ESP/TCS/ABS]

Test item	Dianlassitam	Display		
	Display item	UP	KEEP	DOWN
	FR RH IN SOL	OFF	OFF	OFF
ED DIT COL	FR RH OUT SOL	OFF	OFF	OFF
FR RH SOL	USV [FR-RL]	OFF	ON	ON
	HSV [FR-RL]	OFF	ON*	OFF
	FR LH IN SOL	OFF	OFF	OFF
ED I II COI	FR LH OUT SOL	OFF	OFF	OFF
FR LH SOL	USV [FL-RR]	OFF	ON	ON
	HSV [FL-RR]	OFF	ON*	OFF
	RR RH IN SOL	OFF	OFF	OFF
	RR RH OUT SOL	OFF	OFF	OFF
RR RH SOL	USV [FL-RR]	OFF	ON	ON
	HSV [FL-RR]	OFF	ON*	OFF
RR LH SOL	RR LH IN SOL	OFF	OFF	OFF
	RR LH OUT SOL	OFF	OFF	OFF
	USV [FR-RL]	OFF	ON	ON
	HSV [FR-RL]	OFF	ON*	OFF

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is malfunction because it is an operation for checking.

#### **ABS MOTOR**

• Touch "ON" and "OFF" on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Dis	play
	Display item	ON	OFF
ABS MOTOR	MOTOR RELAY	ON	OFF
	ACTUATOR RLY NOTE	ON	ON

#### NOTE

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

[ESP/TCS/ABS]

## COMPONENT DIAGNOSIS

C1101, C1102, C1103, C1104 WHEEL SENSOR-1

Description INFOID:000000001181727

When the sensor rotor rotates, the magnetic field changes. The sensor converts the magnetic field changes to current signals (rectangular wave) and transmits them to the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause	
C1101	RR RH SENSOR-1	Circuit of rear RH wheel sensor is open or short circuit. Current signal from sensor is outside limits.		
C1102	RR LH SENSOR-1	Circuit of rear LH wheel sensor is open or short circuit. Current signal from sensor is outside limits.	Harness or connector     Wheel sensor	
C1103	FR RH SENSOR-1	Circuit of front RH wheel sensor is open or short circuit. Current signal from sensor is outside limits.	ABS actuator and electric unit (control unit)	
C1104	FR LH SENSOR-1	Circuit of front LH wheel sensor is open or short circuit. Current signal from sensor is outside limits.		

#### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
RR RH SENSOR-1
RR LH SENSOR-1
FR RH SENSOR-1
FR LH SENSOR-1

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-99">BRC-99</a>, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

**CAUTION:** 

Do not check between wheel sensor terminals.

### INSPECTION PROCEDURE

## 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- Check wheel sensor for damage, disconnection or looseness.

#### Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

## 2. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.

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## C1101, C1102, C1103, C1104 WHEEL SENSOR-1

#### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

 Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3.CHECK WHEEL SENSOR HARNESS

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- 4. Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and ele	ectric unit (control unit)	Wheel	sensor	Continuity
Connector	Terminal	Connector	Terminal	Continuity
	9	E39 (Front RH)	2	Existed
E36	16	E22 (Front LH)		
E30	8	B41 (Rear RH)		
	6	B44 (Rear LH)		

Measurement terminal for signal circuit

ABS actuator and ele	ectric unit (control unit)	Wheel	sensor	Continuity
Connector	Terminal	Connector	Terminal	Continuity
	10	E39 (Front RH)	- 1	
E36	5	E22 (Front LH)		Existed
€30	19	B41 (Rear RH)	1	Existed
	17	B44 (Rear LH)		

Measurement terminal for ground circuit

ABS actuator and electric unit (control unit)				Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E36	10, 9	E36	1, 4	Not existed	
	5, 16				
	19, 8				
	17, 6				

5. Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

## 4. CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel	sensor		Voltage
Connector	Terminal		
E39 (Front RH)			
E22 (Front LH)	2	Ground	8 V or more
B41 (Rear RH)	2	Giodila	8 v oi more
B44 (Rear LH)			

## C1101, C1102, C1103, C1104 WHEEL SENSOR-1

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

INFOID:0000000001181730

INFOID:0000000001181731

#### Is the inspection result normal?

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

## Component Inspection

## 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SENSOR", and check the vehicle speed.

Wheel sensor	Vehicle speed (DATA MONITOR)
FR LH SENSOR	
FR RH SENSOR	Nearly matches the speedometer dis-
RR LH SENSOR	play (±10% or less)
RR RH SENSOR	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-99">BRC-99</a>, "Diagnosis Procedure".

## Special Repair Requirement

## 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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#### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

## C1105, C1106, C1107, C1108 WHEEL SENSOR-2

Description INFOID:000000001181732

ABS unit continually monitors wheel speed sensors to detect abnormal signals.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1105	RR RH SENSOR-2	Signal from rear RH wheel sensor does not match other 3 wheel speed signal.	<ul><li>Sensor not installed corretly</li><li>Sensor rotor or encoder dam</li></ul>
C1106	RR LH SENSOR-2	Signal from rear LH wheel sensor does not match other 3 wheel speed signal.	aged Sensor rotor loose on axle Electrical interference
C1107	FR RH SENSOR-2	Signal from front RH wheel sensor does not match other 3 wheel speed signal.	Wheel not turning - e.g. vel cle driven on 2WD dyno
C1108	FR LH SENSOR-2	Signal from front LH wheel sensor does not match other 3 wheel speed signal.	Sensor damaged     ABS unit damaged

#### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
RR RH SENSOR-2
RR LH SENSOR-2
FR RH SENSOR-2
FR LH SENSOR-2

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-102</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000001181734

#### **CAUTION:**

Do not check between wheel sensor terminals.

#### INSPECTION PROCEDURE

# 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- Check wheel sensor for damage, disconnection or looseness.

#### Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

## 2.check connector

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

Is any item indicated on the self-diagnosis display?

## C1105, C1106, C1107, C1108 WHEEL SENSOR-2

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

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YES >> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3.CHECK WHEEL SENSOR HARNESS

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- 4. Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and ele	ABS actuator and electric unit (control unit)		Wheel sensor	
Connector	Terminal	Connector Terminal		Continuity
<u>-</u>	9	E39 (Front RH)		
E36	16	E22 (Front LH)		Existed
E30	8	B41 (Rear RH)		Existed
1	6	B44 (Rear LH)		

Measurement terminal for signal circuit

ABS actuator and electric unit (control unit)  Connector Terminal		Wheel sensor		Continuity
		Connector	Terminal	Continuity
	10	E39 (Front RH)		
E36	5	E22 (Front LH)	1	Existed
E30	19	B41 (Rear RH)	Existed	Existed
	17	B44 (Rear LH)		

Measurement terminal for ground circuit

ABS actuator and electric unit (control unit)				Continuity	
Connector	Terminal	Terminal Connector Terminal			
	10, 9	E36	1, 4	Not existed	
E36	5, 16				
E30	19, 8				
	17, 6				

5. Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

### 4.CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel sensor			Voltage	
Connector	Terminal		voltage	
E39 (Front RH)		Ground 8 \	8 V or more	
E22 (Front LH)	Front LH)			
B41 (Rear RH)	2		o v oi more	
B44 (Rear LH)				

#### Is the inspection result normal?

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

**BRC-103** 

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## C1105, C1106, C1107, C1108 WHEEL SENSOR-2

#### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

## Component Inspection

INFOID:0000000001181735

## 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SENSOR", and check the vehicle speed.

Wheel sensor	Vehicle speed (DATA MONITOR)
FR LH SENSOR	
FR RH SENSOR	Nearly matches the speedometer dis-
RR LH SENSOR	play (±10% or less)
RR RH SENSOR	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-102">BRC-102</a>, "Diagnosis Procedure".

### Special Repair Requirement

INFOID:0000000001181736

## 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

### C1109 POWER AND GROUND SYSTEM

< COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

## C1109 POWER AND GROUND SYSTEM

Description INFOID:0000000001181737

Power is supplied from the battery to ABS actuator and electric unit (control unit).

DTC Logic INFOID:0000000001181738

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause	
C1109	BATTERY VOLTAGE [ABNORMAL]	When the ABS actuator and electric unit (control unit) power supply is lower than normal and vehicle speed is greater than 6 km/h (4 MPH). Power supply is greater than normal limits.	Harness or connector     ABS unit     Fuse     Vehicle electrical power system	

#### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results BATTERY VOLTAGE [ABNORMAL]

#### Is above displayed on the self-diagnosis display?

>> Proceed to diagnosis procedure. Refer to <a href="BRC-105">BRC-105</a>, "Diagnosis Procedure". YES

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181739

#### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to BRC-95, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

>> Poor connection of connector terminal. Repair or replace connector. NO

## 2.check abs actuator and electric unit (control unit) power supply circuit and **GROUND CIRCUIT**

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- Turn ignition switch ON or OFF and check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and electric unit (control unit)  Connector Terminal			Condition	Voltage
		_	Condition	vollage
E36	18	Ground	Ignition switch: ON	Battery voltage
	10	Giouna	Ignition switch: OFF	Approx. 0 V

Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

YES >> GO TO 3.

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### C1109 POWER AND GROUND SYSTEM

#### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

NO >> Repair or replace malfunctioning components.

# $3.\mathsf{abs}$ power supply check (under load conditions)

- 1. Use 12V lamp (normal rating 10 to 20W) connected between E36 terminals 18 and 4. With ignition switch ON check bulb illuminates correctly.
- 2. Check ABS motor supply under loaded condition (connector E36 terminals 1 and 2).

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

## 4. CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and electronic	ric unit (control unit)	_	Continuity
Connector Terminal		_	Continuity
E36	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Check battery for terminal looseness, low voltage, etc. if any malfunction is found, repair malfunctioning parts.

NO >> Repair or replace malfunctioning components. (Check ABS earth bolt for tightness and corrosion.)

## Special Repair Requirement

INFOID:0000000001181740

## 1.adjustment of steering angle sensor neutral position

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

#### C1110, C1153, C1170 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) [ESP/TCS/ABS] < COMPONENT DIAGNOSIS > C1110, C1153, C1170 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL Α UNIT) Description INFOID:0000000001181741 В ABS unit is continuously monitoring ECU hardware and software for correct operation. DTC Logic INFOID:0000000001181742 DTC DETECTION LOGIC DTC Display item Malfunction detected condition Possible cause · Internal failure of control unit components. Е Possible internal failure of control unit components. C1110 **CONTROLLER FAILURE** · ABS solenoid valve or motor power supply / ground abnor-**BRC** · ABS control unit software fail-C1153 **EMERGENCY BRAKE** Continuous ABS/EBD control for more than 60 seconds. · Wheel speed sensor input abnormality. ABS actuator and electric unit C1170 **VARIANT CODING** In a case where VARIANT CODING is different. (control unit) DTC CONFIRMATION PROCEDURE Н 1. CHECK SELF-DIAGNOSIS RESULTS Check both ABS solenoid valve and motor supply and ground circuits using a suitable electrical load. Check wheel speed sensor inputs. Check the self-diagnosis results. Self-diagnosis results CONTROLLER FAILURE **EMERGENCY BRAKE** VARIANT CODING Is above displayed on the self-diagnosis display? YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-107">BRC-107</a>, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:0000000001181743 INSPECTION PROCEDURE ${f 1}$ .REPLACE ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) Ν Replace ABS actuator and electric unit (control unit) when self-diagnostic result shows items other than those applicable. >> Replace ABS actuator and electric unit (control unit). Р Special Repair Requirement INFOID:0000000001181744 ${f 1}$ .ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actua-

tor and electric unit (control unit). Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEU-

TRAL POSITION: Description".

# C1110, C1153, C1170 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) < COMPONENT DIAGNOSIS > [ESP/TCS/ABS]

>> END

### C1111 ABS MOTOR, MOTOR RELAY SYSTEM

< COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

## C1111 ABS MOTOR, MOTOR RELAY SYSTEM

Description INFOID:0000000001181745

**PUMP** 

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The pump returns the brake fluid stored in the reservoir to the master cylinder by reducing the pressure.

#### **MOTOR**

The motor drives the pump according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1111	PUMP MOTOR	During the actuator motor operating with ON, when the actuator motor turns OFF, or when the control line for actuator motor relay is open.	Harness or connector     ABS actuator and electric unit
Omi	TOWN WOTOK	During the actuator motor operating with OFF, when the actuator motor turns ON, or when the control line for relay is shorted to ground.	(control unit)

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### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
PUMP MOTOR

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-109">BRC-109</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181747

#### INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.

3. Check terminal for deformation, disconnect, looseness, and so on. If any malfunction is found, repair or replace terminal.

4. Reconnect connector and then perform the self-diagnosis. Refer to BRC-95, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.CHECK ABS MOTOR AND MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check voltage between the ABS actuator and electric unit (control unit) harness connector terminal and ground.

**BRC-109** 

ABS actuator and ele	ectric unit (control unit)		Voltage
Connector Terminal		_	voltage
E36	2	Ground	Battery voltage

Reconnect ABS actuator and electric unit (control unit) connector.

### Is the inspection result normal?

< COMPONENT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

f 3.abs power supply check (under load condition)

Use 12V lamp (normal rating 10 to 20W) connected between E36 terminals 1 and 2. With ignition switch ON check bulb illuminates correctly.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

# f 4.CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and ele	ectric unit (control unit)	_	Continuity
Connector Terminal			Continuity
E36	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

>> Repair or replace malfunctioning components. (Check ABS each bolt for tightness and corrosion.)

# Component Inspection

INFOID:0000000001181748

[ESP/TCS/ABS]

# 1. CHECK ACTIVE TEST

- On "ACTIVE TEST", select "ABS MOTOR".
- Touch ON and OFF on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Display	
rest item		ON	OFF
ADC MOTOD	MOTOR RELAY	ON	OFF
ABS MOTOR	ACTUATOR RLY NOTE	ON	ON

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

#### Is the inspection result normal?

YES >> INSPECTION END

>> Go to diagnosis procedure. Refer to <u>BRC-109</u>, "<u>Diagnosis Procedure</u>".

# Special Repair Requirement

INFOID:0000000001181749

# ${f 1}$ . ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEU-TRAL POSITION: Description".

C1111 ABS MOTOR, MOTOR RELAY SYSTEM < COMPONENT DIAGNOSIS >	[ESP/TCS/ABS]	
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### C1114 ACTUATOR RELAY SYSTEM

Description INFOID:000000001181750

Activates or deactivates each solenoid valve according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1114	MAIN RELAY	During the actuator relay operating with OFF, when the actuator relay turns ON, or when the control line for the relay is shorted to the ground.	Harness or connector     ABS actuator and electric unit
		During the actuator relay operating with ON, when the actuator relay turns ON, or when the control line for the relay is open.	(control unit)

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results	_
MAIN RELAY	

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-112">BRC-112</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181752

### INSPECTION PROCEDURE

## 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connector and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.CHECK SOLENOID, ESP SWITCH-OVER VALVE AND ACTUATOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)		Voltage
Connector	Terminal		Voltage
E36	3	Ground	Battery voltage

Reconnect ABS actuator and electric unit (control unit) connector.

#### Is the inspection result normal?

### C1114 ACTUATOR RELAY SYSTEM

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.abs power supply check (under load condition)

Use 12V lamp (normal rating 10 to 20W) connected between E36 terminals 1 and 3. With ignition switch ON check bulb illuminates correctly.

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check both power supply and ground circuit.

# $oldsymbol{4}.$ CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and ele	ectric unit (control unit)		Continuity
Connector	Terminal	_	Continuity
E36	1, 4	Ground	Existed

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components. (Check ABS each bolt for tightness and corrosion.)

### Component Inspection

### 1. CHECK ACTIVE TEST

- On "ACTIVE TEST", select "ABS MOTOR".
- Touch ON and OFF on screen. Make sure motor relay and actuator relay operates as shown in table below.

Test item	Display item	Display	
rest item	Display Item	ON	OFF
ADCMOTOD	MOTOR RELAY	ON	OFF
ABS MOTOR	ACTUATOR RLY NOTE	ON	ON

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-33">BRC-33</a>, "Diagnosis Procedure".

### Special Repair Requirement

# ${f 1}$ . ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to BRC-77, "ADJUSTMENT OF STEERING ANGLE SENSOR NEU-TRAL POSITION: Description".

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INFOID:0000000001181754

### C1115 WHEEL SENSOR

Description INFOID:000000001181755

When the sensor rotor rotates, the magnetic field changes. The sensor converts the magnetic field changes to current signals (rectangular wave) and transmits them to the ABS actuator and electric unit (control unit).

DTC Logic (INFOID:000000001181756

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1115	ABS SENSOR [ABNORMAL SIGNAL]	Miss-match between the 4 wheel speed sensor signals.	Harness or connector is not a possible cause     Other possible causes     Tire radius (due to wrong size or pressure) interference.

### DTC CONFIRMATION PROCEDURE

### 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
ABS SENSOR [ABNORMAL SIGNAL]

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-114">BRC-114</a>, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000001181757

#### **CAUTION:**

Do not check between wheel sensor terminals.

### INSPECTION PROCEDURE

# 1. CHECK SENSOR AND SENSOR ROTOR

- Check sensor rotor for damage.
- Check wheel sensor for damage, disconnection or looseness.

### Are the sensor and sensor rotor normal?

YES >> GO TO 2.

NO >> Repair wheel sensor mount or replace sensor rotor. Then perform the self-diagnosis.

# 2.check connector

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Repair or replace connector.

# 3.CHECK WHEEL SENSOR HARNESS

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect malfunctioning wheel sensor connector.

4. Check continuity between terminals. (Also check continuity when steering wheel is turned right and left and when sensor harness inside the wheel house is moved.)

Measurement terminal for power supply circuit

ABS actuator and ele	ectric unit (control unit)	Wheel sensor		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	9	E39 (Front RH)			
E36	16	E22 (Front LH)	2	Existed	
	8	B41 (Rear RH)	2	LXISIGU	
	6	B44 (Rear LH)			

Measurement terminal for signal circuit

ABS actuator and ele	ectric unit (control unit)	Wheel sensor		Continuity
Connector	Terminal	Connector	Terminal	Continuity
10	E39 (Front RH)			
E36	5	E22 (Front LH)	1	Existed
E30	19	B41 (Rear RH)	· · · · · · · · · · · · · · · · · · ·	LXISIEU
	17	B44 (Rear LH)		

Measurement terminal for ground circuit

ABS actuator and electric unit (control unit)		Continuity		
Connector Terminal Connect		Connector	Terminal	Continuity
E36  10, 9  5, 16  19, 8  17, 6	10, 9		4.4	Not existed
	5, 16	E36 1, 4		
	19, 8		1, 4	
	17, 6			

5. Reconnect ABS actuator and electric unit (control unit) connector.

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

## 4. CHECK WHEEL SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- Check voltage between wheel sensor harness connector power supply terminal and ground.

Wheel sensor  Connector Terminal			Voltage
		_	voltage
E39 (Front RH)			
E22 (Front LH)	2	Ground	8 V or more
B41 (Rear RH)	2	Ground	8 V OI IIIOIE
B44 (Rear LH)			

#### Is the inspection result normal?

YES >> Replace applicable wheel sensor.

NO >> Replace ABS actuator and electric unit (control unit).

# Component Inspection

### 1. CHECK DATA MONITOR

On "DATA MONITOR", select "FR LH SENSOR", "FR RH SENSOR", "RR LH SENSOR", and "RR RH SENSOR", and check the vehicle speed.

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INFOID:0000000001181758

Wheel sensor	Vehicle speed (DATA MONITOR)	
FR LH SENSOR		
FR RH SENSOR	Nearly matches the speedometer dis-	
RR LH SENSOR	play (±10% or less)	
RR RH SENSOR		

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-114">BRC-114</a>, "Diagnosis Procedure".

### Special Repair Requirement

INFOID:0000000001181759

# 1.adjustment of steering angle sensor neutral position

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

### C1116 STOP LAMP SWITCH

Description INFOID:0000000001181760

The stop lamp switch transmits the stop lamp switch signal (ON/OFF) to the ABS actuator and electric unit (control unit).

DTC Logic INFOID:0000000001181761

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1116	STOP LAMP SW	When stop lamp switch circuit is open.	Harness or connector     Stop lamp switch     ABS actuator and electric unit (control unit)

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results STOP LAMP SW

### Is above displayed on the self-diagnosis display?

>> Proceed to diagnosis procedure. Refer to <a href="BRC-117">BRC-117</a>, "Diagnosis Procedure". YES

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000001181762

#### INSPECTION PROCEDURE

### 1. CHECK STOP LAMPS ILLUMINATE

Check stop lamps illuminate when brake pedal is pressed.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check stop lamp circuit.

# 2.CHECK DATA MONITOR

Using "DATA MONITOR" check both pressure sensor signal and brake lamp switch signal.

Pressure sensor

Condition	PRESS SEN (DATA MONITOR)
Brake pedal released	Approx. 3 bar
Brake pedal pressed	0 to 200 bar

Stop lamp switch

Condition	STOP LAMP SW (DATA MONITOR)
Brake pedal released	OFF
Brake pedal pressed	ON

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning parts.

# 3. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.

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#### < COMPONENT DIAGNOSIS >

- 3. Disconnect stop lamp switch connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors securely.
- 6. Start engine.
- Repeat pumping brake pedal carefully several times, and perform self-diagnosis. Refer to <u>BRC-95</u>, "<u>CON-SULT-III</u> Function (ABS)"

### Is any item indicated in the self-diagnosis display?

YES >> GO TO 4.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 4.CHECK STOP LAMP SWITCH

- 1. Disconnect stop lamp switch connector.
- 2. Check continuity between stop lamp switch connector terminals.

Stop lamp switch	Condition	Continuity	
Terminal	Condition	Continuity	
1 – 2	Release stop lamp switch (When brake pedal is depressed.)		
	Push stop lamp switch (When brake pedal is released.)	Not existed	

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace stop lamp switch.

# 5. CHECK STOP LAMP SWITCH CIRCUIT

- 1. Disconnect ABS actuator and electric unit (control unit) connector.
- Connect stop lamp switch connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and e	ectric unit (control unit)	Condition	Voltage
Connector	Terminal		voltage
E36	20	Brake pedal is depressed	Battery voltage
⊏30	20	Brake pedal is released	Approx. 0 V

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# Component Inspection

INFOID:0000000001181763

# 1. CHECK STOP LAMP SWITCH

- Turn ignition switch OFF.
- 2. Disconnect stop lamp switch connector.
- 3. Check continuity between stop lamp switch connector terminals.

Stop lamp switch	Condition	Continuity
Terminal	Condition	Continuity
Terminal Re (W Pu	Release stop lamp switch (When brake pedal is depressed.)	Existed
	Push stop lamp switch (When brake pedal is released.)	Not existed

#### Is the inspection result normal?

YES >> INSPECTION END

C1116 STOP LAMP SWITCH	
< COMPONENT DIAGNOSIS > [ESP/TCS/ABS]	
NO >> Replace stop lamp switch.	
Special Repair Requirement	А
1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION	В
Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a> , "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".	
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# C1120, C1122, C1124, C1126 IN ABS SOL

Description INFOID:000000001181765

The solenoid valve increases, holds or decreases the fluid pressure of each brake caliper according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic (INFOID:000000001181766

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1120	FR LH IN ABS SOL	When the control unit detects a malfunction in the front LH inlet solenoid circuit.	
C1122	FR RH IN ABS SOL	When the control unit detects a malfunction in the front RH inlet solenoid circuit.	ABS actuator and electric unit
C1124	RR LH IN ABS SOL	When the control unit detects a malfunction in the rear LH inlet solenoid circuit.	(control unit)
C1126	RR RH IN ABS SOL	When the control unit detects a malfunction in the rear RH inlet solenoid circuit.	

### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results	
FR LH IN ABS SOL	
FR RH IN ABS SOL	
RR LH IN ABS SOL	
RR RH IN ABS SOL	

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-120">BRC-120</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181767

### INSPECTION PROCEDURE

### 1. CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.CHECK SOLENOID, ESP SWITCH-OVER VALVE AND ACTUATOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)	— Voltage	
Connector	Connector Terminal		voltage
E36	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

 ${f 3.}$ check solenoid, esp switch-over valve and acuator relay ground circuit

Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and ele	ectric unit (control unit)	— Continuity	
Connector	Connector Terminal		Continuity
E36	1, 4	Ground	Existed

Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# Component Inspection

1. CHECK ACTIVE TEST

Select each test menu item on "ACTIVE TEST".

2. On the display, touch "UP", "KEEP", and "DOWN", and check that the system operates as shown in the table below.

To at it and	Diamlassitana	Display		
Test item	Display item	UP	KEEP	DOWN
	FR RH IN SOL	OFF	ON	ON
ED DIT COL	FR RH OUT SOL	OFF	OFF	ON*
FR RH SOL	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF
	FR LH IN SOL	OFF	ON	ON
FR LH SOL	FR LH OUT SOL	OFF	OFF	ON*
FR LH SOL	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
	RR RH IN SOL	OFF	ON	ON
RR RH SOL	RR RH OUT SOL	OFF	OFF	ON*
KK KH SOL	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
	RR LH IN SOL	OFF	ON	ON
RR LH SOL	RR LH OUT SOL	OFF	OFF	ON*
KK LH SUL	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

#### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

#### Is the inspection result normal?

YES >> INSPECTION END BRC

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### C1120, C1122, C1124, C1126 IN ABS SOL

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

NO >> Go to diagnosis procedure. Refer to <a href="BRC-120">BRC-120</a>, "Diagnosis Procedure".

# Special Repair Requirement

INFOID:0000000001181769

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

# C1121, C1123, C1125, C1127 OUT ABS SOL

Description INFOID:0000000001181770

The solenoid valve increases, holds or decreases the fluid pressure of each brake caliper according to the signals transmitted by the ABS actuator and electric unit (control unit).

DTC Logic INFOID:0000000001181771

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1121	FR LH OUT ABS SOL	When the control unit detects a malfunction in the front LH outlet solenoid circuit.	
C1123	FR RH OUT ABS SOL	When the control unit detects a malfunction in the front RH outlet solenoid circuit.	ABS actuator and electric unit
C1125	RR LH OUT ABS SOL	When the control unit detects a malfunction in the rear LH outlet solenoid circuit.	(control unit)
C1127	RR RH OUT ABS SOL	When the control unit detects a malfunction in the rear RH outlet solenoid circuit.	

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
FR LH OUT ABS SOL
FR RH OUT ABS SOL
RR LH OUT ABS SOL
RR RH OUT ABS SOL

### Is above displayed on the self-diagnosis display?

>> Proceed to diagnosis procedure. Refer to <a href="BRC-123">BRC-123</a>, "Diagnosis Procedure". YES

NO >> INSPECTION END

# Diagnosis Procedure

INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to BRC-95, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 2.check solenoid, esp switch-over valve and actuator relay power supply circuit

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

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ABS actuator and ele	ectric unit (control unit)	— Voltage	
Connector Terminal		_	voltage
E36	3	Ground	Battery voltage

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.check solenoid, esp switch-over valve and acuator relay ground circuit

Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and electric unit (control unit)  Connector Terminal			Continuity
		_	Continuity
E36	1, 4	Ground	Existed

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

### Component Inspection

INFOID:0000000001181773

# 1. CHECK ACTIVE TEST

- 1. Select each test menu item on "ACTIVE TEST".
- 2. On the display, touch "UP", "KEEP", and "DOWN", and check that the system operates as shown in the table below.

Test item	Display item -	Display		
restitem		UP	KEEP	DOWN
	FR RH IN SOL	OFF	ON	ON
FR RH SOL	FR RH OUT SOL	OFF	OFF	ON*
FR KH SOL	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF
	FR LH IN SOL	OFF	ON	ON
FR LH SOL	FR LH OUT SOL	OFF	OFF	ON*
FR LH SOL	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
	RR RH IN SOL	OFF	ON	ON
RR RH SOL	RR RH OUT SOL	OFF	OFF	ON*
KK KIT SOL	USV [FL-RR]	OFF	OFF	OFF
	HSV [FL-RR]	OFF	OFF	OFF
	RR LH IN SOL	OFF	ON	ON
RR LH SOL	RR LH OUT SOL	OFF	OFF	ON*
IXIX LIT GOL	USV [FR-RL]	OFF	OFF	OFF
	HSV [FR-RL]	OFF	OFF	OFF

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

### NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

### Is the inspection result normal?

YES >> INSPECTION END

### C1121, C1123, C1125, C1127 OUT ABS SOL

# < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

NO >> Go to diagnosis procedure. Refer to <u>BRC-123, "Diagnosis Procedure"</u>.

# Special Repair Requirement

INFOID:0000000001181774

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

\_\_\_\_ В

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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# C1130, C1131, C1132 ENGINE SIGNAL

Description INFOID:000000001181775

ABS actuator and electric unit (control unit) receives the engine signel from ECM with CAN communication line.

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause	
C1130	ENGINE SIGNAL 1	ECM signals are invalid or ECM self diagnosis indicates a fault that prevents correct TCS operation.		Harness or connector
C1131	ENGINE SIGNAL 2		ABS actuator and electric unit (control unit)	
C1132	ENGINE SIGNAL 3		ECM     CAN communication line	

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
ENGINE SIGNAL 1
ENGINE SIGNAL 2
ENGINE SIGNAL 3

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to BRC-126, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000001181777

### INSPECTION PROCEDURE

# 1. CHECK ENGINE SYSTEM

- 1. Perform ECM self-diagnosis. Repair or replace items indicated, then perform ECM self-diagnosis again.
- HR16DE (with EURO-OBD): ECH-89, "CONSULT-III Function".
- HR16DE (without EURO-OBD): <u>ECH-419</u>, "<u>CONSULT-III Function</u>".
- MR20DE (with EURO-OBD: ECM-91, "CONSULT-III Function".
- MR20DE (without EURO-OBD: ECM-425, "CONSULT-III Function".
- K9K: <u>ECK-63</u>, "<u>Diagnosis Description</u>".
- M9R: <u>ECR-101</u>, "<u>CONSULT-III Function</u>".
- Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

#### Is any item indicated on the self-diagnosis display?

YES >> Repair or replace the affected part.

NO >> INSPECTION END

### Special Repair Requirement

INFOID:0000000001181778

# ${f 1}$ .adjustment of steering angle sensor neutral position

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

### C1142 PRESS SENSOR

Description INFOID:0000000001181779

The pressure sensor converts the brake fluid pressure to an electric signal and transmits it to the ABS actuator and electric unit (control unit). [The pressure sensor is integrated in the ABS actuator and electric unit (control unit).]

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1142	PRESS SEN CIRCUIT	Pressure sensor signal line is open or shorted, or pressure sensor is malfunctioning.	Harness or connector     Stop lamp switch     ABS actuator and electric unit (control unit)

### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
PRESS SEN CIRCUIT

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-127</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181781

### INSPECTION PROCEDURE

# 1. CHECK STOP LAMP SWITCH CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect stop lamp switch connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors securely.
- Start engine.
- 7. Repeat pumping brake pedal carefully several times, and perform self-diagnosis.

Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

2.CHECK STOP LAMP SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch connector.
- 3. Check continuity between stop lamp switch connector terminals.

Stop lamp switch	Condition	Continuity
Terminal	Condition	
1 – 2	Release stop lamp switch (When brake pedal is depressed.)	Existed
1 – 2	Push stop lamp switch (When brake pedal is released.)	Not existed

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### < COMPONENT DIAGNOSIS >

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace stop lamp switch.

# 3.check stop lamp switch circuit

- 1. Disconnect ABS actuator and electric unit (control unit) connector.
- 2. Connect stop lamp switch connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and electric unit (control unit)		Condition	Voltage
Connector	Terminal	Condition	voltage
E36	20	Brake pedal is depressed	Battery voltage
		Brake pedal is released	Approx. 0 V

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

## Component Inspection

INFOID:0000000001181782

# 1. CHECK DATA MONITOR

On "DATA MONITOR", select "PRESS SENSOR" and check the brake fluid pressure.

Condition	PRESS SENSOR (DATA MONITOR)
With ignition switch turned ON and brake pedal released.	Approx. 3 bar
With ignition switch turned ON and brake pedal depressed.	0 to 200 bar

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-127">BRC-127</a>, "Diagnosis Procedure".

# Special Repair Requirement

INFOID:0000000001181783

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

### C1143, C1144 STEERING ANGLE SENSOR

< COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

# C1143, C1144 STEERING ANGLE SENSOR

Description INFOID:000000001181784

The steering angle sensor detects the rotation amount, angular velocity and direction of the steering wheel, and transmits the data to the ABS actuator and electric unit (control unit) via CAN communication.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1143	ST ANG SEN CIRCUIT	Neutral position of steering angle sensor is dislocated, or the steering angle sensor is malfunctioning.	Harness or connector     Steering angle sensor
C1144	ST ANG SEN SIGNAL	Neutral position of steering angle sensor is not finished.	<ul> <li>ABS actuator and electric unit (control unit)</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
ST ANG SEN CIRCUIT
ST ANG SEN SIGNAL

Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <a href="BRC-129">BRC-129</a>, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181786

### INSPECTION PROCEDURE

## 1. CHECK VEHICLE STATE

Check vehicle for any suspension/steering misalignment or damage.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Correct any damage found.

### 2.CHECK CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect steering angle sensor connector.
- 4. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)"

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 3.CHECK STEERING ANGLE SENSOR HARNESS

- 1. Turn ignition switch OFF.
- 2. Disconnect steering angle sensor connector.
- 3. Check continuity between steering angle sensor harness connector terminal and ground.

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INFOID:0000000001181787

INFOID:0000000001181788

Steering angle sensor		Continuity	
Connector	Terminal	_	Continuity
M30	3	Ground	Existed

- 4. Turn ignition switch ON.
- 5. Check voltage between steering angle sensor harness connector terminal and ground.

Steering angle sensor		_	Voltage
Connector	Terminal	_	voltage
M30	1	Ground	Battery voltage

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

### 4. CHECK DATA MONITOR

- 1. Connect the steering angle sensor connector and ABS actuator and electric unit (control unit) connector.
- Select "STR ANGLE SIG" in "DATA MONITOR" and check steering angle sensor signal.

Steering condition	STR ANGLE SIG (DATA MONITOR)	
Driving straight	±2.5 °	
Turn 90 ° to right	Approx. +90 °	
Turn 90 ° to left	Approx. –90 °	

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Adjust neutral position of steering angle sensor.

# 5.CHECK FOR BACKLASH

- 1. Check for backlash [turn wheel to left then straight then right then straight (approx. 90)].
- 2. Check straight position is always similar value.

### Is there noticeable backlash?

YES >> Check sensor is correctly fitted to combination witch.

NO >> Check sensor output is correct from lock to lock.

# Component Inspection

1. CHECK DATA MONITOR

Select "STR ANGLE SIG" in "DATA MONITOR" and check steering angle sensor signal.

Steering condition	STR ANGLE SIG (DATA MONITOR)	
Driving straight	±2.5 °	
Turn 90 ° to right	Approx. +90 °	
Turn 90 ° to left	Approx. –90 °	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-129">BRC-129</a>, "Diagnosis Procedure".

# Special Repair Requirement

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the steering angle sensor or the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>. "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

### C1143. C1144 STEERING ANGLE SENSOR

< COMPONENT DIAGNOSIS >	[ESP/TCS/ABS]
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### C1145 YAW RATE SENSOR

Description INFOID:000000001181789

The yaw rate sensor detects the yaw rate affecting the vehicle, and transmits the data to the ABS actuator and electric unit (control unit) as an analog voltage signal.

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1145	YAW RATE SENSOR	Yaw rate sensor is malfunctioning, or the yaw rate sensor signal line is open or shorted.	<ul> <li>Harness or connector</li> <li>ABS actuator and electric unit (control unit)</li> <li>Yaw rate sensor</li> </ul>

### DTC CONFIRMATION PROCEDURE

## 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diag	nosis results
YAW RA	TE SENSOR

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-132</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000001181791

#### **CAUTION:**

- Driving on high speed banked corners can also indicate yaw rate sensor malfunction.
- If vehicle is on turn-table at entrance to parking garage, or on other moving surface, VDC OFF indicator lamp may illuminate and CONSULT-III self-diagnosis may indicate yaw rate sensor system malfunction. However, in this case there is no malfunction in yaw rate sensor system. Take vehicle off of turn-table or other moving surface, and start engine. Results will return to normal. And after doing spin turns or acceleration turns with VDC function is being off (VDC OFF switch "ON"), too, the results will return to a normal condition by re-starting vehicle.

#### INSPECTION PROCEDURE

# 1. CHECK INSTALLATION STATE OF YAW RATE SENSOR

Check yaw rate sensor is correctly attached to vehicle. Refer to BRC-177, "Exploded View".

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

### 2.CHECK CONNECTOR

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- 3. Disconnect yaw rate sensor connector.
- 4. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 5. Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Replace or repair connector.

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

# $\overline{\mathbf{3.}}$ CHECK YAW RATE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect yaw rate sensor connector.
- 3. Turn ignition switch ON or OFF and check voltage between yaw rate sensor harness connector terminal and ground.

Yaw ra	te sensor		Condition	Voltage
Connector	Terminal	_	Condition	voltage
M72	4	Ground	Ignition switch: ON	Battery voltage
IVI7 Z	4	Giodila	Ignition switch: OFF	Approx. 0 V

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

# 4. CHECK YAW RATE SENSOR GROUND CIRCUIT

Check continuity between yaw rate sensor harness connector terminal and ground.

Yaw rate sensor		_	Continuity
Connector	Terminal		Continuity
M72	1	Ground	Existed

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning components.

### 5. CHECK YAW RATE SENSOR HARNESS

- 1. Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between yaw rate sensor harness connector terminals and ABS actuator and electric unit (control unit) harness connector terminals.

ABS actuator and ele	ectric unit (control unit)	Yaw rate sensor  Connector Terminal  Continu		Continuity
Connector	Terminal			Continuity
E36	14	M72	2	Existed
L30	25	IVIT Z	3	LAISIEU

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning components.

### **6.**CHECK DATA MONITOR

- 1. Connect the yaw rate sensor connector and ABS actuator and electric unit (control unit) connector.
- 2. Select "YAW RATE SEN", in "DATA MONITOR" and check yaw rate sensor signal.

Vehicle condition	YAW RATE SEN (DATA MONITOR)	
Stopped	Approx. 0 d/s	
Turning right	Negative value	
Turning left	Positive value	

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Replace yaw rate sensor.

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### C1145 YAW RATE SENSOR

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

# Component Inspection

INFOID:0000000001181792

### 1. CHECK DATA MONITOR

Select "YAW RATE SEN" in "DATA MONITOR" and check yaw rate sensor signal.

Vehicle condition	YAW RATE SEN (DATA MONITOR)	
Stopped	Approx. 0 d/s	
Turning right	Negative value	
turning left	Positive value	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-132">BRC-132</a>, "Diagnosis Procedure".

### Special Repair Requirement

INFOID:0000000001181793

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

>> END

### C1146 G SENSOR

Description INFOID:0000000001181794

G sensor detects G affecting the vehicle, and transmits the data to the ABS actuator and electric unit (control unit) as an analog voltage signal.

DTC Logic INFOID:0000000001181795

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause	D
C1146	SIDE G-SEN CIRCUIT	Side G sensor is malfunctioning, or circuit of side G sensor is open or shorted.	Harness or connector     ABS actuator and electric unit (control unit)     G sensor	Е

### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results SIDE G-SEN CIRCUIT

### Is above displayed on the self-diagnosis display?

>> Proceed to diagnosis procedure. Refer to <a href="BRC-135">BRC-135</a>, "Diagnosis Procedure". YES

NO >> INSPECTION END

### Diagnosis Procedure

**CAUTION:** 

Sudden turns (such as spin turns, acceleration turns), drifting, etc., when VDC function is off (VDC OFF switch "ON") may cause G sensor system to indicate a malfunction. However, this is not a malfunction, if normal operation can be resumed after restarting engine. Then erase memory of self-diagnosis.

### INSPECTION PROCEDURE

### CHECK INSTALLATION STATE OF G SENSOR

Check G sensor is correctly attached to vehicle. Refer to BRC-177, "Exploded View".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

### 2.CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector. 2.
- 3. Disconnect G sensor connector.
- 4. Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-135, "Diagnosis Procedure"</u>.

#### Is any item indicated on the self-diagnosis display?

YES >> GO TO 3.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 3.check g sensor harness

- Turn ignition switch OFF.
- 2. Disconnect G sensor connector and ABS actuator and electric unit (control unit) connector.

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INFOID:0000000001181796

### < COMPONENT DIAGNOSIS >

Check continuity between G sensor harness connector terminals and ABS actuator and electric unit (control unit) harness connector terminals.

ABS actuator and ele	ectric unit (control unit)	G sensor		Continuity
Connector	Terminal	Connector	Terminal	Continuity
	14		1	
E36	21	M71	2	Existed
	24		3	

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

## 4. CHECK DATA MONITOR

- Connect the G sensor connector and ABS actuator and electric unit (control unit) connector.
- Select "SIDE G-SENSOR" in "DATA MONITOR" and check G sensor signal.

Vehicle condition	SIDE G-SENOR (DATA MONITOR)	
Stopped	Approx. 0 m/s <sup>2</sup>	
Turning right	Negative value	
Turning left	Positive value	

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Replace G sensor.

### Component Inspection

INFOID:0000000001181797

### 1. CHECK DATA MONITOR

Select "SIDE G-SENSOR" in "DATA MONITOR" and check G sensor signal.

Vehicle condition	SIDE G-SENSOR (DATA MONITOR)	
Stopped	Approx. 0 m/s <sup>2</sup>	
Turning right	Negative value	
Turning left	Positive value	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-135">BRC-135</a>, "Diagnosis Procedure".

# Special Repair Requirement

INFOID:0000000001181798

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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INFOID:0000000001181801

# C1147, C1148, C1149, C1150 USV/HSV LINE

Description INFOID:000000001181799

### USV1, USV2 (CUT VALVE)

The cut valve shuts off the normal brake fluid path from the master cylinder, when ESP/TCS is activated.

### HSV1, HSV2 (SUCTION VALVE)

The suction valve supplies the brake fluid from the master cylinder to the pump, when ESP/TCS is activated.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1147	USV LINE [FL-RR]	ESP switch-over solenoid valve (USV1) on the primary side is open circuit or shorted, or the control line is open or shorted to the power supply or the ground.	
C1148	USV LINE [FR-RL]	ESP switch-over solenoid valve (USV2) on the primary side is open circuit or shorted, or the control line is open or shorted to the power supply or the ground.	Harness or connector     ABS actuator and electric unit
C1149	HSV LINE [FL-RR]	ESP switch-over solenoid valve (HSV1) on the primary side is open circuit or shorted, or the control line is open or shorted to the power supply or the ground.	(control unit)
C1150	HSV LINE [FR-RL]	ESP switch-over solenoid valve (HSV2) on the primary side is open circuit or shorted, or the control line is open or shorted to the power supply or the ground.	

### DTC CONFIRMATION PROCEDURE

# 1. CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results
USV LINE [FL-RR]
USV LINE [FR-RL]
HSV LINE [FL-RR]
HSV LINE [FR-RL]

#### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-137</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

# Diagnosis Procedure

INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- 4. Reconnect connector and then perform the self-diagnosis. Refer to <a href="BRC-95">BRC-95</a>, "CONSULT-III Function (ABS)".

### Is any item indicated on the self-diagnosis display?

YES >> GO TO 2.

NO >> Poor connection of connector terminal. Replace or repair connector.

**BRC-137** 

< COMPONENT DIAGNOSIS >

2.check solenoid, esp switch-over valve and actuator relay power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) connector.
- Check voltage between ABS actuator and electric unit (control unit) harness connector terminal and ground.

ABS actuator and ele	ectric unit (control unit)	— Voltage	
Connector	Terminal		voltage
E36	3	Ground	Battery voltage

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

# 3.check solenoid, esp switch-over valve and acuator relay ground circuit

Check continuity between ABS actuator and electric unit (control unit) harness connector terminals and ground.

ABS actuator and electric unit (control unit)		_	Continuity
Connector	Terminal		Continuity
E36	1, 4	Ground	Existed

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

## Component Inspection

INFOID:0000000001181802

[ESP/TCS/ABS]

# 1. CHECK ACTIVE TEST

- 1. Select each test menu item on "ACTIVE TEST".
- On the display, touch "UP", "ACT UP", and "ACT KEEP", and check that the system operates as shown in the table below.

Test item	Display item	Display		
iest ileili	(Note)	UP	ACT UP	ACT KEEP
	FR RH IN SOL	OFF	OFF	OFF
FR RH SOL	FR RH OUT SOL	OFF	OFF	OFF
FR RH SOL	USV [FR-RL]	OFF	ON	ON
	HSV [FR-RL]	OFF	ON*	OFF
	FR LH IN SOL	OFF	OFF	OFF
ED I II SOI	FR LH OUT SOL	OFF	OFF	OFF
FR LH SOL	USV [FL-RR]	OFF	ON	ON
	HSV [FL-RR]	OFF	ON*	OFF
	RR RH IN SOL	OFF	OFF	OFF
RR RH SOL	RR RH OUT SOL	OFF	OFF	OFF
KK KH SUL	USV [FL-RR]	OFF	ON	ON
	HSV [FL-RR]	OFF	ON*	OFF
RR LH SOL	RR LH IN SOL	OFF	OFF	OFF
	RR LH OUT SOL	OFF	OFF	OFF
	USV [FR-RL]	OFF	ON	ON
	HSV [FR-RL]	OFF	ON*	OFF

<sup>\*:</sup> ON for 1 to 2 seconds after the touch, and then OFF.

### C1147, C1148, C1149, C1150 USV/HSV LINE

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

NOTE:

A brief moment of ON/OFF condition occurs every 20 seconds after ignition switch turned ON. This is not malfunction because it is an operation for checking.

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Is the inspection result normal?

YES >> INSPECTION END

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NO >> Go to diagnosis procedure. Refer to <a href="BRC-137">BRC-137</a>, "Diagnosis Procedure".

Special Repair Requirement

INFOID:0000000001181803

1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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# C1155 BRAKE FLUID LEVEL SWITCH

Description INFOID:000000001181804

Brake fluid level switch contacts close when brake fluid level is low. This is detected by the combination meter which sends the status of fluid level to the ABS actuator and electric unit (control unit) via the CAN communication.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1155	BR FLUID LEVEL LOW	Ignition switch ON and brake fluid signal low or not available for 10 seconds.	<ul> <li>Brake fluid level is low</li> <li>Brake fluid level switch</li> <li>Harness or connector</li> <li>CAN communication line</li> <li>Combination meter</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### CHECK SELF-DIAGNOSIS RESULTS

Check the self-diagnosis results.

Self-diagnosis results	
BR FLUID LEVEL LOW	

### Is above displayed on the self-diagnosis display?

YES >> Proceed to diagnosis procedure. Refer to <u>BRC-140</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000001181806

#### INSPECTION PROCEDURE

# 1. CHECK BRAKE FLUID LEVEL

Check the brake fluid level.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Investigate and fix.

# 2.CHECK BRAKE WARNING LAMP 1

Check that the brake warning lamp illuminates after the ignition switch is turned ON.

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Check wiring to brake fluid level switch and combination meter.

### 3.CHECK BRAKE WARNING LAMP 2

Check that the brake warning lamp in the combination meter turns ON/OFF correctly when operating the parking brake.

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Check parking brake switch. Refer to <u>BRC-144</u>, "<u>Diagnosis Procedure</u>".

### 4. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect brake fluid level switch connector and combination meter connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.

### C1155 BRAKE FLUID LEVEL SWITCH

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

Reconnect connectors and then perform the self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

Is any item indicated on the self-diagnosis display?

YES >> GO TO 5.

NO >> Poor connection of connector terminal. Replace or repair connector.

# 5. CHECK BRAKE FLUID LEVEL SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect brake fluid level switch connector.
- 3. Check continuity between brake fluid level switch connector terminals.

Brake fluid	level switch	Condition	Continuity	
Connector	Terminal	Condition		
E37	1 – 2	When brake fluid is full in the reservoir tank.	Not existed	
E31	1-2	When brake fluid is empty in the reservoir tank.	Existed	

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Brake fluid level switch is malfunction. Replace reservoir tank.

### 6.CHECK BRAKE FLUID LEVEL SWITCH CIRCUIT

- Disconnect combination meter connector.
- Check continuity between brake fluid level switch harness connector terminals and combination meter harness connector terminal and/or ground.

Combina	Combination meter		Brake fluid level switch	
Connector	Terminal	Connector	Terminal	Continuity
M34	27	E37	1	Existed

Combina	Combination meter		Continuity
Connector	Terminal		Continuity
M34	27	Ground	Not existed

Brake fluid	level switch	— Continuity	
Connector	Connector Terminal		Continuity
E37	2	Ground	Existed

#### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace malfunctioning components.

# **Component Inspection**

# 1. CHECK BRAKE FLUID LEVEL SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect brake fluid level switch connector.
- 3. Check continuity between brake fluid level switch connector terminals.

Brake fluid	level switch		Condition	Continuity
Connector	Terminal	_	Condition	Continuity
E37	1	Cround	When brake fluid is full in the reservoir tank.	Not existed
E37	ļ	Ground	When brake fluid is empty in the reservoir tank.	Existed

#### Is the inspection result normal?

YES >> INSPECTION END

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### C1155 BRAKE FLUID LEVEL SWITCH

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

NO >> Replace reservoir tank.

Special Repair Requirement

INFOID:0000000001181808

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <a href="https://example.com/BRC-77">BRC-77</a>. "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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## U1000, U1002 CAN COMM CIRCUIT

Description

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

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	When ABS actuator and electric unit (control unit) is not transmitting or receiving CAN communication signal for 2 seconds or more.	CAN communication line     ABS actuator and electric unit
U1002	SYSTEM COMM	When ABS actuator and electric unit (control unit) is not transmitting or receiving CAN communication signal for 2 seconds or less.	(control unit)

Diagnosis Procedure

INFOID:0000000001181811

### INSPECTION PROCEDURE

# 1. CHECK CONNECTOR

- Turn ignition switch OFF.
- Disconnect ABS actuator and electric unit (control unit) connector.
- Check terminal for deformation, disconnection, looseness, and so on. If any malfunction is found, repair or replace terminal.
- Reconnect connector and perform self-diagnosis.

Self-diagnosis results
CAN COMM CIRCUIT
SYSTEM COMM

Is above displayed on the self-diagnosis display?

YES >> Go to LAN-13, "Trouble Diagnosis Flow Chart".

NO >> INSPECTION END

# Special Repair Requirement

INFOID:0000000001181812

# 1. ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION

Always perform the neutral position adjustment for the steering angle sensor, when replacing the ABS actuator and electric unit (control unit). Refer to <u>BRC-77</u>. "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".

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### PARKING BRAKE SWITCH

Description INFOID:000000001181813

The parking brake switch converts the status of the parking brake pedal to an electric signal and transmits it to the ABS actuator and electric unit (control unit).

### **Diagnosis Procedure**

INFOID:0000000001181814

# 1. CHECK COMBINATION METER INPUT SIGNAL

- Turn ignition switch ON.
- 2. Check voltage between combination meter harness connector terminal 26 and ground.

26 - Ground

Parking brake ON : Approx. 0 V
Parking brake OFF : Approx. 5 V

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2.check parking brake switch signal circuit

- Turn ignition switch OFF.
- 2. Disconnect combination meter connector and parking brake switch connector.
- Check continuity between combination meter harness connector terminal 26 and parking brake switch harness connector terminal 1.

26 – 1 : Continuity should exist.

4. Check continuity between combination meter harness connector terminal 26 and ground.

26 – Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair harness or connector.

# Component Function Check

INFOID:0000000001181815

# 1. CHECK PARKING BRAKE SWITCH OPERATION

Operate the parking brake pedal. Then check that the brake warning lamp in the combination meter turns on/off correctly.

Condition	Brake warning lamp illumination status
When the parking brake switch is operation	ON
When the parking brake switch is not operation.	OFF

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-144">BRC-144</a>, "Diagnosis Procedure".

# Component Inspection

INFOID:0000000001181816

#### INSPECTION PROCEDURE

# 1. CHECK PARKING BRAKE SWITCH

- Turn ignition switch OFF.
- 2. Disconnect parking brake switch connector.

## **PARKING BRAKE SWITCH**

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

3. Check continuity between parking brake switch terminal and ground.

Parking bi	Parking brake switch		Condition	Continuity
Connector	Terminal		Condition	Continuity
M103	1	Ground	When the parking brake switch is operated.	Existed
WTOS	•	Giodila	When the parking brake switch is not operated.	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace parking brake switch.

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## **ESP OFF SWITCH**

Description INFOID:000000001181817

ESP OFF switch can deactivate (turn OFF) the ESP/TCS function by pressing the ESP OFF switch.

## Component Function Check

### INFOID:0000000001181818

## 1. CHECK ESP OFF SWITCH OPERATION

Turn ON/OFF the ESP OFF switch and check that the ESP OFF indicator lamp in the combination meter turns ON/OFF correctly.

Condition	ESP OFF indicator lamp illumination status
ESP OFF switch: ON	ON
ESP OFF switch: OFF	OFF

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-146">BRC-146</a>. "Diagnosis Procedure".

## Diagnosis Procedure

### INFOID:0000000001181819

## 1. CHECK ESP OFF SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect ESP OFF switch connector.
- 3. Check continuity between ESP OFF switch connector terminals.

ESP OFF switch		Condition	Continuity	
Connector	Terminal	Condition	Continuity	
M5 1 – 2		When ESP OFF switch is hold pressed.	Existed	
IVIS 1 – 2		When releasing ESP OFF switch.	Not existed	

### Is the inspection result normal?

YES >> GO TO 2.

NO >> ESP OFF switch is malfunctioning. Replace ESP OFF switch.

## 2.CHECK ESP OFF SWITCH HARNESS

- Disconnect ABS actuator and electric unit (control unit) connector.
- Check continuity between ESP OFF switch connector terminals and ABS actuator and electric unit (control unit) connector terminal and/or ground.

ABS actuator and electric unit (control unit)		ESP OFF switch		Continuity		
Connector	Terminal	Connector	Terminal	7		
E36	21	M5	1	Existed		
ABS actuator a	and electric unit (	control unit)	_	Continuity		
Connector	Connector Te			Continuity		
E36	E36		Ground	Not existed		
ESP OFF switch				Continuity		
Connector	r Te	erminal		Continuity		
M5		2	Ground	Existed		

### Is the inspection result normal?

### **ESP OFF SWITCH**

### < COMPONENT DIAGNOSIS >

[ESP/TCS/ABS]

YES >> GO TO 3.

NO >> If the open or short in harness, repair or replace harness.

## 3. CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

## Component Inspection

INFOID:0000000001181820

### INSPECTION PROCEDURE

## 1. CHECK ESP OFF SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect ESP OFF switch connector.
- 3. Check continuity between ESP OFF switch connector terminals.

ESP OFF switch		Condition	Continuity	
Connector	Terminal	Condition	Continuity	
M5 1 – 2	1 – 2	When ESP OFF switch is hold pressed.	Existed	
IVIS I - Z		When releasing ESP OFF switch.	Not existed	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ESP OFF switch.

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### [ESP/TCS/ABS]

## **ABS WARNING LAMP**

Description INFOID:000000001181821

 $\times$ : ON -: OFF

Condition	ABS warning lamp
Ignition switch OFF	-
For 1 second after turning ON ignition switch	×
1 second later after turning ON ignition switch	-
ABS function is malfunctioning.	×
EBD function is malfunctioning.	×

## Component Function Check

INFOID:0000000001181822

## 1. CHECK ABS WARNING LAMP OPERATION

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-148">BRC-148</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001181823

## 1. CHECK SELF-DIAGNOSIS

Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-95</u>, "CONSULT-III Function (ABS)".

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check items displayed by self-diagnosis.

## 2. CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

[ESP/TCS/ABS]

## **BRAKE WARNING LAMP**

Description INFOID:000000001181824

×: ON –: OFF

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Condition	Brake warning lamp NOTE 1
Ignition switch OFF	-
For 1 second after turning ON ignition switch	× NOTE 2
1 second later after turning ON ignition switch	X NOTE 2
EBD function is malfunctioning.	×

### NOTE:

- 1: Brake warning lamp will turn on in case of parking brake operation (when switch is ON) or of brake fluid level switch operation (when brake fluid is insufficient).
- · 2: After starting engine, brake warning lamp is turned off.

## Component Function Check

INFOID:0000000001181825

# 1.BRAKE WARNING LAMP OPERATION CHECK 1

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to diagnosis procedure. Refer to <a href="BRC-149">BRC-149</a>, "Diagnosis Procedure".

## 2.BRAKE WARNING LAMP OPERATION CHECK $\scriptscriptstyle 2$

Check that the brake warning lamp in the combination meter turns ON/OFF correctly when operating the parking brake pedal.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check parking brake switch. Refer to BRC-144, "Diagnosis Procedure".

### Diagnosis Procedure

INFOID:0000000001181826

## 1. CHECK PARKING BRAKE SWITCH

Check that the brake warning lamp in the combination meter turns ON/OFF correctly when operating the parking brake pedal.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check parking brake switch. Refer to BRC-144, "Diagnosis Procedure".

## 2. CHECK SELF-DIAGNOSIS

Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-95, "CONSULT-III Function (ABS)"</u>.

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Check items displayed by self-diagnosis.

## 3 CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

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## **ESP OFF INDICATOR LAMP**

Description INFOID:000000001181827

×: ON -: OFF

Condition	ESP OFF indicator lamp
Ignition switch OFF	-
For 1 second after turning ON ignition switch	×
1 second later after turning ON ignition switch	-
ESP OFF switch turned ON. (ESP function is OFF.)	×
ESP/TCS function is malfunctioning.	×
ABS function is malfunctioning.	×
EBD function is malfunctioning.	×

## Component Function Check

INFOID:0000000001181828

## 1. ESP OFF INDICATOR LAMP OPERATION CHECK 1

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to diagnosis procedure. Refer to <a href="BRC-150">BRC-150</a>, "Diagnosis Procedure".

## 2.ESP OFF INDICATOR LAMP OPERATION CHECK 2

Check that the ESP OFF indicator lamp in the combination meter turns ON/OFF correctly when operating the ESP OFF switch.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check ESP OFF switch. Refer to <a href="BRC-146">BRC-146</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001181829

## 1. CHECK SELF-DIAGNOSIS

Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-95, "CONSULT-III Function (ABS)"</u>.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check items displayed by self-diagnosis.

## 2. CHECK ESP OFF SWITCH

Check that the ESP OFF indicator lamp in the combination meter turns ON/OFF correctly when operating the ESP OFF switch.

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Check ESP OFF switch. Refer to <a href="BRC-146">BRC-146</a>, "Diagnosis Procedure".

## 3. CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

[ESP/TCS/ABS]

## SLIP INDICATOR LAMP

Description INFOID:0000000001181830

×: ON –: OFF

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Condition	SLIP indicator lamp
Ignition switch OFF	-
For 1 second after turning ON ignition switch	×
1 second later after turning ON ignition switch	-
VDC/TCS function is malfunctioning.	×
ABS function is malfunctioning.	×
EBD function is malfunctioning.	×

## Component Function Check

INFOID:0000000001181831

## 1. CHECK SLIP INDICATOR LAMP OPERATION

Check that the lamp illuminates for approximately 1 second after the ignition switch is turned ON.

## Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to diagnosis procedure. Refer to <a href="BRC-151">BRC-151</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001181832

## 1. CHECK SELF-DIAGNOSIS

Perform ABS actuator and electric unit (control unit) self-diagnosis. Refer to <u>BRC-95, "CONSULT-III Function (ABS)"</u>.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check items displayed by self-diagnosis.

## 2.CHECK COMBINATION METER

Check if the indication and operation of combination meter are normal. Refer to MWI-25, "Diagnosis Description".

### Is the inspection result normal?

YES >> Replace ABS actuator and electric unit (control unit).

NO >> Repair or replace combination meter.

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< ECU DIAGNOSIS > [ESP/TCS/ABS]

# **ECU DIAGNOSIS**

# ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Reference Value

### VALUES ON THE DIAGNOSIS TOOL

### **CAUTION:**

The display shows the control unit calculation data, so a normal value might be displayed even in the event the output circuit (harness) is open or short-circuited.

Monitor item	Conditi	on	Value/Status
		Vehicle stopped	0 [km/h (MPH)]
FR LH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
		Vehicle stopped	0 [km/h (MPH)]
FR RH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
		Vehicle stopped	0 [km/h (MPH)]
RR LH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
		Vehicle stopped	0 [km/h (MPH)]
RR RH SENSOR	Wheel speed	Vehicle running NOTE 1	Nearly matches the speed meter display (± 10% or less)
STOP LAMP SW	Stop lamp quitch gignel etetue	When brake pedal is depressed	ON
STOP LAIVIP SVV	Stop lamp switch signal status	When brake pedal is not depressed	OFF
BATTERY VOLT	Battery voltage supplied to the ABS actuator and electric unit (control unit)	Ignition switch ON	10 – 16 V
GEAR	Gear position determined by TCM	1st gear 2nd gear 3rd gear 4th gear 5th gear 6th gear	1 2 3 4 5 6
SLCT LVR POSI	Selector lever position	P position R position N position D position	P R N D
OFF SW	ESP OFF switch ON/OFF	ESP OFF switch ON (When ESP OFF indicator lamp is ON)	ON
OFF 3W		ESP OFF switch OFF (When ESP OFF indicator lamp is OFF)	OFF
VAM DATE CEN	Yaw rate detected by yaw rate/side G sensor	When vehicle stop	Approx. 0 °/s
YAW RATE SEN		When vehicle turning	−75 to 75 °/s
ACCEL POS SIC	Throttle actuator opening/closing is displayed	Accelerator pedal not depressed (ignition switch is ON)	0 %
ACCEL POS SIG	(linked with accelerator pedal)	Depress accelerator pedal (ignition switch is ON)	0 - 100 %

ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
[ESP/TCS/ABS] < ECU DIAGNOSIS >

Monitor item	Condit	Condition	
		Vehicle stopped	Approx. 0 m/s <sup>2</sup>
SIDE G-SENSOR Transverse G de	Transverse G detected by side G sensor	Vehicle turning right	Negative value (m/s <sup>2</sup> )
		Vehicle turning left	Positive value (m/s <sup>2</sup> )
STR ANGLE SIG	Steering angle detected by steering angle	Straight-ahead	Approx. 0°
STR ANGLE SIG	sensor	Steering wheel turned	–720 to 720°
PRESS SENSOR	Brake fluid pressure detected by pressure	With ignition switch turned ON and brake pedal released	Approx. 3 bar
TRESS SENSOR	sensor	With ignition switch turned ON and brake pedal depressed	0 to 200 bar
		With engine stopped	0 tr/min
ENGINE RPM	With engine running	Engine running	Almost in accordance with tachometer display
FLUID LEV SW	Brake fluid level switch signal status	When brake fluid level switch ON	ON
I LUID LEV SVV	Brake fluid level switch signal status	When brake fluid level switch OFF	OFF
	Dodding hyplic quitab aignal status	Parking brake switch is active	ON
PARK BRAKE SW	Parking brake switch signal status	Parking brake switch is inactive	OFF
FR RH IN SOL Operation valve	Operation status of front RH inlet solenoid	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
	valve	When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
Opera	Operation status of front RH outlet solenoid	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
FR RH OUT SOL	valve	When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
ED I II IN SOL	Operation status of front LH inlet solenoid	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
FR LH IN SOL	valve	When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
ED I II OUT CO	Operation status of front RH inlet solenoid	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
FR LH OUT SOL valve	valve	When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
RR RH IN SOL	Operation status of rear RH inlet solenoid	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
valve		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF

< ECU DIAGNOSIS > [ESP/TCS/ABS]

Monitor item	Condit	ion	Value/Status
RR RH OUT SOL	Operation status of rear RH outlet solenoid valve	Actuator (solenoid valve) is active ("AC-TIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
KK KH OUT SOL		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
DD I H IN SOI	Operation status of rear LH inlet solenoid valve	Actuator (solenoid valve) is active ("ACTIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
RR LH IN SOL		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
RR LH OUT SOL	Operation status of rear RH inlet solenoid valve	Actuator (solenoid valve) is active ("AC-TIVE TEST" with CONSULT-III) or actuator relay is inactive (in fail-safe mode)	ON
		When the actuator (solenoid valve) is not active and actuator relay is active (ignition switch ON)	OFF
MOTOR RELAY	Motor and motor relay operation	When the motor relay and motor are operating	ON
		When the motor relay and motor are not operating	OFF
ACTUATOR RLY	Actuator relay operation	When the actuator relay is operating	ON
NOTE 2		When the actuator relay is not operating	OFF
ABS WARN LAMP	ABS warning lamp NOTE 3	When ABS warning lamp is ON	ON
ABS WARN LAMP		When ABS warning lamp is OFF	OFF
OFF LAMP	ESP OFF indicator lamp NOTE 3	When ESP OFF indicator lamp is ON	ON
		When ESP OFF indicator lamp is OFF	OFF
SLIP LAMP	OLID TO TO A SUM NOTE 3	When SLIP indicator lamp is ON	ON
SLIF LAWIF	SLIP indicator lamp NOTE 3	When SLIP indicator lamp is OFF	OFF

### NOTE:

- 1: Confirm tire pressure is normal.
- 2: Every 20 seconds momentary switch to OFF.
- 3: On and off timing for warning lamp and indicator lamp.
- ABS warning lamp: BRC-148, "Description".
- ESP OFF indicator lamp: BRC-150, "Description".
- SLIP indicator lamp: BRC-151, "Description".

Wiring Diagram - BRAKE CONTROL SYSTEM -

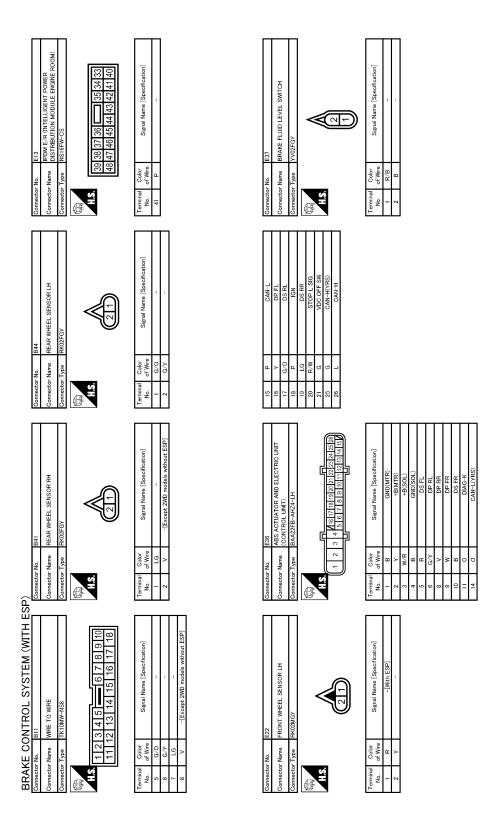
INFOID:0000000001181834 Α (G): With gasoline engine
(D): With diesel engine
(GM): Gasoline engine M/T models
(XG): Except gasoline engine M/T models
(C): With CVT В COMBINATION METER (ABS, SLIP, ESP OFF, BRAKE) (M34) C (M77) D DATA LINE DATA LINE Е BRC STEERING ANGLE SENSOR (M30) ESP OFF SWITCH M76) 44 G To CAN system. (M777) DATA LINK CONNECTOR (M4) IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) 53 M77 YAW RATE SENSOR (M72) 54 Н anij atao M77 E105 ATA LINE ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) IGNITION SWITCH ON or START REAR WHEEL SENSOR RH (B41) 10A J 40A K REAR WHEEL SENSOR LH (B44) To ECM BRAKE CONTROL SYSTEM (WITH ESP) L FRONT WHEEL SENSOR RH (E39) (2) M Ν (M77) E105 FRONT WHEEL SENSOR LH (E22) ₽ 10 10 BATTERY (2) 0 2007/04/27

To shift lock system : CC

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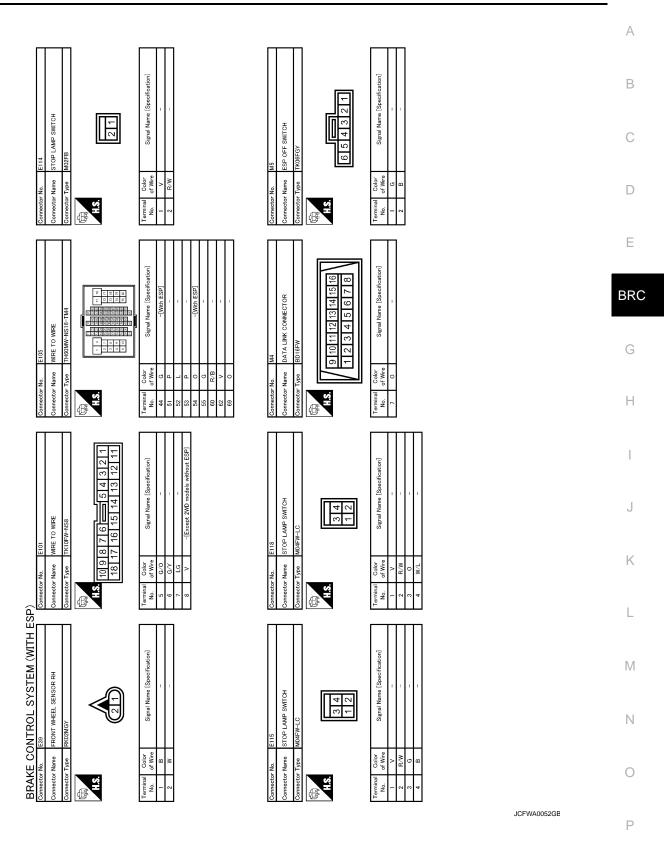
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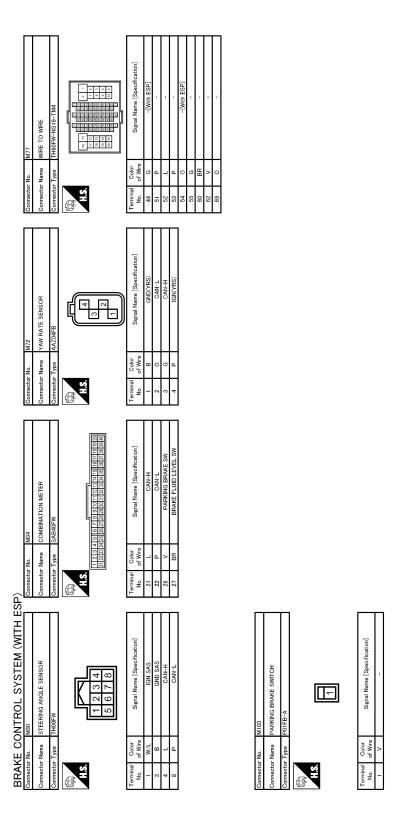
< ECU DIAGNOSIS > [ESP/TCS/ABS]



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< ECU DIAGNOSIS > [ESP/TCS/ABS]





JCFWA0053GE

### Fail-Safe

### INFOID:0000000001181835

## ABS, EBD SYSTEM

In case of electrical malfunctions with the ABS, ABS warning lamp, ESP OFF indicator lamp, SLIP indicator lamp will turn on. In case of electrical malfunctions with the EBD, brake warning lamp, ABS warning lamp, ESP OFF indicator lamp and SLIP indicator lamp will turn on. Simultaneously, the ESP/TCS/ABS become one of the following conditions of the fail-safe function.

< ECU DIAGNOSIS > [ESP/TCS/ABS]

• For malfunction of ABS, only the EBD is activated and the condition of vehicle is the same condition of vehicles without TCS/ABS system.

### NOTE:

ABS self-diagnosis sound may be heard. That is a normal condition because a self-diagnosis for "Ignition switch ON" and "The first starting" are being performed.

 For malfunction of EBD, EBD and ABS become inoperative, and the condition of vehicle is the same as the condition of vehicles without TCS/ABS, EBD system.

### ESP/TCS SYSTEM

In case of malfunction in the ESP/TCS/ABS system, ESP OFF indicator lamp, SLIP indicator lamp are turned on, and the condition of vehicle is the same as the condition of vehicles without ESP/TCS control.

If the Fail-Safe function is activated, then perform self-diagnosis for ESP/TCS/ABS control system.

DTC No. Index

DTC	Items (CONSULT screen terms)	Reference	
C1101	RR RH SENSOR-1	BRC-99, "Description"	
C1102	RR LH SENSOR-1		
C1103	FR RH SENSOR-1		
C1104	FR LH SENSOR-1		
C1105	RR RH SENSOR-2	BRC-102, "Description"	
C1106	RR LH SENSOR-2		
C1107	FR RH SENSOR-2		
C1108	FR LH SENSOR-2		
C1109	BATTERY VOLTAGE [ABNORMAL]	BRC-105, "Description'	
C1110	CONTROLLER FAILURE	BRC-107, "Description'	
C1111	PUMP MOTOR	BRC-109, "Description'	
C1114	MAIN RELAY	BRC-112, "Description"	
C1115	ABS SENSOR [ABNORMAL SIGNAL]	BRC-114, "Description"	
C1116	STOP LAMP SW	BRC-117, "Description"	
C1120	FR LH IN ABS SOL	BRC-120, "Description"	
C1121	FR LH OUT ABS SOL	BRC-123, "Description"	
C1122	FR RH IN ABS SOL	BRC-120, "Description"	
C1123	FR RH OUT ABS SOL	BRC-123, "Description'	
C1124	RR LH IN ABS SOL	BRC-120, "Description"	
C1125	RR LH OUT ABS SOL	BRC-123, "Description"	
C1126	RR RH IN ABS SOL	BRC-120, "Description"	
C1127	RR RH OUT ABS SOL	BRC-123, "Description'	
C1130	ENGINE SIGNAL 1		
C1131	ENGINE SIGNAL 2	BRC-126, "Description"	
C1132	ENGINE SIGNAL 3		
C1142	PRESS SEN CIRCUIT	BRC-127, "Description"	
C1143	ST ANG SEN CIRCUIT	DDO 400 "D 11" "	
C1144	ST ANG SEN SIGNAL	BRC-129, "Description"	
C1145	YAW RATE SENSOR	BRC-132, "Description'	
C1146	SIDE G-SEN CIRCUIT	BRC-135, "Description'	

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ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

[ESP/TCS/ABS] < ECU DIAGNOSIS >

DTC	Items (CONSULT screen terms)	Reference	
C1147	USV LINE [FL-RR]		
C1148	USV LINE [FR-RL]	BRC-137, "Description"	
C1149	HSV LINE [FL-RR]	BRC-137, Description	
C1150	HSV LINE [FR-RL]		
C1153	EMERGENCY BRAKE	BRC-107, "Description"	
C1155	BR FLUID LEVEL LOW	BRC-140, "Description"	
C1170	VARIANT CORDING	BRC-107, "Description"	
U1000	CAN COMM CIRCUIT	BRC-143, "Description"	
U1002	SYSTEM COMM	BRC-143, "Description"	

## **EXCESSIVE ABS FUNCTION OPERATION FREQUENCY**

[ESP/TCS/ABS] < SYMPTOM DIAGNOSIS > SYMPTOM DIAGNOSIS Α **EXCESSIVE ABS FUNCTION OPERATION FREQUENCY** Diagnosis Procedure INFOID:0000000001181837 В 1.CHECK START Check front and rear brake force distribution using a brake tester. Refer to BR-49. "General Specifications" (LHD models), BR-96, "General Specifications" (RHD models). Is the inspection result normal? YES >> GO TO 2. D NO >> Check brake system. 2.CHECK FRONT AND REAR AXLE Make sure that there is no excessive play in the front and rear axles. • Front: FAX-7, "Inspection" (2WD models), FAX-59, "Inspection" (4WD models) Rear: RAX-3, "Inspection" (2WD models), RAX-9, "Inspection" (4WD models) BRC Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace malfunctioning components. 3.CHECK WHEEL SENSOR AND SENSOR ROTOR Check the following. Wheel sensor installation for damage. Н Sensor rotor installation for damage. Wheel sensor connector connection. Wheel sensor harness inspection. Is the inspection result normal? YES >> GO TO 4. NO >> • Replace wheel sensor or sensor rotor. · Repair harness. 4. CHECK ABS WARNING LAMP DISPLAY Make sure that the ABS warning lamp is turned off after the ignition switch is turned ON or when driving. Is the ABS warning lamp illuminated? >> Perform self-diagnosis. Refer to BRC-95, "CONSULT-III Function (ABS)". NO >> INSPECTION END L M N

[ESP/TCS/ABS]

INFOID:0000000001181838

## UNEXPECTED PEDAL REACTION

## Diagnosis Procedure

# 1. CHECK BRAKE PEDAL STROKE

Check brake pedal stroke. Refer to <u>BR-8</u>, "<u>Inspection and Adjustment</u>" (LHD models), <u>BR-55</u>, "<u>Inspection and Adjustment</u>" (RHD models).

### Is the stroke too large?

YES >> • Bleed a

- >> Bleed air from brake tube and hose. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
  - Check brake pedal, brake booster, and master cylinder for mount play, looseness, brake system fluid leakage, etc.
  - Brake pedal: <u>BR-17</u>, "Exploded View" (LHD models), <u>BR-64</u>, "Exploded View" (RHD models).
  - Brake booster: <u>BR-30</u>. "Exploded View" (LHD models), <u>BR-77</u>. "Exploded View" (RHD models).
  - Brake master cylinder: <u>BR-27</u>, "Exploded View" (LHD models), <u>BR-74</u>, "Exploded View" (RHD models).
  - Brake fluid: <u>BR-11</u>, "Inspection" (LHD models), <u>BR-58</u>, "Inspection" (RHD models).

NO >> GO TO 2.

## 2. CHECK FUNCTION

Disconnect ABS actuator and electric unit (control unit) connector to deactivate ABS. Check if braking force is normal in this condition. Connect connector after inspection.

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Check brake system.

## THE BRAKING DISTANCE IS LONG

< SYMPTOM DIAGNOSIS >	[ESP/TCS/ABS]	
THE BRAKING DISTANCE IS LONG		Λ
Diagnosis Procedure	INFOID:000000001181839	Α
CAUTION: The stopping distance on slippery road surfaces might be longer with the the ABS is not operating.  1.CHECK FUNCTION	ABS operating than when	В
Turn ignition switch OFF and disconnect ABS actuator and electric unit (control ABS. In this condition, check stopping distance. After inspection, connect connect	,	

Is the inspection result normal?

YES

NO

>> INSPECTION END

>> Check brake system.

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### **ABS FUNCTION DOES NOT OPERATE**

< SYMPTOM DIAGNOSIS >

[ESP/TCS/ABS]

## **ABS FUNCTION DOES NOT OPERATE**

Diagnosis Procedure

INFOID:0000000001181840

### **CAUTION:**

ABS does not operate when speed is 10 km/h (6 MPH) or lower.

1. CHECK ABS WARNING LAMP DISPLAY

Make sure that the ABS warning lamp turns OFF after ignition switch is turned ON or when driving. <u>Is the inspection result normal?</u>

YES >> INSPECTION END

NO >> Perform self-diagnosis. Refer to <u>BRC-95, "CONSULT-III Function (ABS)"</u>.

### PEDAL VIBRATION OR ABS OPERATION SOUND OCCURS

[ESP/TCS/ABS] < SYMPTOM DIAGNOSIS > PEDAL VIBRATION OR ABS OPERATION SOUND OCCURS Α Diagnosis Procedure INFOID:0000000001181841 **CAUTION:** В Under the following conditions, ABS is activated and vibration is felt when brake pedal is lightly depressed (just place a foot on it). However, this is normal. When shifting gears When driving on slippery road During cornering at high speed When passing over bumps or grooves [at approximately 50 mm (1.97 in) or more] When pulling away just after starting engine [at approximately 10 km/h (6 MPH) or higher] D 1.SYMPTOM CHECK 1 Check that there are pedal vibrations when the engine is started. Е Do vibrations occur? YES >> GO TO 2. NO >> Inspect the brake pedal. BRC 2.SYMPTOM CHECK 2 Check that there are ABS operation noises when the engine is started. Do the operation noises occur? YES >> GO TO 3. NO >> Perform self-diagnosis. Refer to BRC-95, "CONSULT-III Function (ABS)". Н 3.SYMPTOM CHECK 3 Check symptoms when electrical component (headlamps, etc.) switches are operated. Do symptoms occur? YES >> Check if there is a radio, antenna, antenna lead wire, or wiring close to the control unit. If there is, move it farther away. NO >> INSPECTION END J K L M Ν

[ESP/TCS/ABS]

## VEHICLE JERKS DURING ESP/TCS/ABS CONTROL

## Diagnosis Procedure

INFOID:0000000001181842

## 1.SYMPTOM CHECK

Check if the vehicle jerks during ESP/TCS/ABS control.

## Is the inspection result normal?

>> INSPECTION END YES

NO >> GO TO 2.

## 2.CHECK SELF-DIAGNOSIS RESULTS

Perform self-diagnostic of ABS actuator and electric unit (control unit). Refer to BRC-95, "CONSULT-III Function (ABS)".

### Are self-diagnosis results indicated?

>> Check corresponding items, make repairs, and perform ABS actuator and electric unit (control unit) self-diagnosis.

NO >> GO TO 3.

## 3.check connector

- Turn ignition switch OFF and disconnect ABS actuator and electric unit (control unit) connector and check terminal for deformation, disconnection, looseness, etc.
- Securely connect connectors and perform ABS actuator and electric unit (control unit) self-diagnosis.

### Are self-diagnosis results indicated?

YES >> If poor contact, damage, open or short circuit of connector terminal is found, repair or replace.

NO >> GO TO 4.

## 4. CHECK ECM AND TCM SELF-DIAGNOSIS RESULTS

Perform ECM and TCM self-diagnosis.

### Are self-diagnosis results indicated?

YES

>> Check the corresponding items.

- ECM:
- HR16DE (with EURO-OBD): ECH-89, "CONSULT-III Function".
- HR16DE (without EURO-OBD): ECH-419, "CONSULT-III Function".
- MR20DE (with EURO-OBD): ECM-91, "CONSULT-III Function".
- MR20DE (without EURO-OBD): ECM-425, "CONSULT-III Function".
- K9K: ECK-63, "Diagnosis Description".
- M9R: ECR-101, "CONSULT-III Function"
- TCM: Refer to TM-432, "CONSULT-III Function (TRANSMISSION)".

NO >> Replace ABS actuator and electric unit (control unit).

## **NORMAL OPERATING CONDITION**

< SYMPTOM DIAGNOSIS >

[ESP/TCS/ABS]

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# NORMAL OPERATING CONDITION

Description INFOID:000000001181843

Symptom	Result	
Slight vibrations are felt on the brake pedal and the operation noises occur, when ESP, TCS or ABS is activated.		
Stopping distance is longer than that of vehicles without ABS when the vehicle drives on rough, gravel, or snow-covered (fresh, deep snow) roads.	This is a normal condition due to the ESP, TCS or ABS activation.	
The brake pedal moves and generates noises, when TCS or ESP is activated due to rapid acceleration or sharp turn.	1.00 01.7150 dollyddioll.	
The brake pedal vibrates and motor operation noises occur from the engine room, after the engine starts and just after the vehicle starts.	This is a normal, and it is caused by the ABS operation check.	
Depending on the road conditions, the driver may experience a sluggish feel.	This is normal, because TCS places the highest priority on the optimum traction (stability).	
TCS may activate momentarily if wheel speed changes when driving over location where friction coefficient varies, when downshifting, or when fully depressing accelerator pedal.		
The ABS warning lamp, ESP OFF indicator lamp and SLIP indicator lamp may turn ON when the vehicle is subject to strong shaking or large vibration, such as when the vehicle is rotating on a turntable or located on a ship while the engine is running.	In this case, restart the engine on a normal road. If the normal con-	
ESP may not operate normally or the ABS warning lamp, ESP OFF indicator lamp, and SLIP indicator lamp may illuminate, when running on a special road that is extremely slanted (e.g. bank in a circuit course).	dition is restored, there is no malfunction. At	
A malfunction may occur in the yaw rate/side G sensor system, when the vehicle turns sharply, such as during a spin turn, axle turn, or drift driving, while the ESP function is off (ESP OFF indicator lamp illuminated).	that time, erase the self- diagnosis memory.	
The vehicle speed will not increase even though the accelerator pedal is depressed, when inspecting the speedometer on a 2-wheel chassis dynamometer.	Normal (Deactivate the ESP/TCS function before performing an inspection on a chassis dynamometer.)	

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< PRECAUTION > [ESP/TCS/ABS]

# **PRECAUTION**

## **PRECAUTIONS**

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SRS AIRBAG" and "SEAT BELT" of this Service Manual.

### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIRBAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

## Precaution for Brake System

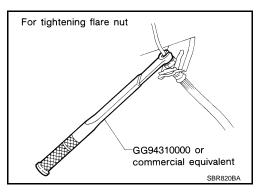
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### **WARNING:**

Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.

- Only use DOT 3 brake fluid. Refer to MA-27, "Fluids and Lubricants".
- Never to reuse drained brake fluid.
- Never to spill or splash brake fluid on painted surfaces. Brake fluid may seriously damage paint. Wipe it off immediately and wash with water if it gets on a painted surface.
- Never to use mineral oils such as gasoline or light oil. They may damage rubber parts and cause improper operation.
- Always loosen the brake tube flare nut with a flare nut wrench.
- Tighten the brake tube flare nut to the specified torque with a flare nut torque wrench.
- Always conform the specified tightening torque when installing the brake pipes.
- Brake system is an important safety part. If a brake fluid leak is detected, always disassemble the affected part. If a malfunction is detected, replace part with a new one.
- Turn the ignition switch OFF and disconnect the ABS actuator and electric unit (control unit) connector or the battery negative terminal before performing the work.



### Precaution for Brake Control

• Just after starting vehicle after ignition switch ON, brake pedal may vibrate or motor operating noise may be heard from engine compartment. This is normal condition.

 When an error is indicated by ABS or another warning lamp, collect all necessary information from customer (what symptoms are present under what conditions) and check for simple causes before starting diagnostic servicing. Besides electrical system inspection, check brake booster operation, brake fluid level, and oil leaks.

- If tire size and type are used in an improper combination, or brake pads are not Genuine NISSAN parts, stopping distance or steering stability may deteriorate.
- ABS might be out of order or malfunctions by putting a radio (wiring inclusive), an antenna and a lead-in wire near the control unit.
- If aftermarket parts (car stereo, CD player, etc.) have been installed, check for incidents such as harness pinches, open circuits, and improper wiring.
- ESP system may not operate normally or a ESP OFF indicator lamp or SLIP indicator lamp may light.

## **PRECAUTIONS**

< PRECAUTION > [ESP/TCS/ABS]

When replacing the following parts with parts other than genuine parts or making modifications: Suspension-related parts (shock absorber, spring, bushing, etc.), tires, wheels (other than specified sizes), brake-related parts (pad, rotor, caliper, etc.), engine-related parts (muffler, ECM, etc.) and body reinforcement-related parts (roll bar, tower bar, etc.).
When driving with worn or deteriorated suspension, tires and brake-related parts.

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< PREPARATION > [ESP/TCS/ABS]

# **PREPARATION**

## **PREPARATION**

Special Service Tool

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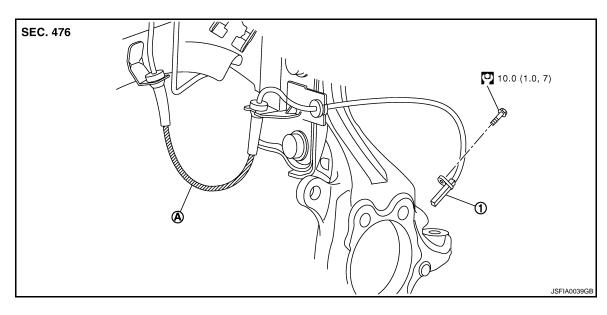
Tool number Tool name		Description
GG94310000 Flare nut torque wrench a: 10 mm (0.39 in)/ 12 mm (0.47 in)	a S-NT406	Installing each brake piping

< ON-VEHICLE REPAIR > [ESP/TCS/ABS]

## ON-VEHICLE REPAIR

WHEEL SENSOR FRONT WHEEL SENSOR

FRONT WHEEL SENSOR: Exploded View



Front LH wheel sensor

A. White line (slant line)

Refer to GI section GI-4, "Components" for symbols in the figure.

### NOTE:

The above figure (front side) shows left side. Right side is the mirror image.

### FRONT WHEEL SENSOR: Removal and Installation

### REMOVAL

Pay attention to the following when removing sensor.

### **CAUTION:**

- Do not twist sensor harness as much as possible, when removing it. Pull sensors out without pulling on sensor harness.
- Take care to avoid damaging sensor edges or rotor teeth. Remove wheel sensor first before removing front or rear wheel hub. This is to avoid damage to sensor wiring and loss of sensor function.
- When you see the harness of the wheel sensor from the front side of the vehicle ensure that the white lines (A) are not twisted.

### INSTALLATION

Pay attention to the following when installing wheel sensor. Tighten installation bolts to the specified torques. Refer to <a href="https://example.com/BRC-66">BRC-66</a>, "FRONT WHEEL SENSOR: Exploded View".

- When installing, make sure there is no foreign material such as iron chips on and in the mounting hole of the wheel sensor. Make sure no foreign material has been caught in the sensor rotor. Remove any foreign material and clean the mount.
- When installing wheel sensor, be sure to press rubber grommets in until they lock at locations shown above in the figure. When installed, harness must not be twisted.

### REAR WHEEL SENSOR

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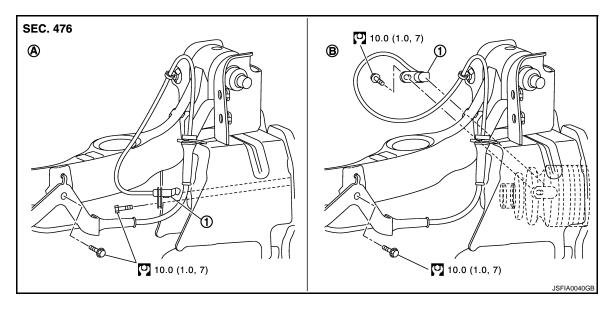
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REAR WHEEL SENSOR: Exploded View

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INFOID:0000000001181851



- 1. Rear LH wheel sensor
- A. 2WD models
- B. 4WD models

Refer to GI section GI-4, "Components" for symbols in the figure.

### NOTE:

The above figure (front side) shows left side. Right side is the mirror image.

REAR WHEEL SENSOR: Removal and Installation

### **REMOVAL**

Pay attention to the following when removing sensor.

### **CAUTION:**

- Do not twist sensor harness as much as possible, when removing it. Pull sensors out without pulling on sensor harness.
- Take care to avoid damaging sensor edges or rotor teeth. Remove wheel sensor first before removing front or rear wheel hub. This is to avoid damage to sensor wiring and loss of sensor function.

### INSTALLATION

Pay attention to the following when installing wheel sensor. Tighten installation bolts to the specified torques. Refer to <a href="https://example.com/BRC-67">BRC-67</a>, "REAR WHEEL SENSOR: Exploded View".

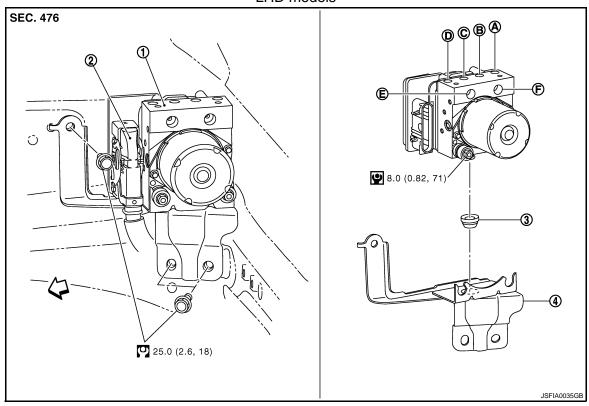
- When installing, make sure there is no foreign material such as iron chips on and in the mounting hole of the wheel sensor. Make sure no foreign material has been caught in the sensor rotor. Remove any foreign material and clean the mount.
- When installing wheel sensor, be sure to press rubber grommets in until they lock at locations shown above in the figure. When installed, harness must not be twisted.

## **SENSOR ROTOR**

SENSOR ROTOR	
< ON-VEHICLE REPAIR >	[ESP/TCS/ABS]
SENSOR ROTOR	A
FRONT SENSOR ROTOR	/ /
FRONT SENSOR ROTOR : Exploded View	INFOID:000000001181852
Refer to FAX-9, "Exploded View" (2WD models), FAX-61, "Exploded View" (4WD models)	dels).
FRONT SENSOR ROTOR : Removal and Installation	INFOID:000000001181853
REMOVAL Sensor rotor cannot be disassembled. Remove the sensor rotor together with wheel bly. Refer to FAX-9, "Removal and Installation" (2WD models), FAX-61, "Removal and els).	
INSTALLATION  Sensor rotor cannot be disassembled. Installation the sensor rotor together with assembly. Refer to <u>FAX-9</u> , " <u>Removal and Installation</u> " (2WD models), <u>FAX-61</u> , "Removal and <u>Installation</u> " (2WD models).	
REAR SENSOR ROTOR	BIN
REAR SENSOR ROTOR : Exploded View	INFOID:000000001181854
Refer to RAX-4, "Exploded View" (2WD models), RAX-13, "Exploded View" (4WD models)	
REAR SENSOR ROTOR : Removal and Installation	INFOID:000000001181855
2WD MODELS	
Removal Sensor rotor cannot be disassembled. Remove the sensor rotor together with wheel bly. Refer to RAX-4, "Removal and Installation".	hub and bearing assem-
Installation Sensor rotor cannot be disassembled. Installation the sensor rotor together with assembly. Refer to RAX-4, "Removal and Installation".	wheel hub and bearing
4WD MODELS	К
For removal and installation of sensor rotor, refer to RAX-14, "Disassembly and Asse	<u>;mbly"</u> .
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**Exploded View** INFOID:0000000001181856

### LHD models



- 1. ABS actuator and electric unit (control 2. unit)
- Connector

Bushing

- **Bracket** 4.
- A. To front LH brake caliper
- B. To rear RH brake caliper
- C. To Rear LH brake caliper

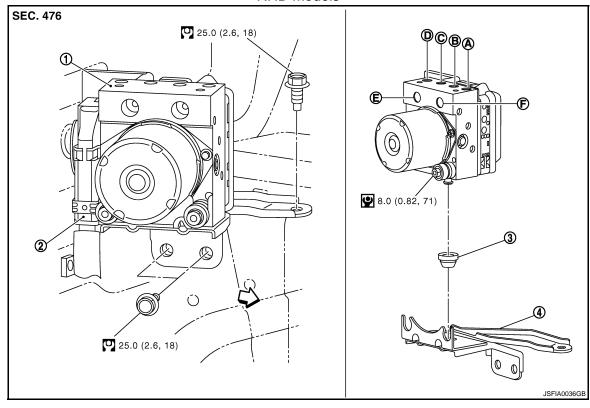
- D. To front RH brake caliper
- E. From master cylinder secondary side F. From master cylinder primary side

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⇒: Vehicle front

Refer to GI section GI-4, "Components" for symbols in the figure.

[ESP/TCS/ABS] < ON-VEHICLE REPAIR >





- ABS actuator and electric unit (control 2. 1. unit)
- Connector

Bushing

- **Bracket** 4.
- A. To front LH brake caliper
- B. To rear RH brake caliper
- C. To Rear LH brake caliper

- D. To front RH brake caliper
- E. From master cylinder secondary side F. From master cylinder primary side

< : Vehicle front

Refer to GI section GI-4, "Components" for symbols in the figure.

### Removal and Installation

LHD MODELS

### Removal

### **CAUTION:**

- . Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to BR-12, "Bleeding Brake System" (LHD models), <u>BR-59</u>, "<u>Bleeding Brake System</u>" (RHD models).
- Remove cowl top cover. Refer to EXT-19, "Exploded View". 1.
- Remove exhaust manifold.
  - HR16DE: <u>EX-5</u>, "<u>Exploded View</u>".
  - MR20DE: EX-10, "Exploded View".
  - K9K: EX-15, "Exploded View".
  - M9R: EM-369, "Exploded View".
- Disconnect ABS actuator and electric unit (control unit) connector.
- Loosen brake tube flare nuts, then remove brake tubes from ABS actuator and electric unit (control unit). 4.
- 5. Remove ABS actuator and electric unit (control unit) bracket mounting nut.
- Remove ABS actuator and electric unit (control unit) from vehicle.

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< ON-VEHICLE REPAIR > [ESP/TCS/ABS]

Installation

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

### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- After installing harness connector in the ABS actuator and electric unit (control unit), make sure connector is securely locked.
- When replacing ABS actuator and electric unit (control unit), make sure to adjust neutral position of steering angle sensor. Refer to <u>BRC-77</u>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL <u>POSITION</u>: Special Repair Requirement".

### RHD MODELS

### Removal

### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- 1. Remove cowl top cover. Refer to EXT-19, "Exploded View".
- 2. Remove air cleaner and air duct.
  - HR16DE: <u>EM-28</u>, "<u>Exploded View</u>".
  - MR20DE: EM-145, "Exploded View".
  - K9K: EM-266, "Exploded View".
  - M9R: EM-354, "Exploded View".
- 3. Disconnect ABS actuator and electric unit (control unit) connector.
- 4. Loosen brake tube flare nuts, then remove brake tubes from ABS actuator and electric unit (control unit).
- Remove ABS actuator and electric unit (control unit) bracket mounting nut.
- 6. Remove ABS actuator and electric unit (control unit) from vehicle.

### Installation

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

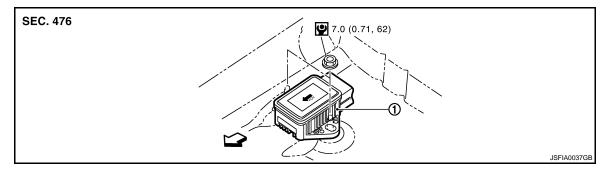
### **CAUTION:**

- Before servicing, disconnect the battery cable from negative terminal.
- To remove brake tube, use a flare nut wrench to prevent flare nuts and brake tube from being damaged. To install, use flare nut crowfoot and torque wrench.
- Do not apply excessive impact to ABS actuator and electric unit (control unit), such as dropping it.
- Do not remove and install actuator by holding harness.
- After work is completed, bleed air from brake tube. Refer to <u>BR-12, "Bleeding Brake System"</u> (LHD models), <u>BR-59, "Bleeding Brake System"</u> (RHD models).
- After installing harness connector in the ABS actuator and electric unit (control unit), make sure connector is securely locked.
- When replacing ABS actuator and electric unit (control unit), make sure to adjust neutral position of steering angle sensor. Refer to <u>BRC-77</u>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL <u>POSITION: Special Repair Requirement"</u>.

[ESP/TCS/ABS]

## YAW RATE/SIDE G SENSOR

Exploded View



1. Yaw rate/side G sensor

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□: Vehicle front

Refer to GI section GI-4, "Components" for symbol makes in the figure.

### Removal and Installation

## REMOVAL

### **CAUTION:**

- Do not drop or strike yaw rate/side G sensor, because it has little endurance to impact.
- Do not use power tool etc., because yaw rate/side G sensor is sensitive for the impact.
- 1. Remove lower instrument cover RH. Refer to IP-11, "Exploded View".
- 2. Disconnect yaw rate/side G sensor harness connector.
- Remove mounting nuts. Remove yaw rate/side G sensor.

### **INSTALLATION**

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

### **CAUTION:**

- Do not drop or strike yaw rate/side G sensor, because it has little endurance to impact.
- Do not use power tool etc., because yaw rate/side G sensor is sensitive for the impact.

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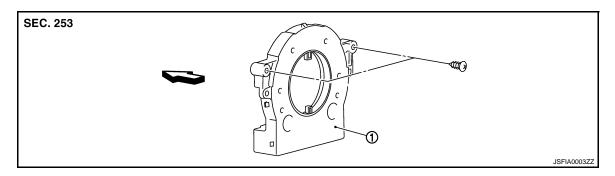
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## STEERING ANGLE SENSOR

Exploded View



1. Steering angle sensor

<□: Vehicle front

### Removal and Installation

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### **REMOVAL**

- 1. Remove spiral cable assembly. Refer to <a href="SR-6">SR-6</a>, "Exploded View".
- 2. Remove steering angle sensor from spiral cable assembly.

### **INSTALLATION**

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

### **CAUTION:**

After work, make sure to adjust neutral position of steering angle sensor. Refer to <u>BRC-77</u>, "ADJUST-MENT OF STEERING ANGLE SENSOR NEUTRAL POSITION: Description".