SECTION STC STEERING CONTROL SYSTEM

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< BASIC INSPECTION >

BASIC INSPECTION DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

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DETAILED FLOW

1.COLLECT THE INFORMATION FROM THE CUSTOMER

It is also important to clarify customer complaints before inspection. First of all, reproduce symptoms, and understand them fully. Ask customer about his/her complaints carefully. In some cases, it is necessary to check symptoms by driving vehicle with customer.

CAUTION:

Customers are not professional. It is dangerous to make an easy guess like "maybe the customer means that...," or "maybe the customer mentions this symptom".

>> GO TO 2.

2. CHECK THE STATUS

- 1. Power steering fluid leakage and check the power steering fluid level. Refer to ST-12, "Inspection".
- 2. Check the drive belt tension. Refer to EM-13. "Checking".
- 3. Check the power steering gear for damages, cracks and fluid leakage. Refer to <u>ST-12, "Inspection"</u>.
- 4. Check the relief oil pressure. Refer to <u>ST-52</u>, "FOR MODELS WITHOUT 4WAS AND MODELS EXCEPT SPORT MODELS : Inspection".

>> GO TO 3.

3. DIAGNOSIS CHART BY SYMPTOM

Perform the diagnosis by symptom. Refer to STC-23, "Diagnosis Procedure".

>> GO TO 4.

4.FINAL CHECK

Check the input/output standard values for the power steering control unit.

Are the power steering control unit input/output values within standard ranges respectively?

YES >> INSPECTION END NO >> GO TO 2.

< SYSTEM DESCRIPTION > SYSTEM DESCRIPTION EPS SYSTEM

System Diagram

CONTROL DIAGRAM



CROSS-SECTIONAL VIEW



System Description

1.

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• The EPS system controls the power steering solenoid valve through the power steering control unit.

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EPS SYSTEM

< SYSTEM DESCRIPTION >

[WITHOUT 4WAS]

• The valve driving voltage to control the power steering solenoid valve varies according to the vehicle speed.



OPERATION PRINCIPLE

During Parking (When Turning The Steering Wheel To The Right.)



- 1. Power steering solenoid valve is closed while a vehicle is stopped.
- 2. Pinion "1R", "2R" and "3R" are closed depending on steering torque of steering wheel.
- 3. Oil pressure "P" in the gear housing assembly is the sum of oil pressures occurred in "2R" and "3R". This results in a light steering force because of high pressure.

During High-speed Operation



- 1. Power steering solenoid valve is opened during high-speed operation.
- 2. Pinion "1R", "2R" and "3R" are closed depending on steering torque of steering wheel.
- 3. Oil pressure "2R" does not occur because the power steering solenoid valve is on full throttle.
- 4. Oil pressure "P" in the gear housing assembly includes only oil pressure occurred in "3R" and results in a heavy steering force.

EPS SYSTEM

< SYSTEM DESCRIPTION >

Component Parts Location

[WITHOUT 4WAS]

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| Component parts | Reference/Function |
|-------------------------------|--|
| Power steering control unit | Signals from various sensors control the driving voltage to the power steering solenoid valve. The power steering control unit controls the driving voltage to the power steering solenoid valve for maintaining the power steering assist force when the fail-safe function is activated. (The engine speed signals control EPS system if any vehicle speed signal error is detected.) |
| Unified meter and A/C amp. | STC-15. "Description" |
| ECM | STC-13. "Description" |
| Power steering solenoid valve | STC-11, "Description" |

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DTC/CIRCUIT DIAGNOSIS POWER SUPPLY AND GROUND CIRCUIT

Description

Power supply to EPS system

Diagnosis Procedure

1.CHECK POWER SUPPLY

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

| Pov | ver steering control unit | Voltage (Approx.) |
|--------------------|---------------------------|-------------------|
| Connector Terminal | | Vollage (Applox.) |
| M108 | 3 – Ground | 0 V |

4. Turn the ignition switch ON.

CAUTION: Never start the engine.

5. Check the voltage between power steering control unit harness connector and ground.

| Pov | ver steering control unit | Voltage (Approx.) |
|--------------------|---------------------------|-------------------|
| Connector Terminal | | Vollage (Applox.) |
| M108 | 3 – Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 2. NO >> Check th

- >> Check the following. If any items are damaged, repair or replace damaged parts.
 - 10A fuses (#45) open
 - Harness for short or open between ignition switch and power steering control unit harness connector No. 3 terminal.
 - Ignition switch. Refer to PCS-63, "Component Inspection".

2.CHECK GROUND CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Check the continuity between power steering control unit harness connector and ground.

| | Continuity | |
|-----------|------------|------------|
| Connector | Terminal | Continuity |
| M108 | 6 – Ground | Existed |

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to power in harness or connectors.

 ${f 3.}$ CHECK TERMINALS AND HARNESS CONNECTORS

Check the power steering control unit pin terminals for damage or loose connection with harness connector. Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace damaged parts.

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POWER STEERING SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

POWER STEERING SOLENOID VALVE

Description

Power steering solenoid valve controls the power steering oil pressure in the gear housing assembly.

Diagnosis Procedure

1.CHECK POWER STEERING SOLENOID VALVE SIGNAL

- 1. Turn the ignition switch OFF.
- 2. Check the voltage between power steering control unit harness connector and ground.

| | | Voltage (Ap- | | |
|------|------------|--|-------------|--------|
| | Connector | Terminal | Condition | prox.) |
| M108 | 1 – Ground | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | 4.4 – 6.6 V | |
| | | Vehicle speed: 100 km/h (62 MPH) | 2.4 – 3.6 V | |

Is the inspection result normal?

YES >> GO TO 2. NO >> GO TO 4.

2.CHECK HARNESS BETWEEN POWER STEERING SOLENOID VALVE AND POWER STEERING CON-

- 1. Turn the ignition switch OFF.
- 2. Disconnect power steering solenoid valve harness connector.
- 3. Disconnect power steering control unit harness connector.
- 4. Check the continuity between power steering solenoid valve harness connector and the power steering control unit harness connector.

| Power steering solenoid valve | | Power steeri | Continuity | |
|----------------------------------|----------|--------------------|------------|---------|
| Connector | Terminal | Connector Terminal | | |
| F45 | 1 | M108 | 1 | Existed |
| F45 | 2 | M108 | 5 | Existed |

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace damaged parts.

3.CHECK POWER STEERING SOLENOID VALVE

1. Check the resistance between power steering solenoid valve connector terminals.

| Powe | er steering solenoid valve | Posistance (Approx.) |
|-----------|----------------------------|------------------------|
| Connector | Terminal | - Resistance (Approx.) |
| F45 | 1 – 2 | 4 – 6 Ω |

2. Check the power steering solenoid valve connector by listening for its operation sound while applying battery voltage to power steering solenoid valve connector F45 terminals 1 (positive) and 2 (negative).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace gear-sub assembly. Refer to <u>ST-30, "2WD : Exploded View"</u> (2WD), <u>ST-37, "AWD :</u> <u>Exploded View"</u> (AWD).

4.CHECK TERMINALS AND HARNESS CONNECTORS

• Check the power steering control unit pin terminals for damage or loose connection with harness connector.

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POWER STEERING SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[WITHOUT 4WAS]

Check the power steering solenoid valve pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace damaged parts.

Component Inspection

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1.CHECK POWER STEERING SOLENOID VALVE

1. Turn the ignition switch OFF.

2. Disconnect power steering solenoid valve harness connector.

3. Check the resistance between power steering solenoid valve connector terminals.

| Powe | er steering solenoid valve | Resistance (Approx.) |
|-----------|----------------------------|----------------------|
| Connector | Terminal | Resistance (Approx.) |
| F45 | 1 – 2 | 4 – 6 Ω |

4. Check the power steering solenoid valve connector by listening for its operation sound while applying battery voltage to power steering solenoid valve connector F45 terminals 1 (positive) and 2 (negative).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace gear-sub assembly. Refer to <u>ST-30, "2WD : Exploded View"</u> (2WD), <u>ST-37, "AWD :</u> <u>Exploded View"</u> (AWD).

ENGINE SPEED SIGNAL CIRCUIT

| < DTC/CIRO | CUIT DIAGN | OSIS > | | | [WITHOUT 4WAS] | | | |
|---|-------------------------------------|---|-----------|--------------------------------|------------------------|----|--|--|
| ENGINE | SPEED | SIGNAL CIRCUI | Г | | | ٨ | | |
| Description | | | | | | | | |
| ECM sends | engine speed | signal to power steering | g control | unit. | | R | | |
| Diagnosis | Procedur | e | - | | INFOID:000000005650280 | | | |
| 1.PERFOR | M ECM SELI | -DIAGNOSIS | | | | С | | |
| | NSULT-III | | | | | | | |
| Perform EC | M self-diagno | sis. | | | | D | | |
| YES >> | <u>system detec</u> Check the er | <u>ted ?</u> ror svstem. | | | | | | |
| NO >> | GO TO 2. | | | | | Е | | |
| 2.CHECK | HARNESS BE | ETWEEN ECM AND PO | NER ST | EERING CONTROL UNIT | | | | |
| Turn the Disconn | e ignition swite lect ECM hari | ch OFF. ness connectors. | | | | F | | |
| 3. Disconn | ect power ste | ering control unit harnes | s conne | ctor. | init harnoog gannastar | | | |
| 4. Check i | | | Unnector | r and power steering control t | | ÷т | | |
| E | CM | Power steering control unit | Continuit | tv. | | | | |
| Connector | Terminal | Connector Terminal | | | | ш | | |
| M107 | 110 | M108 10 | Existed | | | П | | |
| Also che Is the inspec | ction result no | or short to ground and si ormal? | | ower. | | | | |
| YES >> | GO TO 3. | | | | | | | |
| NO >> | Repair or rep | lace damaged parts. | | | | | | |
| | INGINE SPE | ED SIGNAL (1) | | | | J | | |
| 2. Connec | t ECM harnes | s connectors. | | | | | | |
| 3. Check t | he signal betv | veen ECM harness conr | ector an | d ground with oscilloscope. | | Κ | | |
| | | ECM | | | | | | |
| Connector | Terminal | Condition | | Value (Approx.) | | L | | |
| | | | | 4.0 | | | | |
| | | | | 6 ······ | | M | | |
| | | Engine speed: At idle (Warm-up condition) | | | | | | |
| | | , , , , , , , , , , , , , , , , , , , | | 0 | | Ν | | |
| M107 | 110 One used | | | PBIA3654J | | | | |
| | 110 – Ground | | | | | 0 | | |
| | | | | (V) 6 | | | | |
| | | Engine speed: Approx. 2,00 (Warm-up condition) | 0 rpm | | | P | | |
| | | (| | | | Γ. | | |
| | | | | PBIA3655J | | | | |
| · · · · · | | · · · · · · · · · · · · · · · · · · · | <u> </u> | | | | | |

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

ENGINE SPEED SIGNAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace ECM. Refer to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Description".

4.CHECK ENGINE SPEED SIGNAL (2)

- 1. Turn the ignition switch OFF.
- 2. Connect power steering control unit harness connector.
- 3. Check the signal between power steering control unit harness connector and ground with oscilloscope.

| | Power st | | |
|-----------|---------------|--|--|
| Connector | Terminal | Condition | Value (Approx.) |
| M108 | 10 – Ground | Engine speed: At idle (Warm-up condition) | (V) 6 4 2 0 20ms PBIA3654J |
| MTOO | 10 – Ground - | Engine speed: Approx. 2,000 rpm (Warm-up condition) | (V) 6 4 2 0 20ms PBIA3655J |

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace power steering control unit. Refer to <u>STC-26, "Exploded View"</u>.

5. CHECK TERMINALS AND HARNESS CONNECTORS

Check the power steering control unit pin terminals for damage or loose connection with harness connector.
Check ECM pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace damaged parts.

VEHICLE SPEED SIGNAL CIRCUIT

| < DTC/CIRC | | NOSIS > | [WITHOUT 4WAS] | | | | |
|--|---|--|--|--|--|--|--|
| VEHICLE | E SPEED | D SIGNAL CIRCL | IIT | | | | |
| | | | | | | | |
| Unified mete | er and A/C a | mp. sends vehicle speec | signal to power steering control unit. | | | | |
| Diagnosis | Procedu | re | INF0ID:000000005650282 | | | | |
| 1. PERFOR | M UNIFIED | METER AND A/C AMP. | SELF-DIAGNOSIS | | | | |
| | ISULT-III | | | | | | |
| Perform uni | fied meter a | nd A/C amp. self-diagno | SIS. | | | | |
| YES >> | <u>System dete</u> Check the e | <u>cted :</u> rror system | | | | | |
| NO >> | GO TO 2. | | | | | | |
| 2.снеск і | HARNESS E | BETWEEN UNIFIED ME | TER AND A/C AMP. AND POWER STEERING CONTROL | | | | |
| UNIT | | | | | | | |
| Disconn Disconn Disconn Check the unit harr | ect unified n ect power si he continuity ness connec | neter and A/C amp. harn teering control unit harne between unified meter ctor. | ess connector. ss connector. and A/C amp. harness connector and power steering control S | | | | |
| Unified meter | and A/C amp. | Power steering control unit | Continuity | | | | |
| Connector | Terminal | Connector Terminal | | | | | |
| M66 | 8 | M108 8 | Existed | | | | |
| Also che | eck harness | for short to ground and s | hort to power. | | | | |
| VES >> | <u>CO TO 3</u> | <u>ormal?</u> | | | | | |
| NO >> | Repair or re | place damaged parts. | | | | | |
| 3.check \ | /EHICLE SF | PEED SIGNAL (1) | | | | | |
| 1. Turn the | ignition swi | tch OFF. | | | | | |
| 2. Connect 3 Check tl | t unified met | er and A/C amp. harness eter and A/C amp_input/ | s connector. | | | | |
| Is the inspec | tion result n | ormal? | | | | | |
| YES >> | GO TO 4. | | | | | | |
| NO >> | Replace uni | fied meter and A/C amp. | Refer to <u>MWI-128, "Exploded View"</u> . | | | | |
| 4.CHECK \ | /EHICLE SF | PEED SIGNAL (2) | | | | | |
| Turn the Connect Check the | e ignition swi t power stee he signal be | tch OFF. ring control unit harness tween power steering co | connector. htrol unit harness connector and ground with oscilloscope. | | | | |
| | Power st | eering control unit | | | | | |
| Connector | Terminal | Condition | Value (Approx.) | | | | |
| M108 | 8 – Ground | Vehicle speed: 40 km/h (25 MPH) CAUTION: Check the air pressure of t der standard condition. | ire un- | | | | |
| | | | SEIA0775E | | | | |

VEHICLE SPEED SIGNAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace power steering control unit. Refer to <u>STC-26, "Exploded View"</u>.

5. CHECK TERMINALS AND HARNESS CONNECTORS

• Check the power steering control unit pin terminals for damage or loose connection with harness connector.

• Check the unified meter and A/C amp. pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace damaged parts.

ECU DIAGNOSIS INFORMATION POWER STEERING CONTROL UNIT

Reference Value

TERMINAL LAYOUT



А

С

D

Е

F

INFOID:000000005650283

123456 789101112 JSGIA0023ZZ

PHYSICAL VALUES

| Termir | nal No. | Wiro | Description | | | | ST |
|--------|---------|-------|---|------------------|--|--|----|
| + | - | color | Signal name | Input/ Output | Condition | Value (Approx.) | |
| 1 | Ground | LG | Power steering so- | Output | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | 4.4 – 6.6 V | H |
| | | | lenoid valve voltage | | Vehicle speed: 100 km/h (62 MPH) | 2.4 – 3.6 V | |
| 3 | Ground | G | Ignition switch pow- | Input | Ignition switch: ON | Battery voltage | |
| 5 | Ground | 0 | er supply | mput | Ignition switch: OFF | 0 V | |
| 5 | Ground | В | Power steering so- lenoid valve ground | _ | Always | 0 V | J |
| 6 | Ground | В | Ground | _ | Always | 0 V | |
| 8 | Ground | L | Vehicle speed sig- nal | Input | Vehicle speed: 40 km/h (25 MPH) CAUTION: Check air pressure of tire under standard condition. | (V) 6 4 2 0 • • • 70 ms | K |
| | | | | | | SEIA0775E | M |
| | | | | | Engine speed: At idle (Warm-up condition) | | Ν |
| 10 | Ground | R | Engine speed signal | Input - | | 20ms PBIA3654J | 0 |
| | | | | | Engine speed: Approx. 2,000 rpm (Warm-up condition) | (V) 6 4 2 0 20ms PBIA3655J | Ρ |

CAUTION:

Revision: 2009 November

< ECU DIAGNOSIS INFORMATION >

When using circuit tester or oscilloscope to measure voltage for inspection, be sure not to forcibly extend any connector terminals.

Wiring Diagram - ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM -

INFOID:000000005650284

[WITHOUT 4WAS]



2009/11/05 2009/11/05

ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM

POWER STEERING CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

[WITHOUT 4WAS]



Ρ



JCGWM0316G

POWER STEERING CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

[WITHOUT 4WAS]

< ECU DIAGNOSIS INFORMATION >

А

В



Fail Safe

EPS system

POWER STEERING CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

EPS system enters the fail-safe mode (that allows the steering force to be controlled without impairing the drive ability) if any of the input/output values to/from EPS system (power steering control unit) deviate from the standard range. NOTE:

The system enters the fail-safe mode if the engine speed remains at 1,500 rpm or more for over 10 seconds while the vehicle is stopped. This is normal.

• The fail-safe function is canceled when a vehicle speed signal of 2 km/h (1.2 MPH) or more is inputted or the key switch is turned OFF→ON. EPS system restores the normal operation at that time.



| Mode | Warn- ing lamp | DTC | Detection point (malfunction part) | Error area and root cause |
|-----------------------|-------------------|-----|------------------------------------|--|
| Fail-safe function | | _ | Vehicle speed signal input | Engine speed is 1,500 rpm or more and there is no vehicle speed signal input for over 10 seconds during vehicle travel. Vehicle speed signal has abruptly dropped from 30 km/h (19 MPH) or more to 2 km/h (1.2 MPH) or less within 1.4 seconds. |

[WITHOUT 4WAS]

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION) < SYMPTOM DIAGNOSIS > [WITHOUT 4WAS]

SYMPTOM DIAGNOSIS

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIA-TION)

| | B |
|--|-----|
| Description INFOID:00000005650286 | 3 |
| Hard steering when fully turning the steering wheel. Light steering when driving at a high speed. | С |
| Diagnosis Procedure INFOID:000000005650287 | , |
| 1. CHECK SYSTEM FOR POWER SUPPLY AND GROUND | D |
| Perform trouble diagnosis for power supply and ground. Refer to <u>STC-10, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 2. | E |
| 2.CHECK SYSTEM FOR VEHICLE SPEED SIGNAL | F |
| Perform trouble diagnosis for vehicle speed signal. Refer to <u>STC-15, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 3. NO =>> Repair or replace demaged parts | STC |
| 3. CHECK SYSTEM FOR ENGINE SPEED SIGNAL | Н |
| Perform trouble diagnosis for engine speed signal. Refer to <u>STC-13, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 4. | I |
| 4.CHECK SYSTEM FOR POWER STEERING SOLENOID VALVE | J |
| Perform trouble diagnosis for power steering solenoid valve. Refer to <u>STC-11, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> Perform the symptom diagnosis for the steering system. Refer to <u>ST-3, "NVH Troubleshooting</u> <u>Chart"</u> . | K |
| NO >> Repair or replace damaged parts. | L |
| | Μ |
| | Ν |
| | 0 |
| | |

Ρ

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< PRECAUTION > 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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" 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 AIR BAG".
- 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.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution Necessary for Steering Wheel Rotation after Battery Disconnect

INFOID:000000005843152

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables. **NOTE:**

Supply power using jumper cables if battery is discharged.

- 2. Turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
- 3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
- 4. Perform the necessary repair operation.

PRECAUTIONS

[WITHOUT 4WAS]

- 5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
- 6. Perform self-diagnosis check of all control units using CONSULT-III.

< PRECAUTION >

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REMOVAL AND INSTALLATION POWER STEERING CONTROL UNIT

Exploded View

INFOID:000000005650290

[WITHOUT 4WAS]



1. Power steering control unit

C: Vehicle front

Removal and Installation

INFOID:000000005650291

REMOVAL

- 1. Remove glove box assembly. Refer to <u>IP-12, "A/T MODELS : Exploded View"(A/T models)</u>, <u>IP-22, "M/T MODELS : Exploded View"(M/T models)</u>.
- 2. Remove power steering control unit screws.
- 3. Remove power steering control unit (1).
- 4. Disconnect power steering control unit connector.



INSTALLATION Install in the reverse order of removal.

[WITH 4WAS] < BASIC INSPECTION > **BASIC INSPECTION** А DIAGNOSIS AND REPAIR WORKFLOW Work Flow INFOID:000000005650292 DETAILED FLOW **1**, INTERVIEW FROM THE CUSTOMER It is also important to clarify customer complaints before inspection. First of all, reproduce symptoms, and understand them fully. Ask customer about his/her complaints carefully. In some cases, it is necessary to D check symptoms by driving vehicle with customer. CAUTION: Customers are not professional. It is dangerous to make an easy guess like "maybe the customer means that...," or "maybe the customer mentions this symptom". Е >> GO TO 2. 2.CHECK SYMPTOM F Start the engine. CAUTION: STC Stop the vehicle. Does 4WAS warning lamp turn ON? YES >> GO TO 3. Н NO >> GO TO 6. **3.** PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT) (P)With CONSULT-III Perform 4WAS main control unit self-diagnosis. Is any DTC detected other than "C1930" or "C1931"? YES >> GO TO 4. NO >> GO TO 5. ${f 4.}$ PERFORM TROUBLE DIAGNOSIS (4WAS MAIN CONTROL UNIT) K (P)With CONSULT-III Check the error system detected from the self-diagnosis. CAUTION: L Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Erase 4WAS main control unit self-diagnosis memory. CAUTION: • Never erase the self-diagnosis result (record) history when replacing 4WAS main control unit. Μ Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". Ν >> GO TO 5. **5.** PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT AND 4WAS MAIN CONTROL UNIT) With CONSULT-III 1. Perform 4WAS front control unit self-diagnosis. 2. Check the error system detected from the self-diagnosis. Ρ CAUTION: Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Erase 4WAS front control unit self-diagnosis memory. CAUTION: • Never erase the self-diagnosis result (record) history when replacing 4WAS front control unit. Erase the memory of the self-diagnosis results (record) after printing out or recording all the val-

ues of "DATA MONITOR".4. Perform 4WAS main control unit self-diagnosis.

< BASIC INSPECTION >

- 5. Check the error system detected from the self-diagnosis.
 - Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function.
- 6. Erase 4WAS main control unit self-diagnosis memory. CAUTION:
 - Never erase the self-diagnosis result (record) history when replacing 4WAS main control unit.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

>> GO TO 6.

6.CHECK TERMINAL

Check each harness connector pin terminal for disconnection.

>> GO TO 7.

7. CHECK SYMPTOM REPRODUCTION

With CONSULT-III

Perform DTC reproduction procedure for the error system.

Is any error system detected?

YES >> GO TO 2. NO >> GO TO 8.

8.PERFORM SYMPTOM DIAGNOSIS

With CONSULT-III

Perform the symptom diagnosis for each system.

Is any error detected?

YES >> GO TO 2. NO >> GO TO 9.

9.FINAL CHECK

With CONSULT-III

Check input/output signal standard of 4WAS front control unit and 4WAS main control unit.

Is the input/output the standard value?

YES >> INSPECTION END NO >> GO TO 2.

| INSPECTION AND ADJUSTMENT | |
|--|-----|
| < BASIC INSPECTION > [WITH 4WAS] | |
| INSPECTION AND ADJUSTMENT | Δ |
| ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT | A |
| ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description | В |
| Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Perform 4WAS front actuator adjustment when performing any service below. 4WAS front actuator and the steering components (including wheel alignment) removal. Refer to <u>STC-29.</u> <u>"4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern</u> | С |
| • Check the following items before the removal: | D |
| 4WAS warning lamp is turned OFF after the engine starts. Self-diagnosis of each control unit of 4WAS system (4WAS front control unit/4WAS main control unit) is performed. Check that 4WAS system is controlled properly. 4WAS front actuator and the steering components (including wheel alignment) installation. Refer to <u>STC-30</u>. | E |
| "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern | F |
| - 4WAS front control unit and the steering angle sensor replacement. Refer to <u>STC-30, "4WAS FRONT</u> <u>ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>. - When driving while misaligning the steering wheel position (center) after installing 4WAS front actuator. Refer to STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair | ST(|
| Requirement (Pattern 4)". | |
| 4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT | Н |
| 4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Description | |
| Perform 4WAS front actuator adjustment when performing any service below. 4WAS front actuator and the steering components (including wheel alignment) removal. Refer to <u>STC-29</u>. <u>"4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern</u> | |
| 1)". CAUTION: • Check the following items before the removal: - 4WAS warning lamp OFF after the engine starts. - Self-diagnosis of each control unit of 4WAS system (4WAS front control unit/4WAS main control unit) is performed. Check that 4WAS system controlled properly. | J |
| - 4WAS front actuator and the steering components (including wheel alignment) installation. Refer to <u>STC-30</u> , <u>"4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern</u> | L |
| - 4WAS front control unit and the steering angle sensor replacement. Refer to <u>STC-30, "4WAS FRONT</u> <u>ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>. - When driving while misaligning the steering wheel position (center) after installing 4WAS front actuator. Refer to <u>STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 4)"</u>. | Μ |
| 4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair | Ν |
| Requirement (Pattern 1) | |
| 1.4WAS FRONT ACTUATOR ADJUSTMENT | 0 |
| With CONSULT-III Start the engine. | Ρ |
| CAUTION: Stop the vehicle | |
| Turn the steering wheel to adjust "ACTR ROTA ANG" of the 4WAS front control unit "DATA MONITOR" so that it falls within the range shown below: | |

ACTR ROTA ANG : -3.5 - 3.5 deg

3. Turn the ignition switch OFF.

< BASIC INSPECTION >

CAUTION:

Never touch the steering wheel after turning ignition switch OFF.

>> END

4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2) INFOID:000000005650296

1.4WAS FRONT ACTUATOR ADJUSTMENT

(R) With CONSULT-III

- Turn the ignition switch ON. 1. **CAUTION:**
 - Never start the engine.
- Steer 30° leftward slowly. Steer 30° rightward and return the steering wheel to the straight-ahead position. 2.
- Perform the steering angle sensor neutral position adjustment. Refer to <u>BRC-8</u>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement".
- Turn the ignition switch OFF. 4.

>> GO TO 2.

2. PERFORM ACTIVE TEST (SLOW MODE)

(P)With CONSULT-III

1. Start the engine. **CAUTION:**

Stop the vehicle.

- Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit. 2.
- Perform "MODE START" of "ACTIVE TEST".
- 4. Steer the steering wheel leftward slowly until the turning stops.
- Steer the steering wheel rightward slowly until the turning stops. 5.

Is "OK" indicated on both right and left on "SLOW MODE"?

- YES >> GO TO 3.
- NO >> Refer to STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 4)".

3. PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

(P)With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

NOTE:

Detect DTC "C1671" when replacing 4WAS front control unit or performing 4WAS front actuator adjustment. DTC "C1671" becomes past record if 4WAS front actuator adjustment is completed normally.

Is any error system detected?

YES >> Check the error system.

NO >> GO TO 4.

4.ERASE ERROR HISTORY

With CONSULT-III

Erase the memory of 4WAS main control unit and 4WAS main control unit self-diagnosis result.

>> END

4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)

INFOID:000000005650297

1.PERFORM ACTIVE TEST (LOCK OPERATION)

(P)With CONSULT-III

Stop the vehicle to the straight-ahead position. 1.

INSPECTION AND ADJUSTMENT

[WITH 4WAS] < BASIC INSPECTION > 2. Turn the ignition switch ON. CAUTION: Never start the engine. Select "LOCK OPERATION" item on "ACTIVE TEST" of 4WAS front control unit. 4. Perform "RELEASE" of "ACTIVE TEST". CAUTION: Turn the steering wheel 90°. Check that the front wheels do not move. • Never turn the steering wheel during "RELEASE". 5. Turn the steering wheel to adjust "4WAS STR ANG" of the 4WAS front control unit "DATA MONITOR" so that it falls within the range shown below: **4WAS STR ANG** : -3.5 - 3.5 deg Perform "LOCK" item on "ACTIVE TEST" of 4WAS front control unit. 7. Steer 30° leftward slowly. Steer 30° rightward and return the steering wheel to the straight-ahead position. 8. Finish 4WAS front control unit active test. >> GO TO 2. 2.steering angle sensor neutral position adjustment 1. "ADJUSTMENT OF Perform the steering angle sensor neutral position adjustment. Refer to BRC-8. STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement". 2. Turn the ignition switch OFF. >> GO TO 3. $\mathbf{3.}$ RETURN TO 4WAS FRONT ACTUATOR INITIAL POSITION 1. Start the engine. CAUTION: Stop the vehicle. 2. Steer 90° leftward slowly. Then steer 90° rightward. 3. Steer 90° leftward slowly again. Then steer 90° rightward. Return the steering wheel to the straight-ahead position. 4. Stop the vehicle in the straight-ahead position after driving for a period of time. (When engine is running) >> GO TO 4. 4.CHECK 4WAS FRONT ACTUATOR INSPECTION (P)With CONSULT-III Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control unit. 1 CAUTION: Never touch the steering wheel during the service. **4WAS STR ANG** : -3.5 - 3.5 deg Turn the ignition switch OFF. Is the inspection result normal? YES >> GO TO 5. >> GO TO 1. NO **5.**PERFORM ACTIVE TEST (SLOW MODE)

With CONSULT-III

- Start the engine. 1. **CAUTION:** Stop the vehicle.
- Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit.
- 3. Perform "MODE START" of "ACTIVE TEST".
- 4 Steer the steering wheel leftward slowly until the turning stops.
- 5. Steer the steering wheel rightward slowly until the turning stops.

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INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

Is "OK" indicated on both right and left on "SLOW MODE"?

YES >> GO TO 6.

NO >> Refer to STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 4)".

$\mathbf{6}$.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

(R)With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

Is any error system detected?

YES >> Check the error system.

NO >> GO TO 7.

7.ERASE ERROR HISTORY

With CONSULT-III

Erase the memory of 4WAS main control unit and 4WAS main control unit self-diagnosis result.

>> END

4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 4)

INFOID:000000005650298

1.CHECK 4WAS FRONT ACTUATOR

- 1. Stop the vehicle to the straight-ahead position.
- 2. Remove and install 4WAS front actuator again. Check the installation condition.
- Check that the steering wheel is neutral. 3

>> GO TO 2.

2.PERFORM ACTIVE TEST (LOCK OPERATION)

(R) With CONSULT-III

- 1. Stop the vehicle to the straight-ahead position.
- Turn the ignition switch ON. 2.

CAUTION:

Never start the engine.

- Select "LOCK OPERATION" item on "ACTIVE TEST" of 4WAS front control unit.
- 4. Perform "RELEASE" of "ACTIVE TEST".
 - **CAUTION:**
 - Turn the steering wheel 90°. Check that the front wheels do not move.
 - Never turn the steering wheel during "RELEASE".
- Turn the steering wheel to adjust "4WAS STR ANG" of the 4WAS front control unit "DATA MONITOR" so 5. that it falls within the range shown below:

4WAS STR ANG : -3.5 - 3.5 deg

- Perform "LOCK" item on "ACTIVE TEST" of 4WAS front control unit. 6.
- Finish 4WAS front control unit active test.

>> GO TO 3.

${f 3}.$ STEERING ANGLE SENSOR NEUTRAL POSITION ADJUSTMENT

- 1. Perform the steering angle sensor neutral position adjustment. Refer to BRC-8, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement".
- 2. Turn the ignition switch OFF.

>> GO TO 4.

4.RETURN TO 4WAS FRONT ACTUATOR INITIAL POSITION

1. Start the engine.

INSPECTION AND ADJUSTMENT

| < BASIC INSPECTION > | [WITH 4WAS] |
|---|-------------------|
| CAUTION: Stop the vehicle. Steer 90° leftward slowly. Then steer 90° rightward. Steer 90° leftward slowly again. Then steer 90° rightward. Return the steering wheel to the steering wheel to the steering. | ne straight-ahead |
| Stop the vehicle in the straight-ahead position after driving for a period of time. (Engine r | unning) |
| >> GO TO 5. 5.CHECK 4WAS FRONT ACTUATOR | |
| With CONSULT-III Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control unit. CAUTION: | |
| Never touch the steering wheel during the service. | |
| 4WAS STR ANG : -3.5 - 3.5 deg | |
| 2. Turn the Ignition switch OFF. <u>Is the inspection result normal?</u> YES >> GO TO 6. NO =>> GO TO 1 | _ |
| 6.PERFORM ACTIVE TEST (SLOW MODE) | S |
| With CONSULT-III Start the engine. CAUTION: | |
| Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit. Perform "MODE START" of "ACTIVE TEST". Steer the steering wheel leftward slowly until the turning stops. | |
| Is "OK" indicated on both right and left on "SLOW MODE"? YES >> GO TO 7. | |
| 7.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT) | |
| With CONSULT-III Perform 4WAS front control unit self-diagnosis. | |
| Is any error system detected? YES >> Check the error system. | |
| 8. ERASE ERROR HISTORY | |
| With CONSULT-III Erase the memory of 4WAS front control unit and 4WAS main control unit self-diagnosis result. | |
| >> END | (|

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SYSTEM DESCRIPTION 4WAS SYSTEM

System Diagram

INFOID:000000005650299

[WITH 4WAS]

CONTROL DIAGRAM



CROSS-SECTIONAL VIEW

4WAS Front Actuator



1. Front wheel steering angle sensor

2. 4WAS front lock solenoid valve (lock 3. 4WAS front motor structure)

4. Gear shaft

4WAS SYSTEM

< SYSTEM DESCRIPTION >

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System Description

DESCRIPTION

- 4WAS system consists of two control units (4WAS front control unit and 4WAS main control unit) and 4WAS rear actuator components.
- 4WAS main control unit calculates front wheel and rear wheel angles via CAN communication based on the information of the steering angle sensor signal and vehicle speed signal.
- 4WAS main control unit controls 4WAS rear actuator according to the value calculated in 4WAS main control unit.
- It transmits the value that is calculated by 4WAS main control unit to 4WAS front control unit via 4WAS communication line (exclusive line of 4WAS system). 4WAS front control unit controls 4WAS front actuator based on the received demand.
- Self-diagnosis can be performed with CONSULT-III at each control unit to another (4WAS front control unit and 4WAS main control unit).
- It transmits/receives each signal from the following control unit via CAN communication line.

| Component parts | Function | |
|--|--|---|
| Steering angle sensor | It mainly transmits the following signals to 4WAS main control unit with CAN communication. • Steering angle sensor signal | M |
| ABS actuator and electronic unit (con- trol unit) | It mainly transmits the following signals to 4WAS main control unit with CAN communication. Vehicle speed signal | N |
| ECM | It mainly transmits the following signals to 4WAS main control unit with CAN communication. Engine speed signal | |
| Combination meter | It mainly transmits the following signals from 4WAS main control unit with CAN communica- tion. • 4WAS warning lamp signal | 0 |

*: Communication line between 4WAS front control unit and 4WAS main control unit

Operation Description

- The following performance is gained by controlling the best front wheel steering angle and the rear wheel steering angle.
- The desirable vehicle movement is gained toward the driver's steering angle operation (steering angle).

4WAS SYSTEM

< SYSTEM DESCRIPTION >

[WITH 4WAS]

·Front wheel angle Steering angle

Rear wheel angle -()

ront wheel angle

Steering angle

Rear wheel angle

JSGIA0050G

JSGIA0082G

The steering gear ratio changes according to the vehicle speed. The steering wheel operation (steering angle) load decreases.



Angle

Angle

Time(Seconds)

Time(Seconds)

When Driving at Low Speed

 Increased front wheel angle gains the optimum front wheel angle by minimum steering wheel operation (steering angle).



 Increase the front steering angle while controlling to turn the rear wheel steering angle to the same steering angle side of steering wheel operation (steering angle). these operations make response better for vehicle yaw rate/lateral acceleration and also decrease the angle of sideslip.



Operation Feature

4WAS FRONT ACTUATOR

When Driving at High Speed

It is driven by 4WAS front motor.

car response better and vehicle stability higher.

- The front steering gear ratio (4WAS front actuator) changes with 4WAS front motor and the gear shaft when releasing the lock structure (4WAS front lock solenoid valve). NOTE:
 - The lock structure is released when turning 4WAS lock solenoid valve ON.

STC-36
4WAS SYSTEM

< SYSTEM DESCRIPTION >

[WITH 4WAS]

INFOID:000000005650301

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 The lock structure (holder) absorbs force and applies the lock when applying strong force to 4WAS front actuator.

CAUTION:

Replace 4WAS front actuator when the system breaks down due to the excessive external force (rotating direction) applied to 4WAS front actuator.

4WAS REAR ACTUATOR

- It is driven by 4WAS rear motor.
- The irreversible efficiency performance hypoid gear secure the toe-stiffness of rear wheels against the road external force and keep the steering angle when system is malfunction.
- The power from the pinion gear (motor side) is transmitted, but the pinion gear does not rotate as caused by the gear mechanical characteristics (teeth angle) even though the ring gear (tire side) starts to rotate.

Component Parts Location



- 1. Steering angle sensor
- 4. 4WAS front actuator
- 7. Rear wheel steering angle sensor
- 10 Noise suppressor

- 2. 4WAS warning lamp
- 5. 4WAS rear motor
- 8. 4WAS main control unit
- 3. 4WAS front control unit
- 6. 4WAS rear actuator
- 9. 4WAS rear motor relay

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4WAS SYSTEM

< SYSTEM DESCRIPTION >

Component Description

- A. Combination switch
- D. 4WAS rear actuator assembly
- B. Inside combination meter

C. Inside the instrument driver lower panel

E. Inside the rear wheel house finisher (left)

INFOID:000000005650302

[WITH 4WAS]

| Component parts | Reference/Function |
|--|--|
| 4WAS front control unit | STC-57, "Description" |
| 4WAS front actuator | The front wheel steering angle is activated. |
| Front wheel steering angle sensor | The front wheel steering angle increased/decreased degree is detected. It is output to 4WAS front control unit. |
| 4WAS front motor | The front wheel steering angle increased/decreased degree is activated. |
| 4WAS front lock solenoid valve | Secure the inside of 4WAS front actuator temporarily. (It operates when performing active test with fail-safe function and CONSULT-III.) |
| Steering angle sensor | STC-114. "Description" |
| 4WAS main control unit | STC-89, "Description" |
| 4WAS rear actuator | The rear wheel steering angle is activated. |
| Rear wheel steering angle sensor | The rear wheel steering angle increased/decreased degree is detected. It is output to 4WAS main control unit. |
| 4WAS rear motor | 4WAS rear actuator is activated. |
| ABS actuator and electronic unit (con- trol unit) | STC-112, "Description" |
| ECM | STC-117, "Description" |
| Combination meter | It mainly transmits the following signals from 4WAS main control unit with CAN communica- tion. • 4WAS warning lamp signal |
| Power steering solenoid valve | The power steering oil pressure in the gear housing assembly is controlled. |
| Stop lamp switch | The stop lamp switch condition is detected. |

*: Communication line between 4WAS front control unit and 4WAS main control unit

< SYSTEM DESCRIPTION > **EPS SYSTEM**

System Diagram

INFOID:000000005650303



System Description

DESCRIPTION

- The EPS system controls the power steering solenoid valve with 4WAS main control unit.
- The power steering solenoid valve control changes the power steering solenoid valve activation voltage according to the vehicle speed.



OPERATION PRINCIPLE

During Parking (When Turning The Steering Wheel To The Right.)



- Power steering solenoid valve is closed while a vehicle is stopped. 1.
- Pinion "1R", "2R" and "3R" are closed depending on steering torque of steering wheel. 2.
- Oil pressure "P" in the gear housing assembly is the sum of oil pressures occurring in "2R" and "3R". This 3. results in a light steering force because of high pressure.

During High-speed Operation

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EPS SYSTEM



- 1. Power steering solenoid valve is opened during high-speed operation.
- 2. Pinion "1R", "2R" and "3R" are closed depending on steering torque of steering wheel.
- 3. "2R" is bypassed to the return port by the EPS solenoid valve.
- 4. Oil pressure "P" in the gear housing assembly includes only oil pressure occurring in "3R" and results in a heavy steering force.

Component Parts Location

INFOID:000000005650305



- 1. Power steering solenoid valve
- A. Steering gear assembly
- 2. 4WAS main control unit
- B. Inside the rear wheel hose finisher (left)

C:Vehicle front

Component Description

INFOID:000000005650306

| Component parts | Function |
|---|--|
| 4WAS main control unit | The power steering solenoid valve activation voltage is controlled by each sensor signal. The power steering solenoid valve activation voltage is controlled by 4WAS main control unit for maintaining the power steering force in the fail-safe mode. (EPS system is controlled by the engine speed signal if the vehicle speed signal error is detected.) |
| ABS actuator and electric unit (control unit) | It mainly transmits the following signals to 4WAS main control unit with CAN communication. • Vehicle speed signal |
| ECM | It mainly transmits the following signals to 4WAS main control unit with CAN communication. Engine speed signal |
| Power steering solenoid valve | The power steering oil pressure in the gear housing assembly is controlled. |

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (4WAS FRONT CONTROL UNIT)

CONSULT-III Function [4WAS(FRONT)]

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[WITH 4WAS]

FUNCTION

CONSULT-III can display each diagnostic item using the diagnostic test modes shown as follows:

| Diagnostic test mode | Function | C |
|--------------------------------|--|---|
| Self-diagnostic results | Self-diagnostic results can be read and erased quickly. | - |
| Data monitor | Input/Output data in the 4WAS front control unit can be read. | |
| CAN diagnostic support monitor | The results of transmit/receive diagnosis of CAN communication can be read. | |
| Active test | • Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the 4WAS front control unit and also shifts some parameters in a specified range. | |
| ECU part number | 4WAS front control unit part number can be read. | |

SELF-DIAG RESULT MODE

Display Item List

| Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | ST |
|-------------------------------------|---|--|----|
| ACTUATOR [C1621] | 4WAS front motor current error is detected. (4WAS front motor current is excessively large.) | 4WAS front control unit or 4WAS front motor error is de- tected. | Н |
| ACTUATOR [C1622] | 4WAS front motor voltage or current error is detected. (4WAS front motor voltage error is detected.) (Voltage or current error is detected when starting the system.) | 4WAS front control unit or 4WAS front motor error is de- tected. | I |
| ACTUATOR [C1627] | The indication value from 4WAS front actuator (front wheel angle) dif- fers from the value from 4WAS front control unit. | 4WAS front actuator error | |
| ACTUATOR [C1628] | The front wheel steering angle sensor error is detected. | Front wheel steering angle sensor error | J |
| CONTROL UNIT [C1631] | An error is detected inside 4WAS front control unit. | 4WAS front control unit or 4WAS front control unit power supply error is detected. | K |
| CONTROL UNIT [C1632] | An error is detected inside 4WAS front control unit. | 4WAS front control unit or 4WAS front control unit power supply error is detected. | L |
| CONTROL UNIT [C1633] | An error is detected inside 4WAS front control unit. | 4WAS front control unit error | |
| IGN POWER SUPPLY [C1651] | The ignition voltage signal error is detected. | 4WAS front control unit or the ignition power supply error is detected. | Μ |
| MOTOR POWER SUPPLY [C1652] | 4WAS front motor main power supply error is detected. | 4WAS front control unit or 4WAS front motor power sup- ply error is detected. | Ν |
| ACTUATOR RELAY [C1654] | An error is detected on the main relay power supply inside 4WAS front control unit. | The main relay power supply inside 4WAS front control unit error is detected. | 0 |
| PRE-DRIVER [C1655] | 4WAS rear motor 3-phase current error is detected. (Current is not applied to 4WAS front motor.) | 4WAS front control unit or 4WAS front motor power sup- ply error is detected. | Ρ |
| LOCK SOLENOID [C1661] | 4WAS front lock solenoid valve error is detected. (An electric activation error is detected.) | 4WAS front control unit or 4WAS front lock solenoid valve error is detected. | |
| LOCK INSERTION [C1667] | 4WAS front lock solenoid valve (lock) error is detected. (An error is detected in lock condition.) | The inside 4WAS front actua- tor error is detected. | |

< SYSTEM DESCRIPTION >

[WITH 4WAS]

| Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------------------------------------|--|--|
| LOCK HLD GAP DETCT [C1668] | 4WAS front lock solenoid valve (lock) error is detected. (Excessive force is applied to the lock.) | The inside 4WAS front actua- tor error is detected. |
| INCOMP LOCK RELEAS [C1669] | 4WAS front actuator error is detected. (An error is detected in unlock condition.) | The power steering oil pres- sure or the inside 4WAS front actuator error is detected. |
| ACT ADJ NOT PRFRM [C1671] | 4WAS front actuator adjustment is not performed. | 4WAS front actuator adjust- ment is not performed. |
| INCOMP ACTUATR ADJ [C1672] | 4WAS front actuator adjustment is incomplete. | 4WAS front actuator adjust- ment is incomplete. |
| 4WAS MAIN ECU COMM [C1684] | 4WAS communication line* data communication error is detected. (An error signal is detected from 4WAS main control unit.) | 4WAS communication line*/ 4WAS main control unit/ 4WAS front control unit error |
| 4WAS MAIN ECU COMM [C1685] | 4WAS communication line* data communication error is detected. (An error signal is detected from 4WAS main control unit.) | 4WAS communication line*/ 4WAS main control unit/ 4WAS front control unit error |
| 4WAS MAIN ECU [C1686] | An error is detected on 4WAS main control unit side. (4WAS main control unit fail-safe mode.) | 4WAS main control unit fail- safe mode |
| CAN COMM CIRCUIT [U1000] | When 4WAS front control unit is not transmitting or receiving 4WAS communication signal for 2 seconds or more. | 4WAS communication line*/ 4WAS main control unit/ 4WAS front control unit error |
| SYSTEM COMM(CAN) [U1002] | When 4WAS front control unit is not transmitting or receiving 4WAS communication signal for 2 seconds or less. | 4WAS communication line*/ 4WAS main control unit/ 4WAS front control unit error |
| CONTROL UNIT (CAN) [U1010] | When detecting error during the initial diagnosis of 4WAS controller of 4WAS front control unit. | 4WAS communication line*/ 4WAS main control unit/ 4WAS front control unit error |

*: Communication line between 4WAS front control unit and 4WAS main control unit.

DATA MONITOR MODE

Display Item List

| Monitor item (Unit) | Remarks |
|-------------------------------|---|
| 4WAS STR ANG [deg] | The steering angle sensor signal received from 4WAS main control unit via 4WAS commu- nication line * is indicated. |
| VEHICLE SPEED [km/h] or [mph] | The vehicle speed signal received from 4WAS main control unit via 4WAS communication line * is indicated. |
| MOTOR CURRENT [A] | 4WAS front motor power supply current is indicated. (4WAS front control unit main power supply) |
| MTR CRNT ESTM [A] | The value, which 4WAS front control unit presumes 4WAS front motor power supply current, is indicated. (4WAS front control unit main power supply) |
| ACTR ROTA ANG [deg] | 4WAS front actuator increased/decreased angle is indicated. |
| LG VOLT [V] | 4WAS front lock solenoid valve voltage is indicated. |
| THERM TEMP [°C] | 4WAS front control unit internal temperature is indicated. |
| MOTOR VOLT [V] | 4WAS front motor power supply voltage is indicated. (4WAS front control unit main power supply) |
| IGN VOLT [V] | 4WAS front control unit power supply voltage is indicated. (Ignition switch power supply voltage) |
| ACTR ANG COMM [deg] | The command value of 4WAS front actuator increased/decreased angle received from 4WAS main control unit via 4WAS communication line* is indicated. |
| ACTR ROTA SPD [deg/s] | 4WAS front actuator increased/decreased rotation speed is indicated. |
| DUTY COMMAND [%] | 4WAS front actuator command voltage ratio is indicated. |

< SYSTEM DESCRIPTION >

[WITH 4WAS]

| Monitor item (Unit) | Remarks |
|------------------------|--|
| LOCK DTY COMM [%] | 4WAS front lock solenoid valve command voltage ratio is indicated. |
| MTR U VOLT [V] | 4WAS front motor U terminal voltage is indicated. |
| MTR V VOLT [V] | 4WAS front motor V terminal voltage is indicated. |
| MTR W VOLT [V] | 4WAS front motor W terminal voltage is indicated. |
| ACT TEMP ESTM [°C] | The value, which 4WAS front control unit presumes 4WAS front actuator temperature, is in- dicated. |
| MTR PHZ CRNT [A] | 4WAS front motor U, V, and W terminal current is indicated. |
| ACTR DEVI ANG [deg] | 4WAS front actuator command value and the activation angle difference are indicated. |
| ACTR ANGL SUB [deg] | The final command value, which 4WAS front control unit calculates 4WAS front actuator command value transmitted from 4WAS front control unit through 4WAS communication line*, is indicated. |
| STR ANGL SPD [deg/s] | It displays an engine speed value obtained from an angle calculated with the 4WAS front con- trol unit, based on steering angle sensor speed signals transmitted from the 4WAS main con- trol unit through the 4WAS communication line*. |
| OVRLD JDG TMG | It displays record of 4WAS system (entire 4WAS system) high load. (It displays time of occurrence before turning ignition switch ON.) |
| ACT PRTCT TMG | It displays record of 4WAS system (4WAS front actuator) overheating. (It displays time of occurrence before turning ignition switch ON.) |
| ECU PRTCT TMG | It displays record of 4WAS system (4WAS front control unit) overheating. (It displays time of occurrence before turning ignition switch ON.) |
| DRV TMPO TMG | It displays record of 4WAS system (terminal power supply converter of 4WAS front motor) intermittent abnormal. (It displays time of occurrence before turning ignition switch ON.) |
| MTR PW TMP TM | It displays record of 4WAS system (terminal voltage of 4WAS front motor) intermittent abnor- mal. (It displays time of occurrence before turning ignition switch ON.) |
| LOW VOLT TMG | It displays record of 4WAS system (terminal voltage of 4WAS front control unit and 4WAS front actuator) low voltage. (It displays time of occurrence before turning ignition switch ON.) |
| HIGH VOLT TMG | It displays record of 4WAS system (terminal voltage of 4WAS front control unit and 4WAS front actuator) extreme voltage. (It displays time of occurrence before turning ignition switch ON.) |
| OVRLD JDG FLG [On/Off] | 4WAS system (the entire system) heavy load condition is indicated. 4WAS system protection function mode |
| ACT PRTCT FLG [On/Off] | 4WAS system (4WAS front actuator) over-heated condition is indicated. 4WAS system protection function mode |
| ECU PRTCT FLG [On/Off] | 4WAS system (4WAS front control unit) over-heated condition is indicated. 4WAS system protection function mode |
| DRV TMPO FLG [On/Off] | 4WAS system (4WAS front motor terminal power supply converter) intermittent error is indicated. 4WAS system protection function mode |
| MTR PW TMP FL [On/Off] | 4WAS system (4WAS front motor terminal power supply front driver) intermittent error is indicated. 4WAS system protection function mode |
| LOW VOLT FLG [On/Off] | 4WAS system (4WAS front control unit and 4WAS front actuator terminal voltage) voltage- dropped condition 4WAS system protection function mode |
| HIGH VOLT FLG [On/Off] | 4WAS system (4WAS front control unit and 4WAS front actuator terminal voltage) voltage- jumped condition 4WAS system protection function mode |
| MTR SEN U OUT [Hi/Low] | 4WAS front motor U terminal output voltage is indicated. |
| MTR SEN V OUT [Hi/Low] | 4WAS front motor V terminal output voltage is indicated. |
| MTR SEN W OUT [Hi/Low] | 4WAS front motor W terminal output voltage is indicated. |
| | |

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< SYSTEM DESCRIPTION >

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| Monitor item (Unit) | Remarks |
|-------------------------|--|
| MAIN ECU FAIL [On/Off] | 4WAS main control unit fail-safe function condition transmitted from 4WAS main control unit through 4WAS communication line * is indicated. |
| M-ECU TMPO FL [On/Off] | The protection function mode status of 4WAS main control unit transmitted from 4WAS main control unit through 4WAS communication line* is indicated. |
| LOCK MODE [0/1/2/3/4/5] | 4WAS front lock solenoid valve (lock structure) condition is indicated. 0: Lock released condition 1 – 5: Lock condition |
| NEUTRAL OUT [On/Off] | 4WAS front actuator misaligned angle adjustment control condition is indicated. |
| EX OPERAT [On/Off] | 4WAS system enters in the protection function due to the heavy load condition and tempo- rarily abnormal voltage is indicated. |
| SLOW MODE [Ok/-] | ACTIVE TEST "SLOW MODE" judgment condition is indicated. |

*: Communication line between 4WAS front control unit and 4WAS main control unit

CAN DIAGNOSTIC SUPPORT MONITOR

Description

- The communication condition from 4WAS front control unit to 4WAS main control unit and malfunction counter are displayed.
- Error counter displays OK if any malfunction is not detected in the past. If the malfunction is detected, it displays 0. The upper limit of the counters is 39.

| Item | PRSNT | PAST |
|---------------|------------|-------------|
| TRANSMIT DIAG | OK / UNKWN | OK / 0 – 39 |
| 4WAS(MAIN) | OK / UNKWN | OK / 0 – 39 |

ACTIVE TEST MODE

Description

- 4WAS front actuator assembly activation is checked according to the control signal from CONSULT-III.
- 4WAS front lock solenoid valve (lock structure) is activated forcibly (ON/OFF) using each control signal of "LOCK OPERATION". Perform this mode when performing 4WAS front actuator adjustment.
 CAUTION:

Never steer the steering wheel during "RELEASE".

 The steering angle sensor neutral point judgment (OK/NG) is performed using each control signal of "SLOW MODE".

| Select test item | Control signal | Remarks |
|------------------|----------------|--|
| | RELEASE | 4WAS front lock solenoid valve lock is re- leased. |
| LOCK OF LIKEHON | LOCK | 4WAS front lock solenoid valve lock is applied. |
| SLOW MODE | MODE START | Steering angle sensor neutral point check starts. (Turn the steering wheel rightward and left- ward slowly. Steer until the turning stops.) |
| | MODE END | Steering angle sensor neutral point check ends. |

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (4WAS MAIN CONTROL UNIT)

CONSULT-III Function [4WAS(MAIN)/RAS/HICAS]

FUNCTION

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

| Diagnostic test mode | Function | С |
|--------------------------------|---|---|
| Self-diagnostic results | Self-diagnostic results can be read and erased quickly. | |
| Data monitor | Input/Output data in the 4WAS main control unit can be read. | _ |
| CAN diagnostic support monitor | The results of transmit/receive diagnosis of CAN communication can be read. | D |
| Active test | • Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the 4WAS main control unit and also shifts some parameters in a specified range. | _ |
| ECU part number | 4WAS main control unit part number can be read. | |

SELF-DIAG RESULT MODE

Display Item List

| Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | ST |
|--|---|------------------------------|----|
| CONTROL UNIT [ABNORMAL1] [C1900] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | Н |
| CONTROL UNIT [ABNORMAL2] [C1901] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | I |
| MOTOR OUTPUT [REV CURRENT] [C1902] | 4WAS rear motor current error is detected. (4WAS rear motor current output direction differs.) | 4WAS rear motor error | I |
| MOTOR OUTPUT [NO CURRENT] [C1903] | 4WAS rear motor current error is detected. (Current is input to 4WAS main control unit if 4WAS main control unit output is "OFF".) | 4WAS rear motor error | 0 |
| MOTOR OUTPUT [OVERCURRENT] [C1904] | 4WAS rear motor current error is detected. (4WAS rear motor output current is large.) | 4WAS rear motor error | K |
| CONTROL UNIT [ABNORMAL3] [C1905] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | L |
| CONTROL UNIT [ABNORMAL5] [C1906] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | M |
| CONTROL UNIT [ABNORMAL4] [C1907] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | Ν |
| CONTROL UNIT [ABNORMAL7] [C1908] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | 0 |
| CONTROL UNIT [ABNORMAL6] [C1909] | An error is detected inside 4WAS main control unit. | 4WAS main control unit | Ρ |
| MOTOR OUTPUT [MOTOR LOCK] [C1910] | Inside 4WAS rear motor error is detected. (4WAS main motor does not move or the rear wheel angle sensor value does not change if 4WAS main control unit output is 14 A or more.) | 4WAS rear motor error | |

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< SYSTEM DESCRIPTION >

[WITH 4WAS]

| Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|--|---|--|
| MOTOR VOLTAGE [LOW VOLTAGE] [C1911] | 4WAS rear motor voltage error is detected. (4WAS rear motor voltage is low.) | 4WAS rear motor power supply error |
| MOTOR VOLTAGE [BAD OBSTRCT] [C1912] | 4WAS rear motor voltage error is detected. (Voltage is applied to 4WAS main motor if 4WAS main control unit output is "OFF".) | 4WAS rear motor power supply error |
| MOTOR OUTPUT [ABNORML SIG] [C1913] | 4WAS rear motor current error is detected. (4WAS main motor does not move or the rear wheel angle sensor output does not change when 4WAS main control unit output is 18A or more and 4WAS main motor output is low.) | 4WAS rear motor error |
| RR ST ANGLE SENSOR [ABNORML VOL] [C1914] | The rear wheel angle sensor power supply error is detected. | Rear wheel steering sensor power supply error |
| RR ST ANGLE SENSOR [MAIN SIGNAL] [C1915] | The rear wheel angle sensor signal (main) output voltage value error is detected. | Rear wheel steering sensor out- put voltage error |
| RR ST ANGLE SENSOR [SUB SIGNAL] [C1916] | The rear wheel angle sensor signal (sub) output voltage value error is detected. | Rear wheel steering sensor out- put voltage error |
| RR ST ANGLE SENSOR [OFFSET SIG1] [C1917] | The rear wheel angle sensor signal (main and sub) error is detected. (The output signal value differs temporarily between main and sub.) | Rear wheel steering sensor (main and sub) output signal val- ue error signal |
| RR ST ANGLE SENSOR [OFFSET SIG2] [C1918] | The rear wheel angle sensor signal (main and sub) error is detected. (The output signal value differs between main and sub.) | Rear wheel steering sensor (main and sub) output signal er- ror |
| VEHICLE SPEED SEN [NO SIGNAL] [C1919] | Malfunction is detected in vehicle speed signal that is output from ABS actuator and electric unit (control unit) via CAN communication. (Improper signal is input while driving.) | Vehicle speed signal error |
| STEERING ANGLE SEN [NO SIGNAL] [C1920] | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN communication. (No transmission from the steering angle sensor) | Steering angle sensor input sig- nal error |
| ENG REV SIGNAL [C1921] | Malfunction is detected in engine speed signal that is output from ECM via CAN communication. (Improper signal is input to the engine speed.) | Engine speed signal error |
| CONTROL UNIT [ABNORMAL8] [C1922] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| STEERING ANGLE SEN [NO CHANGE] [C1923] | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN communication. [Steering angle sensor input signal error is detected when driving at 60 km/h (37 MPH) or more.] | Steering angle sensor input sig- nal error |
| STEERING ANGLE SEN [NO NEUT STATE] [C1924] | Driving continuously at 10 km (6 mile) while the steering angle sen- sor value is other than L10° – R10°. (Not detected in 4WAS front control unit fail-safe mode) | Steering angle sensor input sig- nal error |
| AD CONVERTER [C1925] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| STEERING ANGLE SEN [C1926] | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN communication. (When improper signal inputs to steering angle sensor and steering angle sensor itself detects the malfunction) | Steering angle sensor error |
| CONTROL UNIT [ABNORMAL5] [C1927] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| CONTROL UNIT [ABNORMAL9] [C1928] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |

< SYSTEM DESCRIPTION >

Items Diagnostic item is detected when... Possible cause (CONSULT-III screen terms) 4WAS FRONT ECU An error is detected on 4WAS front control unit side. 4WAS front control unit fail-safe [C1930] (4WAS front control unit fail safe mode) mode 4WAS communication line/ 4WAS FRONT ECU COMM 4WAS communication line* data communication error is detected. 4WAS front control unit/4WAS (An error signal is detected from 4WAS front control unit.) [C1931] main control unit error STEERING ANGLE SEN If the steering angle sensor error is detected. Steering angle sensor input sig-[C1932] (Steering angle sensor output value is abnormal.) nal error CONTROL UNIT An error is detected inside 4WAS main control unit. 4WAS main control unit error [C1933] CAN COMM When 4WAS main control unit is not transmitting or receiving CAN CAN communication error [U1000] communication signal for 2 seconds or more. CAN communication line and CONTROL UNIT (CAN) When detecting error during the initial diagnosis of CAN controller of 4WAS main control unit/ECM/ [U1010] 4WAS main control unit. ABS actuator and electric unit

*: Communication line between 4WAS front control unit and 4WAS main control unit

DATA MONITOR MODE

Display Item List

| Monitor item (Unit) | Remarks |
|-------------------------------|--|
| VHCL SPEED SE [km/h] or [mph] | The vehicle speed signal from ABS actuator and electric unit (control unit) is indicated with CAN communication line. |
| STEERING ANG [°] | The steering angle sensor signal from the steering angle sensor is indicated with CAN com- munication line. |
| ENGINE SPEED [rpm] | The engine speed signal from ECM is indicated with CAN communication line. |
| STR ANGL SPD [deg/s] | The steering angle speed signal from the steering angle sensor is indicated with CAN com- munication line. |
| POWER STR SOL [A] | The current value of the power steering solenoid valve is indicated. |
| RR ST ANG-MAI [V] | The voltage of the rear wheel steering angle sensor (main) is indicated. |
| RR ST ANG-SUB [V] | The voltage of the rear wheel steering angle sensor (sub) is indicated. |
| RR ST ANG-VOL [V] | The power supply voltage of the rear wheel steering angle sensor is indicated. |
| C/U VOLTAGE [V] | The power supply voltage value of 4WAS main control unit is indicated. |
| MOTOR VOLTAGE [V] | The voltage value of 4WAS rear motor is indicated. |
| MOTOR CURRENT [A] | The current value of 4WAS rear motor is indicated. |
| MTR CRNT OPE [A] | The current value input to 4WAS rear motor is indicated. |
| RR ANGLE OPE [°] | The angle command value is indicated for activating 4WAS rear motor. |
| FR ANGLE OPE [°] | The front wheel angle value transmitted from 4WAS main control unit to 4WAS front control unit is indicated. |
| STOP LAMP SW [On/Off] | The stop lamp switch status is indicated. |
| HICAS RELAY [On/Off] | 4WAS rear motor relay condition is indicated. |
| FAIL SAFE [On/Off] | The fail-safe mode status of 4WAS main control unit is indicated. |
| WARNING LAMP [On/Off] | 4WAS warning lamp ON/OFF condition is indicated. |
| FRNT ECU FAIL [On/Off] | The fail-safe mode status of 4WAS main control unit transmitted from 4WAS front control unit via 4WAS communication line* is indicated. |
| FRNT ECU EX [On/Off] | The protection function mode status of 4WAS front control unit transmitted from 4WAS front control unit via 4WAS communication line* is indicated. |

*: Communication line between 4WAS front control unit and 4WAS main control unit

CAN DIAGNOSTIC SUPPORT MONITOR

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[WITH 4WAS]

(control unit) error

< SYSTEM DESCRIPTION >

Description

- The communication status and the number of errors of 4WAS main control unit, ECM, ABS actuator and electric unit (control unit), 4WAS front control unit and the steering angle sensor are indicated.
- Error counter displays OK if any malfunction is not detected in the past. If the malfunction is detected, it displays 0. The upper limit of the counters is 39.

| Item | PRSNT | PAST |
|---------------|------------|-------------|
| TRANSMIT DIAG | OK / UNKWN | OK / 0 – 39 |
| ECM | OK / UNKWN | OK / 0 – 39 |
| VDC/TCS/ABS | OK / UNKWN | OK / 0 – 39 |
| STRG | OK / UNKWN | OK / 0 – 39 |
| 4WAS | OK / UNKWN | OK / 0 – 39 |

ACTIVE TEST MODE

Description

- 4WAS rear actuator assembly activation is checked according to the control signal from CONSULT-III.
- The control signal forcibly activates (ON/OFF) 4WAS rear assembly, performs the self-diagnosis and checks each sensor in "SELF DIAGNOSTIC MODE".

CAUTION:

Perform the active test while the vehicle is stopped.

| Select test item | Contr | ol signal | Remarks | | |
|----------------------|---|--|---------|--|--|
| SELF DIAGNOSTIC MODE | ON CAUTION: Perform the active is stopped. | ON 4WAS rear actuator assem CAUTION: activates in the same direct Perform the active test while the vehicle activates in the same direct is stopped. 4WAS rear actuator assem OFF 4WAS rear actuator assem tivation. tivation. | | mbly activates. It ction as the steer- steering angle. | |
| | OFF | | | e ac- | |
| Standard value | | | | | |
| Monitor item | | Active test "ON" | | | |
| STEERING ANG | 0° (Neutral) | R 90° | L 90° | | |
| | | | | | |

| RR ST ANG-MAI | 2.4 V | Approx. 4.4 V | Approx. 0.4 V |
|---------------|-------------------------|---------------|---------------|
| RR ST ANG-SUB | 2.4 V | Approx. 4.4 V | Approx. 0.4 V |
| MOTOR CURRENT | No output (Approx. 0 A) | Output | (change) |

C1621, C1622 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS C1621, C1622 4WAS FRONT ACTUATOR

Description

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure), front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

INFOID:000000005650310

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | ŀ |
|-------|-------------------------------------|---|--|----|
| C1621 | ACTUATOR | 4WAS front motor current valve error is detected. (4WAS front motor current valve is excessively large.) | 4WAS front control unit or 4WAS front motor error is detected. | |
| C1622 | ACTUATOR | 4WAS front motor voltage valve or current error valve is detected. (4WAS front motor voltage valve error is detected.) (Voltage valve or current valve error is detected when starting the system.) | 4WAS front control unit or 4WAS front motor error is detected. | L. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- 1. Start the engine.
 - CAUTION:

Stop the vehicle.

- Steer 360° leftward slowly. Then steer 360° rightward to return the steering wheel to the straight-ahead M position. Repeat the same service for 1 minute or more.
 - NOTE:

The protection function mode (overheat protection) activates and the system stops if steering repeats for a long time.

3. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1621" or "C1622" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-49. "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK 4WAS FRONT MOTOR CIRCUIT

Check 4WAS front motor circus. STC-50, "Component Inspection (4WAS Front Motor)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.

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C1621, C1622 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

2.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

- 1. Connect 4WAS front control unit harness connector.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1621" or "C1622" detected?

YES >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.

NO >> GO TO 3.

3.CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-144.</u> "Reference Value".

Is each data the standard value?

YES >> Check each harness connector pin terminal for disconnection.

NO >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.

Component Inspection (4WAS Front Motor)

INFOID:000000005650312

1.CHECK 4WAS FRONT MOTOR

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS front actuator harness connector.
- 3. Check the resistance between 4WAS front actuator harness connectors.

| 4WAS front actuator | | | Resistance | |
|---------------------|----------|-----------|------------|-----------|
| Connector | Terminal | Connector | Terminal | (Approx.) |
| | 1 | | 5 | |
| M351 | 1 | M351 | 6 | 0.1 – 1 Ω |
| | 5 | | 6 | |

4. Check the continuity between 4WAS front actuator harness connector and the ground.

| 4WAS front actuator | | Continuity |
|---------------------|------------|-------------|
| Connector | Terminal | Continuity |
| | 1 – Ground | |
| M351 | 5 – Ground | Not existed |
| | 6 – Ground | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.

Special Repair Requirement

INFOID:000000005650313

AFTER REPLACING 4WAS FRONT ACTUATOR

• Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to <u>STC-30. "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)"</u>.

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

STC-50

C1621, C1622 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

| · Perform 4WAS front actu | tor adjustment after replacing 4WAS front control unit. Refer to STC-30, "4WAS | 3 |
|---------------------------|--|---|
| FRONT ACTUATOR NEL | RAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | |

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C1627 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

C1627 4WAS FRONT ACTUATOR

Description

IWITH 4WAS1

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure), front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

INFOID:000000005650315

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---------------------------|
| C1627 | ACTUATOR | The indication value from 4WAS front actuator (front wheel angle) differs from the value from 4WAS front control unit. | 4WAS front actuator error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

1. Start the engine. CAUTION:

Stop the vehicle.

2. Steer 360° leftward slowly. Then steer 360° rightward to return the steering wheel to the straight-ahead position. Repeat the same service for 1 minute or more.

NOTE:

The protection function mode (overheat protection) activates and the system stops if steering repeats for a long time.

3. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1627" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-52, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650316

1.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis

Is any DTC detected other than "C1627"?

YES >> Check the error system.

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

B With CONSULT-III Perform 4WAS front control unit self-diagnosis.

Is DTC "C1627" detected?

C1627 4WAS FRONT ACTUATOR

| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] | |
|--|--|---|
| YES >> Replace 4WAS front actuator. Refer to <u>STC-182</u> , " <u>Removal and Installation</u> ". NO >> GO TO 3. | | А |
| 3. CHECK INFORMATION | | |
| With CONSULT-III Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Rem <u>"Reference Value"</u> . | fer to <u>STC-144.</u> | В |
| Is each data the standard value? | | 0 |
| YES >> Check each harness connector pin terminal for disconnection. NO >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>. | | C |
| Special Repair Requirement | INFOID:000000005650317 | D |
| AFTER REPLACING 4WAS FRONT ACTUATOR | | |
| Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to <u>S</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Page 1)</u> | <u>TC-30, "4WAS</u> attern <u>2)"</u> . | Е |
| AFTER REPLACING 4WAS FRONT CONTROL UNIT | | |
| | TO OO HANAAO | _ |

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> F <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

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C1628 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

C1628 4WAS FRONT ACTUATOR

Description

IWITH 4WAS1

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure), front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

INFOID:000000005650319

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| C1628 | ACTUATOR | The front wheel steering angle sensor error is detected. | Front wheel steering an- gle sensor error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

Start the engine.
 CAUTION:

Stop the vehicle.

Steer 360° leftward slowly. Then steer 360° rightward to return the steering wheel to the straight-ahead position. Repeat the same service for 1 minute or more.
 NOTE:

The protection function mode (overheat protection) activates and the system stops if steering repeats for a long time.

3. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1628" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-54, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650320

1.CHECK FRONT WHEEL STEERING ANGLE SENSOR CIRCUIT (1)

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS front control unit harness connector.
- 3. Check the continuity between 4WAS front control unit harness connector and the ground.

| | Continuity | |
|-----------|-------------|---------|
| Connector | Continuity | |
| M42 | 18 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the harnesses and connectors.

C1628 4WAS FRONT ACTUATOR [WITH 4WAS < DTC/CIRCUIT DIAGNOSIS > **2.**CHECK FRONT WHEEL STEERING ANGLE SENSOR CIRCUIT (2) А 1. Connect 4WAS front control unit harness connector. 2. Turn the ignition switch ON. **CAUTION:** В Never start the engine. Check the continuity between 4WAS front actuator harness connector and 4WAS front control unit harness connector. 4WAS front actuator 4WAS front control unit Continuity Connector Terminal Connector Terminal D 7 M351 M42 18 Existed Is the inspection result normal? YES >> GO TO 3. Е NO >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View". ${f 3.}$ CHECK FRONT WHEEL STEERING ANGLE SENSOR CIRCUIT (3) F Check the resistance between 4WAS front actuator harness connectors. Refer to STC-55, "Component Inspection (Front Wheel Steering Angle Sensor)". Is the inspection result normal? STC YES >> GO TO 4. NO >> Replace 4WAS front actuator. Refer to STC-182, "Removal and Installation". ${f 4.}$ CHECK FRONT WHEEL STEERING ANGLE SENSOR SIGNAL Н With CONSULT-III Connect 4WAS front actuator harness connector. 2. Start the engine. **CAUTION:** Stop the vehicle. Rotate the steering wheel slowly. Check "MTR SEN U OUT", "MTR SEN V OUT" and "MTR SEN W OUT" item on "DATA MONITOR" of 4WAS front control unit. Do all data monitor values indicate "Hi" or "Low" simultaneously? YES >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View". Κ >> Check 4WAS front actuator harness connector pin terminal for disconnection. NO Component Inspection (Front Wheel Steering Angle Sensor) INFOID:000000005650321 L **1.**CHECK FRONT WHEEL STEERING ANGLE SENSOR 1. Start the engine. **CAUTION:** M Stop the vehicle. Steer to the straight-ahead position. Then turn the ignition switch OFF. 3. Disconnect 4WAS front actuator harness connector. Ν 4. Apply 12 V current between 4WAS front actuator harness connector No. 10 terminal (positive) and NO. 3 terminal (negative). (Release the lock structure.) **CAUTION:** • Never make the terminals short. • Connect the fuse between the terminals when applying the voltage. 5. Slowly steer rightward and leftward alternately. Check the resistance between 4WAS front actuator harness connectors. Ρ CAUTION: The steering angle must be within 10° rightward and leftward.

C1628 4WAS FRONT ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

| 4WAS front actuator | | | | Resistance (Ap- |
|---------------------|----------|-----------|----------|-----------------|
| Connector | Terminal | Connector | Terminal | prox.) |
| | 2 | | 7 | |
| M351 | 4 | M351 | 7 | 1 k – 100 kΩ |
| | 8 | | 7 | |

6. Connect 4WAS front actuator harness connector.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.

Special Repair Requirement

INFOID:000000005650322

AFTER REPLACING 4WAS FRONT ACTUATOR

• Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)"</u>.

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

C1631, C1632 4WAS FRONT CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

C1631, C1632 4WAS FRONT CONTROL UNIT

Description

• Each sensor signal controls 4WAS front actuator.

- The fail-safe functions stops the rear wheel angle function (the front wheel is the steering wheel cutting angle) when the electric components and the mechanical components are malfunctioning.
- The protection function mode stops 4WAS system intermittently when 4WAS system continues high loaded condition and overheat condition or the input signal does not transmit to 4WAS front control unit.
- 4WAS front control unit and 4WAS main control unit control the 4WAS system by 4WAS communication line to optimize control.

DTC Logic

INFOID:000000005650324

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | |
|-------|-------------------------------------|--|--|-----|
| C1631 | CONTROL UNIT | An error is detected inside 4WAS front control unit. | 4WAS front control unit or 4WAS front control unit | F |
| | | | tected. | STC |
| | | | 4WAS front control unit or | |
| C1632 | CONTROL UNIT | An error is detected inside 4WAS front control unit. | 4WAS front control unit power supply error is de- tected. | Н |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC (P)With CONSULT-III Turn the ignition switch from OFF to ON. 1. Perform 4WAS front control unit self-diagnosis. 2. <u>Is DTC "C1631" or "C1632" detected?</u> YES >> Proceed to diagnosis procedure. Refer to STC-57, "Diagnosis Procedure". Κ NO >> INSPECTION END Diagnosis Procedure INFOID:000000005650325 L 1.CHECK 4WAS FRONT CONTROL UNIT POWER SUPPLY 1. Turn the ignition switch OFF. Disconnect 4WAS front control unit harness connector. 2. Μ Check the voltage between 4WAS front control unit harness connector terminal and ground. 3. 4WAS front control unit Ν

| | | Voltage (Approx.) | |
|--------------------|-------------|-------------------|--|
| Connector Terminal | | Voltage (Approx.) | |
| M41 | 11 – Ground | Battery voltage | |
| M42 | 15 – Ground | 0 V | |

4. Turn the ignition switch ON. CAUTION:

Never start the engine.

5. Check the voltage between 4WAS front control unit harness connector terminal and ground.

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INFOID:000000005650323

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C1631, C1632 4WAS FRONT CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

| 4 | WAS front control unit | |
|--------------------|------------------------|-------------------|
| Connector Terminal | | Voltage (Approx.) |
| M41 | 11 – Ground | Battony voltago |
| M42 | 15 – Ground | Ballery vollage |

Is the inspection result normal?

YES >> GO TO 2. NO >> Check th

- >> Check the following items. Repair or replace the malfunctioning parts.
 - 40A fusible link (#I) open
 - Short among 40A fusible link (#I) connector, 4WAS front control unit harness connector No. 11 terminal and the ground
 - Open between the battery and 4WAS front control unit harness connector No. 11 terminal
 - 10A fuse (#3) open
 - Short among 10A fuse (#3) connector, 4WAS front control unit harness connector No. 15 terminal and the ground
 - Short among 10A fuse (#3) connector, unified meter and A/C amp harness connector No. 53 terminal and the ground
 - Open between the ignition switch and 4WAS front control unit harness connector No. 15 terminal
 - Battery or ignition switch

2.CHECK 4WAS FRONT CONTROL UNIT GROUND

Check the continuity between 4WAS front control unit harness connector terminal and the ground.

| | 4WAS front control unit | Continuity |
|-----------|-------------------------|------------|
| Connector | Terminal | Continuity |
| M41 | 12 – Ground | |
| MAD | 18 – Ground | Existed |
| 10142 | 34 – Ground | |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the harnesses and connectors.

3.CHECK TERMINAL

Check 4WAS front control unit harness connector pin terminal and connection for disconnection.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the specific malfunctioning part.

4.CHECK INFORMATION

• Check that any item below is applicable when the malfunctions occur.

- The engine stall occurs while driving or stopping the vehicle.

When detecting the charging system error

Is the item applicable?

- YES >> Check the error system.
 - Perform ECM symptom diagnosis. Refer to EC-606, "Symptom Table".
 - Perform the symptom diagnosis for the charging system. Refer to CHG-19, "Symptom Table".
- NO >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.

Special Repair Requirement

INFOID:000000005650326

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history).
 CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.

| C1631, C1632 4WAS FRONT CONTROL UNIT | |
|---|--|
| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
| Erase the memory of the self-diagnosis results (record) after printing out or reues of "DATA MONITOR". | cording all the val- |
| AFTER REPLACING 4WAS FRONT CONTROL UNIT | |
| Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refe <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement</u> | r to <u>STC-30, "4WAS</u> ant (Pattern 3)". B |
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< DTC/CIRCUIT DIAGNOSIS >

C1633 4WAS FRONT CONTROL UNIT

Description

- Each sensor signal controls 4WAS front actuator.
- The fail-safe functions stops the rear wheel angle function (the front wheel is the steering wheel cutting angle) when the electric components and the mechanical components are malfunctioning.
- The protection function stops 4WAS system temporarily when:
- 4WAS system continues being high load/overheat condition.
- The input signal is not transmitted to 4WAS front control unit.
- 4WAS front control unit and 4WAS main control unit control the 4WAS system by 4WAS communication line to optimize control.

DTC Logic

INFOID:000000005650328

INFOID:000000005650329

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|----------------------------------|
| C1633 | CONTROL UNIT | An error is detected inside 4WAS front control unit. | 4WAS front control unit error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1633" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-60, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK 4WAS FRONT CONTROL UNIT (1)

With CONSULT-III

1. Start the engine.

CAUTION:

Stop the vehicle.

- 2. Check "THERM TEMP" on "DATA MONITOR" of 4WAS front control unit.
- 3. Steer the steering wheel 360° leftward slowly and then steer 360° rightward. Return the steering wheel to the straight-ahead position. Repeat the same service for 3 minutes.
- 4. Check "THERM TEMP" on "DATA MONITOR" of 4WAS front control unit.
- Is DATA MONITOR value difference between before and after the service 3° or less?
- YES >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.

NO >> GO TO 2.

2.CHECK 4WAS FRONT CONTROL UNIT (2)

With CONSULT-III

1. Start the engine.

CAUTION:

Stop the vehicle.

- 2. Check "THERM TEMP" item on "DATA MONITOR" of 4WAS front control unit.
- 3. Steer the steering wheel 360° leftward slowly and then steer 360° rightward. Return the steering wheel to the straight-ahead position. Repeat the same service for 3 minutes.
- 4. Check "THERM TEMP" item on "DATA MONITOR" of 4WAS front control unit.

STC-60

INFOID:000000005650327

C1633 4WAS FRONT CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

| Monitor item | Condition | Display value | A |
|--|--|--|----------------------------------|
| THERM TEMP | Engine running (idling) | _40 − 100°C | |
| Is the inspection re YES >> GO TO | esult normal? O 3. | | В |
| NO >> Repla | ce 4WAS front control unit. Refer to MATION | STC-180, "Exploded View". | С |
| Check that any it Entering and exit When steering the ste | tem below is applicable when malfu ting the garage (Frequent steering) he steering wheel for a long time | nction occurs. | D |
| YES >> 4WAS NO >> Repla | <u>ble ?</u> 5 system protection function mode (ce 4WAS front control unit. Refer to | overheat protection)(4WAS s STC-180, "Exploded View". | ystem temporary stop) ⊟ |
| Special Repair | Requirement | | INFOID:00000005650330 |
| BEFORE REPLA • Record the self- | CING 4WAS FRONT CONTRO | LUNIT | F |
| CAUTION: • Never erase the strength of the st | he memory (history) of self-diagn | osis results when replacin | g 4WAS front control unit ST |
| Erase the menues of "DATA | s. mory of the self-diagnosis result MONITOR". | s (record) after printing ou | t or recording all the val- |
| AFTER REPLAC • Perform 4WAS f | ING 4WAS FRONT CONTROL | UNIT acing 4WAS front control uni | t. Refer to <u>STC-30, "4WAS</u> |
| FRONT ACTUA | TOR NEUTRAL POSITION ADJUS | IMENT: Special Repair Req | uirement (Pattern 3). |
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< DTC/CIRCUIT DIAGNOSIS >

C1651 IGNITION POWER SUPPLY

Description

4WAS system function is controlled by transmitting the ignition switch signal to 4WAS front control unit.

DTC Logic

INFOID:000000005650332

INFOID:000000005650333

INFOID:000000005650331

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---|
| C1651 | IGN POWER SUPPLY | The ignition voltage signal error is detected. | 4WAS front control unit or the ignition power supply error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1651" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-62, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK 4WAS FRONT CONTROL UNIT GROUND

1. Turn the ignition switch OFF.

2. Check the continuity between 4WAS front control unit harness connector and the ground.

| | 4WAS front control unit | Continuity | |
|-----------|-------------------------|------------|--|
| Connector | Connector Terminal | | |
| M42 | 18 – Ground | Existed | |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the harnesses and connectors.

2.CHECK 4WAS FRONT CONTROL UNIT POWER SUPPLY

1. Start the engine. CAUTION:

Stop the vehicle.

2. Check the voltage between 4WAS front control unit harness connectors.

| 4WAS front control unit | | Voltage (Approx.) | |
|-------------------------|----------|-------------------|--|
| Connector | Terminal | voltage (Approx.) | |
| M42 | 15 – 18 | Battery voltage | |

Is the measurement value "9 V" or less?

- YES >> Check the following items. Repair or replace the malfunctioning parts.
 - 4WAS front control unit harness connector pin terminal and connection
 - 10A fuse (#3) open
 - Short among 10A fuse (#3) connector, 4WAS front control unit harness connector No. 15 terminal and the ground
 - Short among 10A fuse (#3) connector, unified meter and A/C amp No. 53 terminal and the ground

STC-62

C1651 IGNITION POWER SUPPLY

| < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS] |
|---|
| Open between the ignition switch and 4WAS front control unit harness connector No. 15 terminal Ignition switch |
| NO >> GO TO 3. 3. CHECK 4WAS FRONT CONTROL UNIT SIGNAL |
| (P)With CONSULT-III |
| 1. Start the engine. CAUTION: Stop the vehicle. |
| 2. Check "IGN VOLT" item on "DATA MONITOR" of 4WAS front control unit. |
| YES >> Perform the symptom diagnosis for the charging system. Refer to <u>CHG-19, "Symptom Table"</u> . NO >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u> . |
| Special Repair Requirement |
| BEFORE REPLACING 4WAS FRONT CONTROL UNIT |
| Record the self-diagnosis results (history). CAUTION: |
| Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". |
| AFTER REPLACING 4WAS FRONT CONTROL UNIT • Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". |
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C1652 4WAS FRONT MOTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

C1652 4WAS FRONT MOTOR POWER SUPPLY

Description

The power supply for 4WAS front motor and 4WAS front control unit.

DTC Logic

INFOID:000000005650336

INFOID:000000005650337

INFOID:000000005650335

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---|
| C1652 | MOTOR POWER SUPPLY | 4WAS front motor main power supply error is detected | 4WAS front control unit or 4WAS front motor power supply error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1652" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-64, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.4WAS FRONT MOTOR GROUND INSPECTION

1. Turn the ignition switch OFF.

2. Check the continuity between 4WAS front control unit harness connector and the ground.

| 4WAS front control unit | | Continuity |
|-------------------------|-------------|------------|
| Connector | Terminal | Continuity |
| M41 | 12 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the harnesses and connectors.

2.4was front motor power supply inspection

1. Start the engine. CAUTION:

Stop the vehicle.

2. Check the voltage between 4WAS front control unit harness connectors.

| 4WAS front control unit | | Voltage (Approx.) | |
|-------------------------|----------|-------------------|--|
| Connector | Terminal | vollage (Applox.) | |
| M41 | 11 – 12 | Battery voltage | |

Is the measurement value "9 V" or less?

YES >> Check the following items. Repair or replace the malfunctioning parts.

• 4WAS front control unit harness connector pin terminal and connection

- 40A fusible link (#I) open
- Short among 40A fusible link (#I) connector, 4WAS front control unit harness connector No. 11 terminal and the ground
- Open between the battery and 4WAS front control unit harness connector No. 11 terminal
- Battery

STC-64

[WITH 4WAS]

C1652 4WAS FRONT MOTOR POWER SUPPLY

| NO >> GO TO 3. 3.4WAS FRONT CONTROL UNIT SIGNAL INSPECTION @With CONSULT-III 1. Start the engine. CAUTION: Stop the vehicle. 2. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. Does the item on "DATA MONITOR" indicate "16 V" or more? YES >> Perform the symptom diagnosis for the charging system. Refer to <u>CHG-19. "Symptom Table".</u> NO >> Replace 4WAS front control unit. Refer to <u>STC-180. "Exploded View".</u> Special Repair Requirement | < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] | |
|---|--|---------------------------------------|----|
| 3.4WAS FRONT CONTROL UNIT SIGNAL INSPECTION With CONSULT-III Start the engine. CAUTION: Stop the vehicle. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. Does the item on "DATA MONITOR" indicate "16 V" or more? YES >> Perform the symptom diagnosis for the charging system. Refer to <u>CHG-19</u>. "Symptom Table". NO >> Replace 4WAS front control unit. Refer to <u>STC-180</u>. "Exploded View". Special Repair Requirement BEFORE REPLACING 4WAS FRONT CONTROL UNIT Record the self-diagnosis results (history). CAUTION: Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30</u>. "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | NO >> GO TO 3. | | |
| With CONSULT-III Start the engine. CAUTION: Stop the vehicle. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. Does the item on "DATA MONITOR" indicate "16 V" or more? YES >> Perform the symptom diagnosis for the charging system. Refer to <u>CHG-19</u>. "Symptom Table". NO >> Replace 4WAS front control unit. Refer to <u>STC-180</u>. "Exploded View". Special Repair Requirement Special Repair Requirement Record the self-diagnosis results (history). CAUTION: Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30</u>. "4WAS FRONT CONTROL UNIT Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30</u>. "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | 3.4WAS FRONT CONTROL UNIT SIGNAL INSPECTION | | A |
| Stop the vehicle. 2. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. Dees the item on "DATA MONITOR" indicate "16 V" or more? YES >> Perform the symptom diagnosis for the charging system. Refer to CHG-19. "Symptom Table". NO >> Replace 4WAS front control unit. Refer to STC-180. "Exploded View". Special Repair Requirement INFOLLOW CONTROL UNIT • Record the self-diagnosis results (history). CAUTION: • Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. • Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT • Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to STC-30. "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | With CONSULT-III Start the engine. CAUTION: | | В |
| Does the item on "DATA MONITOR" indicate "16 V" or more? YES >> Perform the symptom diagnosis for the charging system. Refer to CHG-19, "Symptom Table". NO >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View". Special Repair Requirement IMFOLD.000000000000000000000000000000000000 | Stop the vehicle. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. | | C |
| Special Repair Requirement BEFORE REPLACING 4WAS FRONT CONTROL UNIT • Record the self-diagnosis results (history). CAUTION: • Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. • Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT • Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to STC-30, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | Does the item on "DATA MONITOR" indicate "16 V" or more?YES>> Perform the symptom diagnosis for the charging system. Refer to CHG-19. "Sympton of the charging system. Refer to STC-180. "Exploded View".NO>> Replace 4WAS front control unit. Refer to STC-180. "Exploded View". | <u>otom Table"</u> . | |
| BEFORE REPLACING 4WAS FRONT CONTROL UNIT Record the self-diagnosis results (history). CAUTION: Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>. | Special Repair Requirement | INFOID:000000005650338 | D |
| Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>. | BEFORE REPLACING 4WAS FRONT CONTROL UNIT Record the self-diagnosis results (history). | | E |
| ues of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT • Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to STC-30, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | Never erase the memory (history) of self-diagnosis results when replacing 4WAS froe after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-diagnosis results (record) after printing out or record after between the self-di | ont control unit ding all the val- | F |
| FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)". | ues of "DATA MONITOR". AFTER REPLACING 4WAS FRONT CONTROL UNIT | STC 20 "414/4 S | ST |
| | FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (P | <u>attern 3)"</u> . | F |

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< DTC/CIRCUIT DIAGNOSIS >

C1654 4WAS FRONT ACTUATOR RELAY

Description

- It performs control inside 4WAS front control unit.
- The actuator relay turns ON when turning the ignition switch ON.
- When turning the ignition switch from ON to OFF, the actuator relay remains ON and is turned OFF after a few minutes due to the 4WAS front control unit control.

DTC Logic

INFOID:000000005650340

INFOID:000000005650341

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| C1654 | ACTUATOR RELAY | An error is detected on the main relay power supply in- side 4WAS front control unit. | The main relay power supply inside 4WAS front control unit error is de- tected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- 1. Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1654" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-66, "Diagnosis Procedure"</u>.
- NO >> INSPECTION ĔND

Diagnosis Procedure

1.4WAS FRONT MOTOR GROUND INSPECTION

- 1. Turn the ignition switch OFF.
- 2. Check the continuity between 4WAS front control unit harness connector and the ground.

| | 4WAS front control unit | Continuity |
|-----------|-------------------------|------------|
| Connector | Connector Terminal | |
| M41 | 12 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the harnesses and connectors.

2.4was front motor power supply inspection

1. Start the engine. CAUTION:

Stop the vehicle.

2. Check the voltage between 4WAS front control unit harness connectors.

| 4WAS front control unit | | Voltage (Approx.) | |
|-------------------------|----------|-------------------|--|
| Connector | Terminal | vollage (Applox.) | |
| M41 | 11 – 12 | Battery voltage | |

Is the measurement value "9 V" or less?

YES >> Check the following items. Repair or replace the malfunctioning parts.

4WAS front control unit harness connector pin terminal and connection

• 40A fusible link (#I) open

STC-66

INFOID:000000005650339

C1654 4WAS FRONT ACTUATOR RELAY

| CTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|--|--|
| Short among 40A fusible link (#I) connector, 4WAS front control unit harnes terminal and the ground | ss connector No. 11 |
| Open between the battery and 4WAS front control unit harness connector N Battery | o. 11 terminal |
| 4WAS FRONT CONTROL UNIT SIGNAL INSPECTION | |
| With CONSULT-III Start the engine. CAUTION: | |
| Stop the vehicle. Check "MOTOR VOLT" item on "DATA MONITOR" of 4WAS front control unit. | |
| <u>oes the item on "DATA MONITOR" indicate "16 V" or more?</u> YES >> Perform the symptom diagnosis for the charging system. Refer to <u>CHG-19, "S</u> NO >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>. | Symptom Table". |
| pecial Repair Requirement | INFOID:000000005650342 |
| EFORE REPLACING 4WAS FRONT CONTROL UNIT Record the self-diagnosis results (history). | _ |
| Never erase the memory (history) of self-diagnosis results when replacing 4WAS after diagnosis. Erase the memory of the self-diagnosis results (record) after printing out or reques of "DATA MONITOR". | S front control unit cording all the val- |
| FTER REPLACING 4WAS FRONT CONTROL UNIT | |
| FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement | to <u>STC-30, 4WAS</u> <u>nt (Pattern 3)"</u> . |
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< DTC/CIRCUIT DIAGNOSIS >

C1655 4WAS FRONT DRIVER

Description

- It perform control inside 4WAS front control unit.
- The power supply for 4WAS front motor (3-phase motor).

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|---|
| C1655 | PRE-DRIVER | 4WAS front motor 3-phase current error is detected. (Current is not applied to 4WAS front motor) | 4WAS front control unit or 4WAS front motor power supply error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

(B) With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1655" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>STC-68, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK 4WAS FRONT MOTOR GROUND

1. Turn the ignition switch OFF.

- 2. Disconnect 4WAS front control unit harness connector.
- 3. Check the continuity between 4WAS front control unit harness connector and the ground.

| 4WAS front control unit | | Continuity |
|-------------------------|-------------|------------|
| Connector | Terminal | Continuity |
| M41 | 12 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the harnesses and connectors.

2.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

- 1. Connect 4WAS front control unit harness connector.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1622" detected?

YES >> Check the error system.

NO >> Replace 4WAS front control unit. Refer to <u>STC-180</u>, "Exploded View".

Special Repair Requirement

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history).
- CAUTION:
- Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.

STC-68

INFOID:000000005650346

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C1655 4WAS FRONT DRIVER

| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|--|--|
| Erase the memory of the self-diagnosis results (record) after printing out or record ues of "DATA MONITOR". | ding all the val- |
| AFTER REPLACING 4WAS FRONT CONTROL UNIT • Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (F</u> | <u>STC-30, "4WAS</u> Pattern <u>3)"</u> . B |
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C1661 4WAS FRONT LOCK SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

C1661 4WAS FRONT LOCK SOLENOID VALVE

Description

INFOID:000000005650347

IWITH 4WAS1

- Secure the inside of 4WAS front actuator temporarily. (It operates when performing active test with fail-safe function and CONSULT-III.)
- 4WAS front lock solenoid value is activated in the active test (lock release). The secured 4WAS front actuator is released.
- 4WAS front control unit controls 4WAS front actuator. 4WAS front actuator releases the lock when the engine speed signal is "ON". 4WAS front actuator applies the lock when the engine speed signal is "OFF".

DTC Logic

INFOID:000000005650348

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| C1661 | LOCK SOLENOID | 4WAS front lock solenoid valve error is detected. (An electric activation error is detected.) | 4WAS front control unit or 4WAS front lock solenoid valve error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1661" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-70, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650349

1.CHECK 4WAS FRONT SOLENOID VALVE CIRCUIT

Check 4WAS front solenoid valve circuit. Refer to <u>STC-70</u>, "Component Inspection (4WAS Front Lock Solenoid Valve)".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.

2. CHECK INFORMATION

With CONSULT-III

- 1. Connect 4WAS front actuator harness connector.
- Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-144, "Reference Value"</u>.

Is each data the standard value?

- YES >> Check each harness connector pin terminal for disconnection.
- NO >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.

Component Inspection (4WAS Front Lock Solenoid Valve)

INFOID:000000005650350

CHECK 4WAS FRONT SOLENOID VALVE CIRCUIT Turn the ignition switch OFF.

- Turn the ignition switch OFF.
 Disconnect 4WAS front actuator harness connector.
- Check the resistance between 4WAS front actuator harness connectors.

C1661 4WAS FRONT LOCK SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

| 4WAS front actuator | | | Pasistanco | А | |
|--|---|--|---|--|--------------------------------------|
| Connector | Terminal | Connector | Terminal | (Approx.) | |
| M351 | 10 | M351 | 3 | 1 – 100 Ω | R |
| 4. Check the continuity between 4WAS front actuator harness connector and the ground. | | | | | |
| 4WAS front actuator | | | | | |
| Connector | | Terminal | | - Continuity | |
| M351 | M351 3 – Ground 10 – Ground | | | Not existed | D |
| | | | | | |
| Is the inspec | tion result n | ormal? | | | |
| NO >>1 | Replace 4W | AS front actu | ator. Refer | to STC-182, "Removal and Installation". | E |
| Special Re | epair Req | luirement | | INFOID:00000005650351 | _ |
| AFTER REP | | 1WAS FROM | | TOR | - |
| • Perform 4 | WAS front a | actuator adju | stment after | r replacing 4WAS front actuator. Refer to STC-30, "4WAS | |
| FRONT AC | CTUATOR N | IEUTRAL PC | SITION AD | DJUSTMENT : Special Repair Requirement (Pattern 2)". | STO |
| BEFORE R | | | | TROI UNIT | |
| | EPLACING | | | | |
| Record the CAUTION: | self-diagno | sis results (h | istory). | | Н |
| Record the CAUTION: Never er | e self-diagno | mory (histor | istory). r y) of self-c | diagnosis results when replacing 4WAS front control unit | Н |
| Record the CAUTION: Never er after diag Erase th | e self-diagno ase the me gnosis. e memory | of the self-d | istory). r y) of self-c liagnosis re | diagnosis results when replacing 4WAS front control unit esults (record) after printing out or recording all the val- | Н |
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C1667 LOCK INSERTION

< DTC/CIRCUIT DIAGNOSIS >

C1667 LOCK INSERTION

Description

IWITH 4WAS1

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure), front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

INFOID:000000005650353

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|---|
| C1667 | LOCK INSERTION | 4WAS front lock solenoid valve (lock) error is detected. (An error is detected in lock condition.) | The inside 4WAS front actuator error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

Start the engine.
 CAUTION:

Stop the vehicle.

- 2. Steer 30° leftward slowly. Steer 30° rightward. Return the steering wheel to the straight-ahead position.
- 3. Turn the ignition switch OFF.
- 4. Turn the ignition switch ON.
- 5. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1667" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-72, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650354

1.CHECK 4WAS FRONT LOCK SOLENOID VALVE (LOCK STRUCTURE)

With CONSULT-III

1. Start the engine. CAUTION:

Stop the vehicle.

- 2. Steer 30° leftward slowly. Steer 30° rightward. Return the steering wheel to the straight-ahead position.
- 3. Turn the ignition switch OFF.
- 4. Turn the ignition switch ON.
- 5. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1667" detected?

- YES >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.
- NO >> GO TO 2.

2. CHECK INFORMATION

With CONSULT-III
C1667 LOCK INSERTION

[WITH 4WAS] < DTC/CIRCUIT DIAGNOSIS > 1. Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to STC-144, "Reference Value". А 2. Perform 4WAS front control unit self-diagnosis. Is each data the standard value? YES >> GO TO 1. В NO >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View". Special Repair Requirement INFOID:000000005650355 С AFTER REPLACING 4WAS FRONT ACTUATOR • Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to STC-30, "4WAS D FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)".

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C1668 LOCK HOLDER GAP DETECT

< DTC/CIRCUIT DIAGNOSIS >

C1668 LOCK HOLDER GAP DETECT

Description

IWITH 4WAS1

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure). front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|---|
| C1668 | LOCK HLD GAP DETCT | 4WAS front lock solenoid valve (lock) error is detected. (Excessive force is applied to the lock.) | The inside 4WAS front actuator error is detected. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

(R)With CONSULT-III

- Turn the ignition switch from OFF to ON. 1.
- Perform 4WAS front control unit self-diagnosis. 2.

Is DTC "C1668" detected?

YES >> Proceed to diagnosis procedure. Refer to STC-74, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

(P)With CONSULT-III

- 1. Start the engine. CAUTION: Stop the vehicle.
- 2. Perform 4WAS front control unit self-diagnosis. Check that DTC "C1668" is detected. CAUTION:
 - Replace 4WAS front actuator when the diagnosis history remains.
 - Never repair the malfunctioning part in 4WAS front actuator adjustment without replacing 4WAS front actuator.

>> Replace 4WAS front actuator.

Special Repair Requirement

AFTER REPLACING 4WAS FRONT ACTUATOR

 Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to <u>STC-30, "4WAS</u> FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)".

STC-74

INFOID:000000005650359

INFOID:000000005650358

INFOID:000000005650357

C1669 INCOMPLETE LOCK RELEASE

< DTC/CIRCUIT DIAGNOSIS >

C1669 INCOMPLETE LOCK RELEASE

Description

- Wiring connected to 4WAS front actuator is integrated with 4WAS front actuator.
- 4WAS front actuator rotates together with steering wheel.
- 4WAS front actuator mainly consists of five components. [4WAS front lock solenoid valve (lock structure), front wheel steering angle sensor, 4WAS front motor, gear shaft, and spiral cable]
- 4WAS front lock solenoid valve (lock structure) is controlled by the 4WAS front control unit, and locks/ C unlocks 4WAS front actuator.
- If a strong force (rotation direction) is applied to 4WAS front actuator, the locking mechanism (holder) absorbs the force and locks 4WAS front actuator.
- Front wheel steering angle sensor detects a turning angle of 4WAS front motor.
- 4WAS front motor controls number of revolutions by a command value from the 4WAS front control unit.
- Gear shaft is an output axis of 4WAS front motor. (Gear shaft = 4WAS front motor revolution + steering angle)
- Spiral cables mean the power line and signal lines of 4WAS front motor.

DTC Logic

DTC DETECTION LOGIC

| | | | | STO |
|-------|-------------------------------------|---|---|-----|
| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | 010 |
| C1669 | INCOMP LOCK RELEAS | 4WAS front actuator error is detected. (An error is detected in unlock condition.) | The power steering oil pressure or the inside 4WAS front actuator error is detected. | Η |

DTC CONFIRMATION PROCEDURE

| 1 | |
|---|--|
| | |
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(P)With CONSULT-III Turn the ignition switch from OFF to ON. 1. 2. Perform 4WAS front control unit self-diagnosis. Κ Is DTC "C1669" detected? YES >> Proceed to diagnosis procedure. Refer to STC-75, "Diagnosis Procedure". >> INSPECTION END NO L Diagnosis Procedure INFOID:000000005650362 **1.**CHECK INFORMATION M Check that any item below is applicable. - The steering force is heavy when 4WAS warning lamp is ON. - The power steering system error is detected (oil leakage, belt tension, steering force etc.). Ν Is the item applicable? YES >> Perform the symptom diagnosis for the steering system. Refer to ST-3, "NVH Troubleshooting Chart". NO >> Replace 4WAS front actuator. Refer to STC-182, "Removal and Installation". Special Repair Requirement INFOID:000000005650363 P AFTER REPLACING 4WAS FRONT ACTUATOR • Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to STC-30, "4WAS

 Perform 4WAS front actuator adjustment after replacing 4WAS front actuator. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)"</u>.

INFOID:000000005650360

INFOID:000000005650361

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C1671 ACTUATOR ADJUSTMENT NOT PERFORMED

< DTC/CIRCUIT DIAGNOSIS >

C1671 ACTUATOR ADJUSTMENT NOT PERFORMED

Description

• Memorize the neutral position of 4WAS front actuator in 4WAS front control unit.

DTC Logic

INFOID:000000005650365

INFOID:000000005650366

INFOID:000000005650364

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| C1671 | ACT ADJ NOT PRFRM | 4WAS front actuator adjustment is not performed. | 4WAS front actuator ad- justment is not per- formed. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1671" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-76, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

- Is any DTC other than "C1671" detected?
- YES >> Check the error system.
- NO >> GO TO 2.
- 2.4was front actuator adjustment

With CONSULT-III

- 1. Perform 4WAS front actuator adjustment. Refer to <u>STC-30, "4WAS FRONT ACTUATOR NEUTRAL</u> <u>POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)"</u>.
- 2. Perform 4WAS front control unit self-diagnosis.

Is any DTC other than "C1671" detected?

- YES >> Check the error system.
- NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

Is DTC "C1671" detected?

- YES >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View".
- NO >> INSPECTION END

Special Repair Requirement

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history).
- CAUTION:
- Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.

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2010 G37 Coupe

INFOID:000000005650367

[WITH 4WAS]

C1671 ACTUATOR ADJUSTMENT NOT PERFORMED

| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|--|--|
| Erase the memory of the self-diagnosis results (record) after prinues of "DATA MONITOR". | ting out or recording all the val- |
| FTER REPLACING 4WAS FRONT CONTROL UNIT | |
| Perform 4WAS front actuator adjustment after replacing 4WAS front cort | ntrol unit. Refer to STC-30, "4WAS |
| FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Rep | <u>pair Requirement (Pattern 3)"</u> . |
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C1672 INCOMPLETE ACTUATOR ADJUSTMENT

< DTC/CIRCUIT DIAGNOSIS >

C1672 INCOMPLETE ACTUATOR ADJUSTMENT

Description

• Memorize the neutral position of 4WAS front actuator in 4WAS front control unit.

DTC Logic

INFOID:000000005650369

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DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|--|
| C1672 | INCOMP ACTUATR ADJ | 4WAS front actuator adjustment is incomplete. | 4WAS front actuator ad- justment is incomplete. |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- 1. Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "C1672" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-78, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

Is any DTC other than "C1672" detected?

- YES >> Check the error system.
- NO >> GO TO 2.

2. ADJUST 4WAS FRONT ACTUATOR

With CONSULT-III

 Perform 4WAS front actuator adjustment. Refer to <u>STC-30, "4WAS FRONT ACTUATOR NEUTRAL</u> <u>POSITION ADJUSTMENT : Special Repair Requirement (Pattern 2)"</u>.

2. Perform 4WAS front control unit self-diagnosis.

Is any error system detected?

- YES >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View".
 - Perform 4WAS actuator adjustment after replacing 4WAS front control unit. Perform the 4WAS front control unit self-diagnosis again. Replace 4WAS front actuator if DTC "C1672" is detected. Refer to <u>STC-182</u>, "Removal and Installation".
- NO >> INSPECTION END

Special Repair Requirement

INFOID:000000005650371

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

< DTC/CIRCUIT DIAGNOSIS >

C1684, C1685 4WAS MAIN CONTROL UNIT COMMUNICATION

Description

- 4WAS front control unit and 4WAS main control unit transmit/receive information to/from each other for optimum control of the 4WAS system with the specified 4WAS system line (4WAS communication line) between 4WAS front control unit and 4WAS main control unit.
- Be careful to repair wirings because 4WAS system specified line adopts twisted-pair wires. Refer to <u>STC-</u> <u>179, "Precautions for Harness Repair"</u>.

DTC Logic

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[WITH 4WAS]

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DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | Е |
|-------|-------------------------------------|--|--|-----|
| C1684 | 4WAS MAIN ECU COMM | 4WAS communication line* data communication error is detected. (An error signal is detected from 4WAS main control unit.) | 4WAS communication line*/4WAS main control unit/4WAS front control unit error | F |
| C1685 | 4WAS MAIN ECU COMM | 4WAS communication line* data communication error is detected. (An error signal is detected from 4WAS main control unit.) | 4WAS communication line*/4WAS main control unit/4WAS front control unit error | STC |

*: Communication line between 4WAS front control unit and 4WAS main control unit

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

Image: Second Construction Image: Second Constret Image:

1.CHECK COMMUNICATION LINE (1)

- 1. Turn the ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 3. Disconnect yaw rate/side G sensor harness connector.
- 4. Disconnect 4WAS front control unit harness connector.
- 5. Disconnect 4WAS main control unit harness connector.
- Check the continuity between ABS actuator and electric unit (control unit) harness connector and yaw rate/side G sensor harness connector.

| ABS actuator and electric unit (control unit) | | Yaw rate/sid | de G sensor. | Continuity |
|---|----------|--------------|--------------|------------|
| Connector | Terminal | Connector | Terminal | |
| E41 | 25 | M1/3 | 2 | Evistod |
| | 45 | 101143 | 3 | EXISIEU |

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.
- **2.**CHECK COMMUNICATION LINE (2)

< DTC/CIRCUIT DIAGNOSIS >

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

| ABS a | Continuity | |
|-----------|-------------|-------------|
| Connector | Continuity | |
| F/1 | 25 – Ground | Not existed |
| | 45 – Ground | |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

3.CHECK COMMUNICATION LINE (3)

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

| ABS a | Continuity | |
|--------------------|------------|-------------|
| Connector Terminal | | Continuity |
| E41 | 25 – 45 | Not existed |

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair</u>".

4.CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check the continuity between ABS actuator and electric unit (control unit) connector. Refer to <u>STC-86, "Component Inspection [ABS Actuator and Electric Unit (Control Unit)]</u>".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace ABS actuator and electric unit (control unit). Refer to <u>BRC-105, "Exploded View"</u>.

5.CHECK YAW RATE/SIDE G SENSOR

Check the continuity between yaw rate/side G sensor connector. Refer to <u>STC-81, "Component Inspection</u> (Yaw Rate/Side G Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace yaw rate/side G sensor. Refer to <u>BRC-107, "Exploded View"</u>.

6.CHECK CAN DIAGNOSIS SUPPORT MONITOR (4WAS FRONT CONTROL UNIT)

With CONSULT-III

- 1. Connect ABS actuator and electric unit (control unit) harness connector.
- 2. Connect yaw rate/side G sensor harness connector.
- 3. Connect 4WAS front control unit harness connector.
- 4. Connect 4WAS main control unit harness connector.
- 5. Start the engine. CAUTION:

Stop the vehicle.

- 6. Perform CAN diagnosis support monitor of 4WAS front control unit.
- 7. Replace 4WAS main control unit error history. Refer to <u>STC-41, "CONSULT-III Function</u> [4WAS(FRONT)]".

What is the indicated item?

All items are "OK">>GO TO 7.

"TRANSMIT DIAG" is other than "OK">>GO TO 7.

"4WAS(MAIN)" is other than "OK">>GO TO 8.

1.CHECK 4WAS FRONT CONTROL UNIT CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS front control unit harness connector.

< DTC/CIRCUIT DIAGNOSIS >

- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 4. Check the continuity between 4WAS front control unit harness connector and ABS actuator and electric A unit (control unit) harness connector.

| 4WAS front control unit | | ABS actuator and electric unit (control unit) | | Continuity | |
|-------------------------|----------|---|----------|------------|--|
| Connector | Terminal | Connector | Terminal | | |
| M42 | 14 | E41 | 25 | Evictod | |
| 10142 | 25 | | 45 | LAISIEU | |

 Check that 4WAS front control unit connector No. 14 terminal and No. 25 are connected properly and not deformed.

Is the inspection result normal?

- YES >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View".
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness"

8.CHECK 4WAS MAIN CONTROL UNIT CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.
- Disconnect ABS actuator and electric unit (control unit) namess connector.
 Check the continuity between 4WAS main control unit harness connector and ABS actuator and electric unit (control unit) harness connector.

| 4WAS main control unit | | ABS actuator and electric unit (control unit) | | Continuity |
|------------------------|----------|---|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| DE1 | 31 | E 4 1 | 45 | Evictod |
| D34 | 32 | E41 | 25 | EXISIEU |

 Check that 4WAS main control unit connector No. 31 terminal and No. 32 are connected properly and not deformed.

Is the inspection result normal?

 YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.
 NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179, "Precautions for Harness</u> Repair".

Component Inspection [ABS Actuator and Electric Unit (Control Unit)]

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

- 1. Turn the ignition switch OFF.
- Remove ABS actuator and electric unit (control unit). Refer to <u>BRC-105, "Exploded View"</u>.
- 3. Check the resistance between ABS actuator and electric unit (control unit) connector terminals.

| ABS actuator and electric unit (control unit) | | Posistance (Approx.) | |
|---|--------------------------------|-------------------------|--|
| Terminal | | | |
| 25 – 45 | | 120 Ω | |
| <u>Is the in</u> YES | <u>spection result normal?</u> | | |
| NO | >> Replace ABS actuator an | d electric unit (contro | |
| Comp | onent Inspection (Yaw I | Rate/Side G Sen | |

1.CHECK YAW RATE/SIDE G SENSOR

1. Turn the ignition switch OFF.

Remove yaw rate/side G sensor. Refer to <u>BRC-107, "Exploded View"</u>.

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< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

3. Check the resistance between yaw rate/side G sensor connector terminals.

| Yaw rate/side G sensor | - Resistance (Approx.) | |
|------------------------|------------------------|--|
| Terminal | | |
| 2 – 3 | 120 Ω | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace yaw rate/side G sensor.

Special Repair Requirement

INFOID:000000005650377

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history).
 - **CAUTION:**
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

BEFORE REPLACING 4WAS MAIN ACTUATOR

- Record the self-diagnosis results (history).
 - **CAUTION:**
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

< DTC/CIRCUIT DIAGNOSIS >

C1686 4WAS MAIN CONTROL UNIT

Description

• It transmits the value calculated by 4WAS main control unit to 4WAS front control unit with 4WAS communication line (line for 4WAS system). 4WAS front control unit controls 4WAS front actuator according to the received command value.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | |
|--|---|--|------------------------|-----|
| C1686 | 4WAS main control unit fail-safe mode | E | | |
| DTC CONFIR | MATION PROCEDURE | | | F |
| With CONSU 1. Turn the ig 2. Perform 4V Is DTC "C1686 | JLT-III nition switch from OFF to VAS front control unit self- " detected? | ON. diagnosis. | | STO |
| YES >> Pro NO >> INS | Deceed to diagnosis proced | ure. Refer to <u>STC-83, "Diagnosis Procedure"</u> . | | Η |
| Diagnosis P | rocedure | | INFOID:000000005650380 | I |
| 1.PERFORM | SELF-DIAGNOSIS (4WAS | S FRONT CONTROL UNIT) | | I |
| With CONSU Perform 4WAS | JLT-III front control unit self-diag | nosis. | | J |
| Is any DTC oth YES >> Ch NO >> Pe | er than "C1686" detected? eck the error system. rform 4WAS main control | <u>?</u> unit self-diagnosis. | | K |
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< DTC/CIRCUIT DIAGNOSIS >

U1000, U1002 4WAS COMMUNICATION CIRCUIT

Description

- 4WAS front control unit and 4WAS main control unit transmit/receive information to/from each other for optimum control of the 4WAS system with the specified 4WAS system line (4WAS communication line) between 4WAS front control unit and 4WAS main control unit.
- Be careful to repair wirings because 4WAS system specified line adopts twisted-pair wires. Refer to <u>STC-179, "Precautions for Harness Repair"</u>.

DTC Logic

INFOID:000000005650382

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| U1000 | CAN COMM CIRCUIT | When 4WAS front control unit is not transmitting or re- ceiving 4WAS communication signal for 2 seconds or more. | 4WAS communication line*/4WAS main control unit/4WAS front control unit error |
| U1002 | SYSTEM COMM(CAN) | When 4WAS front control unit is not transmitting or re- ceiving 4WAS communication signal for 2 seconds or less. | 4WAS communication line*/4WAS main control unit/4WAS front control unit error |

*: Communication line between 4WAS front control unit and 4WAS main control unit

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "U1000" or "U1002" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-84, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650383

1.CHECK COMMUNICATION LINE (1)

- 1. Turn the ignition switch OFF.
- 2. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 3. Disconnect yaw rate/side G sensor harness connector.
- 4. Disconnect 4WAS front control unit harness connector.
- 5. Disconnect 4WAS main control unit harness connector.
- 6. Check the continuity between ABS actuator and electric unit (control unit) harness connector and yaw rate/side G sensor harness connector.

| ABS actuato unit (cor | r and electric htrol unit) | Yaw rate/sid | Continuity | |
|--------------------------|-------------------------------|--------------|------------|---------|
| Connector | Terminal | Connector | | |
| F/1 | 25 | M1/3 | 2 | Existed |
| C41 | 45 | WIT45 | 3 | LAISted |

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.
- **2.**CHECK COMMUNICATION LINE (2)

INFOID:000000005650381

< DTC/CIRCUIT DIAGNOSIS >

Check the continuity between ABS actuator and electric unit (control unit) harness connector and the ground. ABS actuator and electric unit (control unit) Continuity Connector Terminal 25 - Ground E41 Not existed 45 - Ground Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace the harnesses and connectors. Refer to STC-179, "Precautions for Harness Repair". ${\it 3.}$ CHECK COMMUNICATION LINE (3) Check the continuity between ABS actuator and electric unit (control unit) harness connector. ABS actuator and electric unit (control unit) Continuity Connector Terminal E41 25 - 45Not existed Is the inspection result normal? YES >> GO TO 4. NO >> Repair or replace the harnesses and connectors. Refer to STC-179, "Precautions for Harness Repair". CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) Check the continuity between ABS actuator and electric unit (control unit). Refer to STC-86, "Component Inspection [ABS Actuator and Electric Unit (Control Unit)]". Is the inspection result normal? YES >> GO TO 5. NO >> Replace ABS actuator and electric unit (control unit). Refer to BRC-105, "Exploded View". ${f b}.$ CHECK YAW RATE/SIDE G SENSOR Check the continuity between yaw rate/side G sensor. Refer to STC-86, "Component Inspection (Yaw Rate/ Side G Sensor)". Is the inspection result normal? YES >> GO TO 6. NO >> Replace yaw rate/side G sensor. Refer to BRC-107, "Exploded View". **O.**CHECK CAN DIAGNOSIS SUPPORT MONITOR (4WAS FRONT CONTROL UNIT) (P)With CONSULT-III Connect ABS actuator and electric unit (control unit) harness connector. 2. Connect yaw rate/side G sensor harness connector. 3. Connect 4WAS front control unit harness connector. 4 Connect 4WAS main control unit harness connector. 5. Start the engine. **CAUTION:** Stop the vehicle. Perform CAN diagnosis support monitor of 4WAS front control unit.

7. Replace 4WAS main control unit error history. Refer to <u>STC-41. "CONSULT-III Function</u> [4WAS(FRONT)]".

What is the indicated item?

All items are "OK">>GO TO 7.

"TRANSMIT DIAG" is other than "OK">>GO TO 7.

"4WAS(MAIN)" is other than "OK">>GO TO 8.

1.CHECK 4WAS FRONT CONTROL UNIT CIRCUIT

1. Turn the ignition switch OFF.

2. Disconnect 4WAS front control unit harness connector.

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[WITH 4WAS]

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< DTC/CIRCUIT DIAGNOSIS >

- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 4. Check the continuity between 4WAS front control unit harness connector and ABS actuator and electric unit (control unit) harness connector.

| 4WAS front | control unit | ABS actuato unit (cor | Continuity | | |
|------------|--------------|--------------------------|------------|---------|--|
| Connector | Terminal | Connector | Terminal | | |
| M42 | 14 | E <i>4</i> 1 | 25 | Existed | |
| 10142 | 25 | L41 | 45 | | |

5. Check that 4WAS front control unit connector No. 14 terminal and No. 25 are connected properly and not deformed.

Is the inspection result normal?

- YES >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

8.CHECK 4WAS MAIN CONTROL UNIT CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 4. Check the continuity between 4WAS main control unit harness connector and ABS actuator and electric unit (control unit) harness connector.

| 4WAS mair | n control unit | ABS actuato unit (cor | Continuity | |
|-----------|----------------|--------------------------|------------|---------|
| Connector | Terminal | Connector | Terminal | |
| DE4 | 31 | E41 | 45 | Evicted |
| D34 | 32 | C41 | 25 | Existed |

5. Check that 4WAS main control unit connector No. 31 terminal and No. 32 are connected properly and not deformed.

Is the inspection result normal?

- YES >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

Component Inspection [ABS Actuator and Electric Unit (Control Unit)]

INFOID:000000005650384

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

1. Turn the ignition switch OFF.

2. Remove ABS actuator and electric unit (control unit). Refer to <u>BRC-105, "Exploded View"</u>.

3. Check the resistance between ABS actuator and electric unit (control unit) connector terminals.

| ABS actuator and electric unit (control unit) | Resistance (Approx.) | |
|---|----------------------|--|
| Terminal | | |
| 25 – 45 | 120 Ω | |

Is the inspection result normal?

YES >> INSPECTION END

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

Component Inspection (Yaw Rate/Side G Sensor)

INFOID:000000005650385

1.CHECK YAW RATE/SIDE G SENSOR

- 1. Turn the ignition switch OFF.
- Remove yaw rate/side G sensor. Refer to <u>BRC-107, "Exploded View"</u>.

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2010 G37 Coupe

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

INFOID:000000005650386

| 3. | Check the | resistance | between | yaw | rate/side | G | sensor | connector | terminals. | |
|----|-----------|------------|---------|-----|-----------|---|--------|-----------|------------|--|
|----|-----------|------------|---------|-----|-----------|---|--------|-----------|------------|--|

| Yaw rate/side G sensor | Posistance (Approx |
|------------------------|---------------------|
| Terminal | Resistance (Approx. |
| 2-3 | 120 Ω |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace yaw rate/side G sensor.

Special Repair Requirement

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history).
 - **CAUTION:**
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

- Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>STC FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.
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< DTC/CIRCUIT DIAGNOSIS >

U1010 4WAS COMMUNICATION CIRCUIT

Description

- 4WAS front control unit and 4WAS main control unit transmit/receive information to/from each other for optimum control of the 4WAS system with the specified 4WAS system line (4WAS communication line) between 4WAS front control unit and 4WAS main control unit.
- Be careful to repair wirings because 4WAS system specified line adopts twisted-pair wires. Refer to <u>STC-179</u>, "Precautions for Harness Repair".

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|--|
| U1010 | CONTROL UNIT(CAN) | When detecting error during the initial diagnosis of 4WAS controller of 4WAS front control unit | 4WAS communication line*/4WAS main control unit/4WAS front control unit error |

*: Communication line between 4WAS front control unit and 4WAS main control unit

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS front control unit self-diagnosis.

Is DTC "U1010" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-88, "Diagnosis Procedure"</u>.
- NO >> INSPECTION ĔND

Diagnosis Procedure

INFOID:000000005650389

1.4WAS FRONT CONTROL UNIT

Check that there is no malfunction in 4WAS front control unit harness connector or disconnection.

Is the inspection result normal?

- YES >> Replace 4WAS front control unit. Refer to <u>STC-180, "Exploded View"</u>.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair</u>".

Special Repair Requirement

INFOID:000000005650390

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

 Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

INFOID:000000005650387

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C1900, C1901, C1906, C1907, C1927, C1933 4WAS MAIN CONTROL UNIT < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS]

C1900, C1901, C1906, C1907, C1927, C1933 4WAS MAIN CONTROL UNIT

Description

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- 4WAS rear actuator and the power steering solenoid valve is controlled by each sensor signal.
- The fail-safe functions stops the rear wheel angle function (the front wheel is the steering wheel cutting angle) when the electric components and the mechanical components are malfunctioning.
- The protective function stops 4WAS system temporarily when the input signal is not inputted to 4WAS main control unit (When battery-power dose not work temporarily).
- 4WAS front control unit and 4WAS main control unit perform two-way transmitting/receiving signals for optimal control of 4WAS system via 4WAS communication line.

DTC Logic

INFOID:000000005650392

DTC DETECTION LOGIC

| | | | | _ |
|-------|-------------------------------------|---|------------------------------|-----|
| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | - |
| C1900 | CONTROL UNIT [ABNORMAL1] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | F |
| C1901 | CONTROL UNIT [ABNORMAL2] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | STC |
| C1906 | CONTROL UNIT [ABNORMAL5] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | - |
| C1907 | CONTROL UNIT [ABNORMAL4] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | Н |
| C1927 | CONTROL UNIT [ABNORMAL5] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | |
| C1933 | CONTROL UNIT | An error is detected inside 4WAS main control unit. | 4WAS main control unit error | - |

DTC CONFIRMATION PROCEDURE

| 1.RECHECK DTC | K |
|---|---------|
| With CONSULT-III 1. Turn the ignition switch from OFF to ON. 2. Perform 4WAS main control unit self-diagnosis. | L |
| Is DTC "C1900", "C1901", "C1906", "C1907", "C1927" or "C1933" detected?YES>> Proceed to diagnosis procedure. Refer to STC-89, "Diagnosis Procedure".NO>> INSPECTION END | M |
| Diagnosis Procedure | 5650393 |
| 1. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT) | Ν |
| With CONSULT-III Perform 4WAS main control unit self-diagnosis. Is any DTC "C1900", "C1901", "C1906", "C1907", "C1927" or "C1933" detected? | 0 |
| YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u> . NO >> GO TO 2. 2. CHECK INFORMATION | Ρ |

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> <u>"Reference Value"</u>.

Is each data the standard value?

YES >> Check each harness connector pin terminal for disconnection.

STC-89

C1900, C1901, C1906, C1907, C1927, C1933 4WAS MAIN CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Special Repair Requirement

INFOID:000000005650394

[WITH 4WAS]

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history).
 - **CAUTION:**
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

C1902, C1903, C1904, C1910, C1913 4WAS REAR MOTOR OUTPUT [WITH 4WAS] < DTC/CIRCUIT DIAGNOSIS >

C1902, C1903, C1904, C1910, C1913 4WAS REAR MOTOR OUTPUT

Description

• 4WAS rear motor activates 4WAS rear actuator.

В Maintain the toe-stiffness of rear wheels against the road external force because the irreversible sufficiency performance hypoid gear is used.

DTC Logic

INFOID:000000005650396 С

INFOID:000000005650395

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DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | |
|-------|-------------------------------------|--|-----------------------|-----|
| C1902 | MOTOR OUTPUT [REV CURRENT] | 4WAS rear motor current error is detected. (4WAS rear motor current output direction differs.) | 4WAS rear motor error | E |
| C1903 | MOTOR OUTPUT [NO CURRENT] | 4WAS rear motor current error is detected. (Current is input to 4WAS main control unit if 4WAS main control unit output is "OFF".) | 4WAS rear motor error | F |
| C1904 | MOTOR OUTPUT [OVERCURRENT] | 4WAS rear motor current error is detected. (4WAS rear motor output is overcurrent.) | 4WAS rear motor error | OTC |
| C1910 | MOTOR OUTPUT [MOTOR LOCK] | 4WAS rear motor inside error is detected. (4WAS rear motor does not move or the rear wheel an- gle sensor does not change if 4WAS main control unit output is 14A or more.) | 4WAS rear motor error | Н |
| C1913 | MOTOR OUTPUT [ABNORML SIG] | 4WAS rear motor current error is detected. (4WAS rear motor does not move or the rear wheel an- gle sensor output does not change when 4WAS main control unit output is 18A or more, and 4WAS main mo- tor output is low.) | 4WAS rear motor error | I |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

| With CONSULT-III | | Κ |
|--|--------------------------|---|
| 1. Perform "SELF DIAGNOSTIC MODE" item on "ACTIVE TEST" of 4WAS main control u | nit. | |
| CAUTION: | | |
| Perform the active test while stopping the vehicle. | | L |
| Perform 4WAS main control unit self-diagnosis. | | |
| <u>Is DTC "C1902", "C1903", "C1904", "C1910" or "C1913" detected?</u> | | |
| YES >> Proceed to diagnosis procedure. Refer to <u>STC-91, "Diagnosis Procedure"</u> . | | M |
| NO >> INSPECTION END | | |
| Diagnosis Procedure | INEOID-00000005650207 | |
| Blaghoolo Frocoddio | IN CID.00000000000000000 | Ν |
| 1. CHECK 4WAS REAR MOTOR CIRCUIT | | |
| | | |
| 1. Turn the ignition switch OFF. | | 0 |
| 2. Disconnect 4WAS main control unit harness connector. | | |
| 3. Disconnect 4WAS rear motor harness connector. | <i>.</i> . | |

Check the continuity between 4WAS main control unit harness connector and 4WAS rear motor harness 4. Ρ connector.

| 4WAS mair | n control unit | 4WAS re | ear motor | Continuity |
|-----------|----------------|-----------|-----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| B5/ | 38 | B36 | 1 | Evictod |
| 834 | 39 | D30 | 2 | LAISteu |

C1902, C1903, C1904, C1910, C1913 4WAS REAR MOTOR OUTPUT

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace the harnesses and connectors.

2. CHECK 4WAS REAR MOTOR

Check the continuity between 4WAS rear motor connector terminals. Refer to <u>STC-92, "Component Inspec-</u> tion (4WAS Rear Motor)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View".

3.PERFORM ACTIVE TEST (4WAS MAIN CONTROL UNIT)

With CONSULT-III

- 1. Connect 4WAS main control unit harness connector.
- 2. Connect 4WAS rear motor harness connector.
- Perform "SELF DIAGNOSTIC MODE" item on "ACTIVE TEST" of 4WAS main control unit. CAUTION:

Perform the active test while vehicle is stopped.

4. Check "MOTOR VOLTAGE", "MOTOR CURRENT" and "MTR CRNT OPE" while performing the active test.

| Monitor item | Condition | Display value |
|---------------|---|--------------------|
| MOTOR VOLTAGE | Ignition switch: ON | Battery voltage |
| MOTOR CURRENT | 4WAS rear motor running | 0 – 20 A |
| MTR CRNT OPE | 4WAS rear actuator neutral condition and vehicle straight-ahead position | Approx. –2 – 2 A |
| | 4WAS rear motor running | Approx. –20 – 20 A |

Is "MONITOR" the standard value?

YES >> GO TO 4.

NO >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View".

4.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

<u>Is any DTC "C1902", "C1903", "C1904", "C1910" or "C1913" detected?</u>

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 5.

5.CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> "Reference Value".

Is each data the standard value?

- YES >> Check each harness connector pin terminal for disconnection.
- NO >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".

Component Inspection (4WAS Rear Motor)

INFOID:000000005650398

1.CHECK 4WAS REAR MOTOR

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector and 4WAS rear motor harness connector.
- Check the continuity between 4WAS rear motor connector terminals.

C1902, C1903, C1904, C1910, C1913 4WAS REAR MOTOR OUTPUT < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS]

А 4WAS rear motor Continuity Terminal 1 - 2Existed В Is the inspection result normal? YES >> INSPECTION END NO >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View". С Special Repair Requirement INFOID:000000005650399 D **BEFORE REPLACING 4WAS MAIN CONTROL UNIT** Record the self-diagnosis results (history). **CAUTION:** • Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit Е after diagnosis. • Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". F

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C1905, C1908, C1922, C1925, C1928 4WAS MAIN CONTROL UNIT < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS]

C1905, C1908, C1922, C1925, C1928 4WAS MAIN CONTROL UNIT

Description

INFOID:000000005650400

- 4WAS rear actuator and the power steering solenoid valve is controlled by each sensor signal.
- The fail-safe functions stops the rear wheel angle function (the front wheel is the steering wheel cutting angle) when the electric components and the mechanical components are malfunctioning.
- The protective function stops 4WAS system temporarily when the input signal is not inputted to 4WAS main control unit (When battery-power dose not work temporarily).
- 4WAS front control unit and 4WAS main control unit perform two-way transmitting/receiving signals for optimal control of 4WAS system via 4WAS communication line.

DTC Logic

INFOID:000000005650401

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|------------------------------|
| C1905 | CONTROL UNIT [ABNORMAL3] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| C1908 | CONTROL UNIT [ABNORMAL7] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| C1922 | CONTROL UNIT [ABNORMAL8] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| C1925 | AD CONVERTER | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |
| C1928 | CONTROL UNIT [ABNORMAL9] | An error is detected inside 4WAS main control unit. | 4WAS main control unit error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- 1. Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

<u>Is any DTC "C1905", "C1908", "C1922", "C1925" or "C1928" detected?</u>

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-94, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650402

1.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is any DTC "C1905", "C1908", "C1922", "C1925" or "C1928" detected?

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 2.

2. CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158,</u> <u>"Reference Value"</u>.

Is each data the standard value?

YES >> Check each harness connector pin terminal for disconnection.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

STC-94

C1905, C1908, C1922, C1925, C1928 4WAS MAIN CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS > Special Repair Requirement [WITH 4WAS]

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

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C1909 4WAS MAIN CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

C1909 4WAS MAIN CONTROL UNIT

Description

INFOID:000000005650404

IWITH 4WAS1

- 4WAS rear actuator and the power steering solenoid valve is controlled by each sensor signal.
- The fail-safe functions stops the rear wheel angle function (the front wheel is the steering wheel cutting angle) when the electric components and the mechanical components are malfunctioning.
- The protective function stops 4WAS system temporarily when the input signal is not inputted to 4WAS main control unit (When battery-power dose not work temporarily).
- 4WAS front control unit and 4WAS main control unit perform two-way transmitting/receiving signals for optimal control of 4WAS system via 4WAS communication line.

DTC Logic

INFOID:000000005650405

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|------------------------|
| C1909 | CONTROL UNIT [ABNORMAL6] | An error is detected inside 4WAS main control unit. | 4WAS main control unit |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1909" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-96, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650406

1.CHECK 4WAS MAIN CONTROL UNIT POWER SUPPLY

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Check the voltage between 4WAS main control unit harness connector terminal and the ground.

| 4WAS main control unit | | Voltage (Approx.) |
|------------------------|-------------|-------------------|
| Connector | Terminal | voliage (Applox.) |
| B54 | 27 – Ground | 0 V |

4. Turn the ignition switch ON. CAUTION:

Never start the engine.

5. Check the voltage between 4WAS main control unit harness connector terminal and the ground.

| 4\ | WAS main control unit | Voltage (Approx.) |
|--------------------|-----------------------|-------------------|
| Connector Terminal | | Vollage (Approx.) |
| B54 | 27 – Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 2.

- NG >> Check the following items. Repair or replace the malfunctioning parts.
 - 10A fuse (#45) open
 - Short among 10Å fuse (#45) connector, 4WAS main control unit harness connector No. 27 terminal and the ground

STC-96

C1909 4WAS MAIN CONTROL UNIT

| < DTC/CIRC | UIT DIAGNOSIS > | [WITH 4WAS] |
|--------------------------|--|--|
| • | Open between the ignition switch a | and 4WAS main control unit harness connector No. 27 termi- |
| | nal | |
| • • | | |
| Z.CHECK 4 | WAS MAIN CONTROL UNIT GROU | |
| Check the co | ntinuity between 4WAS main contro | I unit harness connector and the ground. |
| | | |
| | 4WAS main control unit | Continuity |
| Connector | Terminal | - |
| B54 | 34 – Ground | Existed |
| Is the inspect | tion result normal? | |
| YES >> C | 30 TO 3. | |
| 7 2 2 2 2 2 2 3 4 | repair or replace the namesses and | |
| J. PERFORM | M SELF-DIAGNOSIS (4WAS MAIN | CONTROL UNIT) |
| | SULT-III | |
| 1. Connect | 4WAS main control unit harness co | nnector. |
| | 400AS main control unit sell-diagnos | 515. |
| VES >> E | <u>29 delected:</u> 2eplace 4W/AS main control unit. Re | fer to STC-181 "Exploded View" |
| NO >> 0 | GO TO 4. | iter to <u>STC-101, Exploded view</u> . |
| | | |
| | | |
| Check the "D | SULT-III ATA MONITOR" value of each DTC | detected with the self-diagnosis function. Refer to STC-158 |
| <u>"Reference V</u> | <u>'alue"</u> . | |
| Is each data t | the standard value? | |
| YES >> 0 | Check each harness connector pin to | erminal for disconnection. |
| NO >> F | Replace 4WAS main control unit. Re | fer to <u>STC-181, "Exploded View"</u> . |
| Special Re | epair Requirement | INFO/D:00000005650407 |
| | | |
| BEFORE RE | EPLACING 4WAS MAIN CONTR | OL UNIT |
| Record the | self-diagnosis results (history). | |
| Never era | ase the memory (history) of self-d | liagnosis results when replacing 4WAS main control unit |
| after diag | ynosis. | |
| • Erase the | e memory of the self-diagnosis re | esults (record) after printing out or recording all the val- |
| ues of "L | | |
| | | |
| | | |
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| | | |

C1911, C1912 4WAS REAR MOTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

C1911, C1912 4WAS REAR MOTOR POWER SUPPLY

Description

The power supply for 4WAS rear motor.

DTC Logic

INFOID:000000005650409

INFOID:000000005650410

INFOID:000000005650408

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---------------------------------------|
| C1911 | MOTOR VOLTAGE [LOW VOLTAGE] | 4WAS rear motor voltage error is detected. (4WAS rear motor voltage is low.) | 4WAS rear motor power supply error |
| C1912 | MOTOR VOLTAGE [BAD OBSTRCT] | 4WAS rear motor voltage error is detected. (Voltage is applied to 4WAS main motor when 4WAS main control unit output is "OFF".) | 4WAS rear motor power supply error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

1. Turn the ignition switch from OFF to ON. CAUTION:

Stop the vehicle. Wait 15 minutes or more.

Perform 4WAS main control unit self-diagnosis.

Is DTC "C1911" or "C1912" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-98, "Diagnosis Procedure"</u>.
- NO >> INSPECTION ĔND

Diagnosis Procedure

1.CHECK 4WAS MAIN CONTROL UNIT POWER SUPPLY

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4WAS main control unit | | Voltage (Approx) |
|------------------------|-------------|-------------------|
| Connector Terminal | | Vollage (Applox.) |
| B54 | 27 – Ground | 0 V |

4. Turn the ignition switch ON. CAUTION:

Never start the engine.

5. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4\ | WAS main control unit | Voltage (Approx.) |
|-----------|-----------------------|-------------------|
| Connector | Terminal | voltage (Approx.) |
| B54 | 27 – Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 2. NO >> Check th

- >> Check the following items. Repair or replace the malfunctioning parts.
 - 10A fuse (#45) open
 - Short among 10A fuse (#45) connector, 4WAS main control unit harness connector No. 27 terminal and the ground
 - Open between the ignition switch and 4WAS main control unit harness connector No. 27 terminal

STC-98

[WITH 4WAS]

| < DTC/CIR | | , NOSIS > | | | | | [WITH 4WAS] |
|---|--|--|---|--|--|---|--|
| | Ignition sw | /itch | | | | | |
| 2.CHECK | 4WAS REAR | | OWER SUP | PLY CIRCUI | ⁻ (1) | | |
| I. Turn the 2. Remove 3. Check t | e ignition swi e 4WAS rear he continuity | tch OFF. motor relay. v between 4V | VAS rear mo | otor relay har | ness connector te | erminal and th | ne ground. |
| | 4WAS rear | motor relay | | | | | |
| Connector | | Terminal | | Continuity | | | |
| DEO | | 1 – Ground | | Not existed | | | |
| B53 | | 2 – Ground | | Existed | | | |
| . Check t unit har | he continuity ness connec | v between 4V tor terminal. | VAS rear mo | otor relay har | ness connector te | rminal and 4 | WAS main control |
| 4WAS rear | motor relay | 4WAS main | control unit | Ocatia it | | | |
| Connector | Terminal | Connector | Terminal | Continuity | | | |
| B53 | 1 | B54 | 25 | Existed | | | |
| YES >> NO >> CHECK 4 Check the v | GO TO 3. Repair or re 4WAS REAR oltage betwe | place the har MOTOR PC | messes and OWER SUP ar motor rel | I connectors. PLY CIRCUI ay harness c | ⁻ (2) onnector terminal | and the grou | ınd. |
| YES >> NO >> CHECK 4 heck the v 4 Connector | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto | place the har MOTOR PC een 4WAS re | Thesses and OWER SUP ar motor rel | I connectors. PLY CIRCUI ay harness c ge (Approx.) | ⁻ (2) onnector terminal | and the grou | ind. |
| YES >> NO >> •CHECK 4 heck the v 4 Connector B53 | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – | place the har MOTOR PC een 4WAS re r relay erminal Ground | Thesses and DWER SUP ar motor rel Voltag Batte | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage | ⁻ (2) onnector terminal | and the grou | ind. |
| YES >> NO >> CHECK 4 Check the v 4 Connector B53 S the inspec | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – ction result n | place the har MOTOR PC en 4WAS re r relay erminal Ground ormal? | Thesses and DWER SUP ar motor rel Voltag Batte | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage | ⁻ (2) onnector terminal | and the grou | ınd. |
| YES >> NO >> CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – Ction result n GO TO 4. Check the • 20A fuse (- Short amo nal and the • Open betw 4WAS REAR | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ong 20A fuse e ground veen the batt MOTOR PC | messes and DWER SUP ar motor rel Voltag Batte ms. Repair o (#37) conne ery and 4W DWER SUP | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS 'AS rear moto PLY CIRCUI | (2) onnector terminal malfunctioning p rear motor relay h r relay harness co (3) | and the grou parts. harness conn | Ind. ector No. 3 termi- 3 terminal |
| YES >> NO >> •.CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto WAS rear moto Te 3 – Ction result n GO TO 4. Check the • 20A fuse (• Short amo nal and the • Open betw 4WAS REAR e the noise s continuity bet | place the har MOTOR PC en 4WAS re r relay erminal Ground ormal? following iter #37) open ing 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no | messes and DWER SUP ar motor rel Voltag Batte ms. Repair of (#37) conne ery and 4W DWER SUP ise suppres | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear moto PLY CIRCUI | (2) onnector terminal malfunctioning p rear motor relay h r relay harness co (3) connector terminal | and the grou parts. narness conn ponnector No. | Ind. ector No. 3 termi- 3 terminal und. |
| YES >> NO >> •.CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Tre 3 – Ction result n GO TO 4. Check the • 20A fuse (• Short amo nal and the • Open betw 4WAS REAR e the noise s continuity between the secontinuity between the second seco | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ing 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no | messes and OWER SUP ar motor rel Voltag Batte ms. Repair of (#37) conno ery and 4W OWER SUP ise suppres | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear moto PLY CIRCUI sor harness Continuity | r relay harness co (3) (2) (2) (3) (2) (3) | and the grou parts. narness conn onnector No. | Ind. ector No. 3 termi- 3 terminal und. |
| YES >> NO >> •.CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> •.CHECK 4 Remove Check c | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – Ction result n GO TO 4. Check the • 20A fuse (- Short amo nal and the • Open betw 4WAS REAR e the noise s continuity betw | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ong 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no uppressor Terminal | messes and DWER SUP ar motor rel Voltag Batte ms. Repair o (#37) conno ery and 4W DWER SUP ise suppres | d connectors. PLY CIRCUI ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear moto PLY CIRCUI sor harness Continuity | (2) onnector terminal malfunctioning p rear motor relay h r relay harness co (3) onnector termina | and the grou barts. harness conn connector No. | Ind. ector No. 3 termi- 3 terminal und. |
| YES >> NO >> CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> NO >> | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – Ction result n GO TO 4. Check the • 20A fuse (• Short amo nal and the • Open betw 4WAS REAR e the noise s continuity between the the second second second Noise su | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ing 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no uppressor Terminal 3 – Ground | messes and DWER SUP ar motor rel Voltag Batte ms. Repair of (#37) conne ery and 4W DWER SUP ise suppres | d connectors. PLY CIRCUIT ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear moto PLY CIRCUIT sor harness Continuity Not existed | rear motor relay h rear motor relay h r relay harness co (3) | and the grou parts. narness conn onnector No. | Ind. ector No. 3 termi- 3 terminal und. |
| YES >> NO >> CHECK 4 heck the v 4 Connector B53 the inspec YES >> NO >> NO >> | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 - ction result n GO TO 4. Check the • 20A fuse (- Short amo nal and the • Open betw 4WAS REAR e the noise s continuity betw Noise su | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ong 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no uppressor Terminal 3 – Ground 5 – Ground | messes and DWER SUP ar motor rel Voltag Batte ms. Repair o (#37) conne ery and 4W DWER SUP ise suppres | d connectors. PLY CIRCUIT ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear motor PLY CIRCUIT sor harness Continuity Not existed | (2) connector terminal malfunctioning p rear motor relay h r relay harness co (3) connector termina | and the grou parts. narness conn ponnector No. | Ind. ector No. 3 termi- 3 terminal und. |
| YES >> NO >> CHECK 4 Check the v 4 Connector B53 the inspec YES >> NO >> NO >> CONNECK 4 Check c Connector B51 B52 | GO TO 3. Repair or re 4WAS REAR oltage betwe WAS rear moto Te 3 – Ction result n GO TO 4. Check the • 20A fuse (• Short amo nal and the • Open betw 4WAS REAR e the noise s continuity between the secont in the secont in the second se | place the har MOTOR PC een 4WAS re r relay erminal Ground ormal? following iter #37) open ing 20A fuse e ground veen the batt MOTOR PC uppressor. tween the no uppressor. tween the no uppressor. tween the no uppressor. | messes and DWER SUP ar motor rel Voltage Batte ms. Repair of (#37) conne ery and 4W DWER SUP ise suppres | d connectors. PLY CIRCUIT ay harness c ge (Approx.) ery voltage or replace the ector, 4WAS AS rear moto PLY CIRCUIT sor harness Continuity Not existed Not existed | (2) connector terminal malfunctioning p rear motor relay h r relay harness co (3) connector terminal | and the grou parts. narness conn ponnector No. | Ind. ector No. 3 termi- 3 terminal und. |

| Noise suppressor | | 4WAS rear | Continuity | |
|------------------|----------|--------------------|------------|------------|
| Connector | Terminal | Connector Terminal | | Continuity |
| B52 | 1 | B53 | 5 | Existed |

C1911, C1912 4WAS REAR MOTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between the noise suppressor harness connector terminal and 4WAS main control unit harness connector terminal.

| Noise suppressor | | 4WAS main control unit | | Continuity |
|------------------|----------|------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| B 51 | 3 | B54 | 37 | Existed |
| 001 | 5 | DJ4 | 40 | Existed |

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace the harnesses and connectors.

5.CHECK 4WAS REAR MOTOR POWER SUPPLY CIRCUIT (4)

1. Connect 4WAS main control unit harness connector.

2. Turn the ignition switch ON. CAUTION:

Never start the engine.

3. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4\ | NAS main control unit | Voltago (Approx.) |
|-----------|-----------------------|-------------------|
| Connector | Terminal | vollage (Approx.) |
| B54 | 25 – Ground | Battery voltage |

4. Turn the ignition switch OFF.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".

6.CHECK 4WAS REAR MOTOR RELAY

Check 4WAS rear motor relay. Refer to STC-101, "Component Inspection (4WAS Rear Motor Relay)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace 4WAS rear motor relay.

7.CHECK NOISE SUPPRESSOR

Check continuity between the noise suppressor connector terminals. Refer to <u>STC-101, "Component Inspec-</u>tion (Noise Suppressor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace the noise suppressor.

8.CHECK 4WAS REAR MOTOR POWER SUPPLY

1. Install 4WAS rear motor relay.

- 2. Install the noise suppressor.
- 3. Turn the ignition switch ON. CAUTION:

Never start the engine.

4. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4 | WAS main control unit | Voltage (Approx.) |
|-----------|-----------------------|-------------------|
| Connector | Terminal | vollage (Applox.) |
| B54 | 37 – Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

STC-100

[WITH 4WAS]

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| < DTC/CIR(| CIGIT, CUIT DIAGNOS | SIS > | 400A3 K | [WITH 4WAS] | |
|--|--|--|------------------------------------|--|------|
| 9.PERFOR | M SELF-DIAGN | IOSIS (4 | WAS MAIN (| CONTROL UNIT) | Λ |
| With COM Perform 4W | NSULT-III AS main control | unit self- | diagnosis. | | A |
| YES >> NO >> | Replace 4WAS GO TO 10. | main cor | trol unit. Re | fer to <u>STC-181, "Exploded View"</u> . | B |
| | | N | | | C |
| Check the "I | DATA MONITOF Value". | R" value c | of each DTC | detected with the self-diagnosis function. Refer to STC-158. | D |
| Is each data | the standard va | alue? | | | |
| YES >> NO >> | Replace 4WAS | ness con main cor | nector pin te itrol unit. Re | fer to <u>STC-181, "Exploded View"</u> . | E |
| Compone | ent Inspection | ר (4WA | S Rear M | otor Relay) | |
| | 1WAS REAR MO | | | | F |
| 1. Turn the 2. Remove | e ignition switch e 4WAS rear mo | OFF. tor relay | connector. | | ST |
| Apply 12 CAUTIO Never Conno Check to the second s | on the fuse being the continuity be | iinals sh tween th tween 4V | ort. e terminals VAS rear mo | when applying the voltage. tor relay connector terminals. | Н |
| 4W | AS rear motor relav | | | | I |
| Terminal | Condition | า | Continuity | | |
| 2 5 | Apply the voltage No. 1 terminal and minal. | between No. 2 ter- | Existed | | J |
| 3-3 | Do not apply the v tween No. 1 termi No. 2 terminal. | oltage be- nal and | Not existed | | K |
| 5. Check t | he resistance be | etween 4 | NAS rear mo | otor relay connector terminals. | L |
| 4WAS re | ar motor relav | | | | |
| Te | erminal | Resistar | ice (Approx.) | | N |
| | 1 – 2 | | 50 Ω | | 1.01 |
| Is the inspect YES >> NO >> | <u>ction result norm</u> INSPECTION E Replace 4WAS | <u>al?</u> ND rear mote | or relay. | | Ν |
| Compone 1.NOISE S | ent Inspectior | n (Noise NSPECT | e Suppres | SSOr) INFOID:00000005650412 | 0 |
| 1. Turn the 2. Remove 3. Check o | e ignition switch the noise supp continuity betwee | OFF. ressor. en the no | ise suppress | sor connector terminals. | Ρ |

| Noise su | Continuity | | |
|----------|------------|-------------|--|
| Terr | Continuity | | |
| 3 | 3 1 | | |
| 3 | 3 5 | | |
| 3 | 3 2 | | |
| 5 | 2 | Existed | |
| 5 | 1 | Not existed | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the noise suppressor.

Special Repair Requirement

INFOID:000000005650413

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

C1914 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1914 REAR WHEEL STEERING ANGLE SENSOR

Description

- It detects the steering angle condition of rear wheel.
- 2 systems (main and sub sensor) are equipped.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|---|--|--|---|
| C1914 | RR ST ANGLE SENSOR [ABNORML VOL] | The rear wheel angle sensor power supply error is de tected. | e- Rear wheel steering sen- sor power supply error |
| DTC CONFIF | RMATION PROCEDURE | | |
| 1. RECHECK | DTC | | F |
| With CONS I. Turn the ig 2. Perform 4 Is DTC "C1914 YES >> Pi | SULT-III gnition switch from OFF to WAS main control unit self 4" detected? roceed to diagnosis proces | ON. f-diagnosis. dure Refer to STC-103 "Diagnosis Procedur | ST |
| NO >> IN | ISPECTION END | | <u> </u> |
| Diagnosis F | Procedure | | INFOID:000000005650416 |
| 1.CHECK RE | AR WHEEL STEERING A | NGLE SENSOR POWER SUPPLY | 1 |
| 1. Turn the ig 2. Check the | gnition switch OFF. voltage between 4WAS n | nain control unit harness connector terminal a | and the ground. |
| 4WA | S main control unit | | K |
| Connector | Terminal | volage (Approx.) | |
| B54 | 5 – Ground | 0 V | |
| 3. Turn the ig | gnition switch ON. | | L |
| Never sta4.Check the | rt the engine. voltage between 4WAS n | nain control unit harness connector terminal a | and the ground. \mathbb{N} |
| 4WA | S main control unit | | |
| Connector | Terminal | value (Approx.) | Ν |
| B54 | 5 – Ground | 5 V | |
| Is the inspection | on result normal? | | 0 |
| YES >> G NO >> R | O TO 2. eplace 4WAS main control | unit Refer to STC-181 "Exploded View" | |
| 2.CHECK RE | EAR WHEEL STEERING A | NGLE SENSOR | D |
| Check the res "Component In Is the inspection YES >> G | istance between the rear <u>nspection"</u> . on result normal? O TO 3. | wheel steering angle sensor connector term | inals. Refer to <u>STC-104.</u> |
| NO >> RO | eplace 4WAS rear actuato | r. Refer to STC-183. "Exploded View". | |

$\mathbf{3}.$ Check rear wheel steering angle sensor power supply circuit

INFOID:000000005650414

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C1914 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- 1. Disconnect 4WAS main control unit harness connector.
- 2. Check the continuity between 4WAS main control unit harness connector terminal and the rear wheel steering angle sensor harness connector terminal.

| 4WAS main control unit | | Rear wheel steering angle sensor | | Continuity |
|------------------------|----------|----------------------------------|----------|-------------|
| Connector | Terminal | Connector | Terminal | |
| B54 | 5 | B58 | 1 | Existed |
| B54 | 5 | B58 | 3 | Not existed |
| B54 | 4 | B58 | 3 | Existed |
| B54 | 4 | B58 | 1 | Not existed |

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the harnesses and connectors.

4.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

BWith CONSULT-III

- 1. Connect 4WAS main control unit harness connector.
- 2. Connect the rear wheel steering angle sensor harness connector.
- 3. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1914" detected?

- YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.
- NO >> GO TO 5.

5.CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> "Reference Value".

Is each data the standard value?

- YES >> Check each harness connector pin terminal for disconnection.
- NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Component Inspection

INFOID:000000005650417

1.CHECK REAR WHEEL STEERING ANGLE SENSOR

- 1. Turn the ignition switch OFF.
- 2. Disconnect rear wheel steering angle sensor harness connector.
- 3. Check the resistance between rear wheel steering angle sensor connector terminals.

| Rear wheel steering angle sensor | - Resistance (Approx.) | |
|----------------------------------|------------------------|--|
| Terminal | | |
| 1 – 3 | 1 kΩ | |
| 1 – 2 | 1.2 – 1.5 kΩ | |
| 1 – 4 | 1.2 – 1.5 kΩ | |

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace 4WAS rear actuator. Refer to <u>STC-183, "Exploded View"</u>.

Special Repair Requirement

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

• Record the self-diagnosis results (history). CAUTION:

INFOID:000000005650418

< DTC/CIRCUIT DIAGNOSIS >

- Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 Erase the memory of the self-diagnosis results (record) after printing out or recording all the val-
- Erase the memory of the self-diagnosis results (record) after printing out or recording all the va ues of "DATA MONITOR".

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C1915, C1916 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1915, C1916 REAR WHEEL STEERING ANGLE SENSOR

Description

- It detects the steering angle condition of rear wheel.
- 2 systems (main and sub sensor) are equipped.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|--|
| C1915 | RR ST ANGLE SENSOR [MAIN SIGNAL] | The rear wheel angle sensor signal (main) error is detected. | Rear wheel steering sen- sor output voltage error |
| C1916 | RR ST ANGLE SENSOR [SUB SIGNAL] | If the rear wheel angle sensor signal (sub) error is detected. | Rear wheel steering sen- sor output voltage error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1915" or "C1916" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-106, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK 4WAS REAR ACTUATOR

- 1. Turn the ignition switch OFF.
- Measure "A" and "B" of 4WAS rear actuator as shown in the figure.

Is the differential of "A" and "B" 5.8 mm (0.228 in) or less?

- YES >> GO TO 2.
- NO >> Replace 4WAS rear actuator. Refer to <u>STC-183</u>, <u>"Exploded View"</u>.



2.CHECK REAR WHEEL STEERING ANGLE SENSOR (1)

With CONSULT-III

- 1. Start engine. CAUTION: Check condition with the vehicle stopped.
- 2. Check DATA MONITOR "RR ST ANG-MAI" and "RR ST ANG-SUB" value of 4WAS main control unit.

| Monitored item | Condition | Display value |
|----------------|----------------|---------------|
| RR ST ANG-MAI | Straight-ahead | Approx. 2.4 V |
| RR ST ANG-SUB | Straight-ahead | Approx. 2.6 V |

Is the inspection result normal?

YES >> GO TO 3.

STC-106

[WITH 4WAS]

INFOID:000000005650419

INFOID:000000005650420

INFOID:00000000565042

C1915, C1916 REAR WHEEL STEERING ANGLE SENSOR < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS] NO >> Replace 4WAS rear actuator. Refer to STC-183. "Exploded View". A 3.CHECK REAR WHEEL STEERING ANGLE SENSOR (2) A Check the voltage between 4WAS main control unit harness connector terminal and ground. B 4WAS main control unit Voltage (Approx.)

2.4 V

2.6 V

| Is the differe | ential between te | rminal voltage N | lo. 4 and No.7 | approximately | 1 V or more? |
|----------------|-------------------|------------------|----------------|---------------|--------------|

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 4.

B54

4.CHECK REAR WHEEL STEERING ANGLE SENSOR (3)

15 - Ground

7 – Ground

Check the resistance between rear wheel steering angle sensor connector terminals. Refer to <u>STC-108,</u> "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View".

5.CHECK REAR WHEEL STEERING ANGLE SENSOR GROUND CIRCUIT

1. Disconnect 4WAS main control unit harness connector.

 Check for continuity between 4WAS main control unit harness connector terminal and rear wheel steering angle sensor harness connector terminal.

| 4WAS main control unit | | Rear wheel steering angle sensor | | Continuity |
|------------------------|----------|----------------------------------|----------|-------------|
| Connector | Terminal | Connector | Terminal | |
| B54 | 15 | B58 | 1, 2, 3 | Not existed |
| B54 | 15 | B58 | 4 | Existed |
| B54 | 7 | B58 | 1, 3, 4 | Not existed |
| B54 | 7 | B58 | 2 | Existed |
| B54 | 5 | B58 | 1 | Existed |
| B54 | 5 | B58 | 2, 3, 4 | Not existed |
| B54 | 4 | B58 | 1, 2, 4 | Not existed |
| B54 | 4 | B58 | 3 | Existed |

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace each harness and connector.

6.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

- 1. Connect 4WAS main control unit harness connector.
- 2. Connect rear wheel steering angle sensor harness connector.
- 3. Perform 4WAS main control unit self-diagnosis.
- Is DTC "C1915" or "C1916" detected?
- YES >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".

NO >> GO TO 7.

7.CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> <u>"Reference Value"</u>. D

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C1915, C1916 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

Is each data standard?

- YES >> Check pin terminal and connection of each harness connector for non-standard conditions.
- NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Component Inspection

INFOID:000000005650422

1.CHECK REAR WHEEL STEERING ANGLE SENSOR

- 1. Turn the ignition switch OFF.
- 2. Disconnect rear wheel steering angle sensor harness connector.
- 3. Check the resistance between rear wheel steering angle sensor connector terminals.

| Rear wheel steering angle sensor | Resistance (Approx.) | |
|----------------------------------|----------------------|--|
| Terminal | | |
| 1 – 3 | 1 kΩ | |
| 1 – 2 | 1.2 – 1.5 kΩ | |
| 1 – 4 | 1.2 – 1.5 kΩ | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View".

Special Repair Requirement

INFOID:000000005650423

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".
C1917, C1918 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1917, C1918 REAR WHEEL STEERING ANGLE SENSOR

Description

- It detects the steering angle condition of rear wheel.
- 2 systems (main and sub sensor) are equipped.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | D |
|-------|-------------------------------------|---|--|---|
| C1917 | RR ST ANGLE SENSOR [OFFSET SIG1] | The rear wheel angle sensor signal (main and sub) er- ror is detected. (The output signal value differs temporarily between main and sub.) | Rear wheel steering sen- sor (main and sub) output signal value error signal | E |
| C1918 | RR ST ANGLE SENSOR [OFFSET SIG2] | The rear wheel angle sensor signal (main and sub) er- ror is detected. (The output signal value differs between main and sub.) | Rear wheel steering sen- sor (main and sub) output signal error | F |
| | | | | |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

1 Start the engine. **CAUTION:** Stop the vehicle. 2. Perform the active test. Perform 4WAS main control unit self-diagnosis. 3. Is DTC "C1917" or "C1918" detected? YES >> Proceed to diagnosis procedure. Refer to STC-109. "Diagnosis Procedure". >> INSPECTION END NO Κ Diagnosis Procedure INFOID:000000005650426 **1.**CHECK REAR WHEEL STEERING ANGLE SENSOR (1) With CONSULT-III Start engine. 1 CAUTION: Μ Check the condition with the vehicle stopped. Check "RR ST ANG-MAI" and "RR ST ANG-SUB" item on "DATA MONITOR" of 4WAS main control unit. Ν Monitored item Condition Display value **RR ST ANG-MAI** Straight-ahead Approx. 2.4 V **RR ST ANG-SUB** Straight-ahead Approx. 2.6 V Is the inspection result normal? YES >> GO TO 2. NO >> Replace 4WAS rear actuator. Refer to STC-183. "Exploded View". Ρ 2.CHECK REAR WHEEL STEERING ANGLE SENSOR (2)

Check the voltage between 4WAS main control unit harness connector terminal and ground.

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C1917, C1918 REAR WHEEL STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

| | 4WAS main control unit | Voltage (Approx) |
|-----------|------------------------|-------------------|
| Connector | Terminal | vollage (Approx.) |
| B54 | 4 – Ground | 2.4 V |
| 0.04 | 7 – Ground | 2.6 V |

Is the differential between terminal voltage No. 4 and No.7 approximately 1 V or more?

YES >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".

NO >> GO TO 3.

3.CHECK REAR WHEEL STEERING ANGLE SENSOR (3)

Check the resistance between rear wheel steering angle sensor connector terminals. Refer to <u>STC-111, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace 4WAS rear actuator. Refer to <u>STC-183, "Exploded View"</u>.

 ${f 4}.$ CHECK REAR WHEEL STEERING ANGLE SENSOR GROUND CIRCUIT

1. Disconnect 4WAS main control unit harness connector.

2. Check for continuity between 4WAS main control unit harness connector terminal and rear wheel steering angle sensor harness connector terminal.

| 4WAS main control unit | | Rear wheel steering angle sensor | | Continuity |
|------------------------|----------|----------------------------------|----------|-------------|
| Connector | Terminal | Connector | Terminal | |
| B54 | 15 | B58 | 1, 2, 3 | Not existed |
| B54 | 15 | B58 | 4 | Existed |
| B54 | 7 | B58 | 1, 3, 4 | Not existed |
| B54 | 7 | B58 | 2 | Existed |
| B54 | 5 | B58 | 1 | Existed |
| B54 | 5 | B58 | 2, 3, 4 | Not existed |
| B54 | 4 | B58 | 1, 2, 4 | Not existed |
| B54 | 4 | B58 | 3 | Existed |

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace each harness and connector.

 $\mathbf{5.}$ PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

1. Connect 4WAS main control unit harness connector.

- 2. Connect rear wheel steering angle sensor harness connector.
- 3. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1917" or "C1918" detected?

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 6.

6.CHECK INFORMATION

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158,</u> <u>"Reference Value"</u>.

Is each data standard?

YES >> Check the pin terminal and connection of each harness connector for non-standard conditions.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

C1917, C1918 REAR WHEEL STEERING ANGLE SENSOR

[WITH 4WAS]

< DTC/CIRCUIT DIAGNOSIS > **Component Inspection** INFOID:000000005650427 А 1.CHECK REAR WHEEL STEERING ANGLE SENSOR 1. Turn the ignition switch OFF. В 2. Disconnect rear wheel steering angle sensor harness connector. 3. Check the resistance between rear wheel steering angle sensor connector terminals. Rear wheel steering angle sensor Resistance (Approx.) Terminal 1 – 3 $1 \ k\Omega$ D 1 – 2 $1.2 - 1.5 \text{ k}\Omega$ 1 - 4 $1.2 - 1.5 \ k\Omega$ Е Is the inspection result normal? YES >> INSPECTION END >> Replace 4WAS rear actuator. Refer to STC-183, "Exploded View". NO F Special Repair Requirement INFOID:000000005650428 BEFORE REPLACING 4WAS MAIN CONTROL UNIT STC Record the self-diagnosis results (history). **CAUTION:** Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit Н after diagnosis. • Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". Κ

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C1919 VEHICLE SPEED SIGNAL

Description

The vehicle speed signal is transmitted from ABS actuator and electric unit (control unit) to 4WAS main control unit via CAN communication.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|----------------------------|
| C1919 | VEHICLE SPEED SEN [NO SIGNAL] | Malfunction is detected in vehicle speed signal that is output from ABS actuator and electric unit (control unit) via CAN communication. (Improper signal inputs while driving.) | Vehicle speed signal error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- 1. Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1919" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-112, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650431

1.PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III

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

Is any error system detected?

YES >> Check the error system.

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "U1000" or "U1010" detected?

YES >> Check the error system.

NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "C1919" detected?

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 4.

4.INFORMATION CHECK

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> <u>"Reference Value"</u>.

Is each data the standard value?

INFOID:000000005650430

C1919 VEHICLE SPEED SIGNAL

| < DTC/CIRCUIT DIAGNOSIS > [WITH 4WAS] | |
|--|-----|
| YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection. NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u> . | А |
| Special Repair Requirement | |
| BEFORE REPLACING 4WAS MAIN CONTROL UNIT Record the self-diagnosis results (history). CAUTION: | В |
| Never erase the memory (history) of self-diagnosis results when replacing 4wAS main control unit after diagnosis. | C |
| • Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR". | D |
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C1920 STEERING ANGLE SEN

Description

Steering angle sensor signal is transmitted from steering angle sensor to 4WAS main control unit via CAN communication.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---|
| C1920 | STEERING ANGLE SEN [NO SIGNAL] | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN com- munication. (No transmission from the steering angle sensor) | Steering angle sensor in- put signal error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1920" detected?

- YES >> Proceed to diagnosis procedure. Refer to STC-114, "Diagnosis Procedure".
- NO >> INSPECTION ĔND

Diagnosis Procedure

INFOID:000000005650435

1.PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III

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

Is any error system detected?

YES >> Check the error system.

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "U1000" or "U1010" detected?

YES >> Check the error system.

NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "C1920" detected?

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 4.

4.INFORMATION CHECK

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> <u>"Reference Value"</u>.

Is each data the standard value?

INFOID:000000005650433

INEOID 000000005650434

C1920 STEERING ANGLE SEN

| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|---|--|
| YES >> Check that there is no malfunction in each harness connector pin >> Replace 4WAS main control unit. Refer to <u>STC-181</u> , "Exploded Vi | terminal or disconnection. |
| Special Repair Requirement | INFOID:00000005650436 |
| BEFORE REPLACING 4WAS MAIN CONTROL UNIT Record the self-diagnosis results (history). CAUTION: Never erase the memory (history) of self-diagnosis results when repl after diagnosis. Erase the memory of the self-diagnosis results (record) after printin ues of "DATA MONITOR". | acing 4WAS main control unit g out or recording all the val- |
| AFTER REPLACING STEERING ANGLE SENSOR | |
| 1. PERFORM ACTIVE TEST (LOCK OPERATION) | |
| With CONSULT-III Stop vehicle with front wheels in the straight-ahead position. Turn the ignition switch ON. CAUTION: Never start engine. Select "LOCK OPERATION" item on "ACTIVE" of 4WAS front control unit | |
| 4. Perform "RELEASE" of "ACTIVE TEST". CAUTION: • Turn steering wheel 90°, and then check that front tire does not mo • Never turn steering wheel 1 turn or more while performing "RELEA | ve. ASE". |
| Place steering wheel in neutral position. Perform "LOCK" item on "ACTIVE TEST" of 4WAS front control unit. Steer 30° leftward slowly. Steer 30° rightward and return the steering wheeler. Complete active test of 4WAS front control unit. | el to the straight-ahead position. |
| >> GO TO 2. | |
| 2. STEERING ANGLE SENSOR NEUTRAL POSITION ADJUSTMENT | |
| With CONSULT-III Adjust steering angle sensor neutral position. Refer to <u>BRC-8</u>, "ADJUST <u>SENSOR NEUTRAL POSITION : Special Repair Requirement"</u>. Turn the ignition switch OFF. | TMENT OF STEERING ANGLE |
| >> GO TO 3 | |
| 3. RETURN TO 4WAS FRONT ACTUATOR INITIAL POSITION | |
| Start engine. CAUTION: Check condition with the vehicle stopped. Turn steering wheel to the left by 90° slowly, and then turn to the right by 93. Again, turn steering wheel to the left by 90° slowly, and then turn to the right ahead. Stop vehicle with front wheels in the straight-ahead position after driving starting) | 90°. ht by 90° so that it faces straight vehicle for a short time. (Engine |
| >> GO TO 4. | |
| H .CHECK 4WAS FRONT ACTUATOR | |
| With CONSULT-III Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control | ol unit. |

CAUTION:

Never touch steering wheel while performing.

4WAS STR ANG : -3.5 - 3.5deg

2. Turn the ignition switch OFF.

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 1.

5.PERFORM ACTIVE TEST (SLOW MODE)

With CONSULT-III

Start engine.

1.

Check condition with the vehicle stopped.

- 2. Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit.
- 3. Perform "MODE START" of "ACTIVE TEST".
- 4. Turn steering wheel to the left slowly until it stops.
- 5. Turn steering wheel to the right slowly until it stops.

Does "OK" display on both the left and right sides on "SLOW MODE" items of the monitor?

YES >> GO TO 6.

NO >> Refer to <u>STC-32</u>, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special <u>Repair Requirement (Pattern 4)"</u>.

6.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

Is malfunction detected?

YES >> Check malfunctioning circuit.

NO >> GO TO 7.

7.ERASE ERROR RECORD

With CONSULT-III

Erase memories of self-diagnosis results for 4WAS front control unit and 4WAS main control unit.

>> END

C1921 ENGINE SPEED SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

C1921 ENGINE SPEED SIGNAL

Description

The engine speed signal is transmitted to 4WAS main control unit via CAN communication.

DTC Logic

INFOID:000000005650438

INFOID:000000005650437

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|--|---|--|---------------------------|
| C1921 | ENG REV SIGNAL | Malfunction is detected in engine speed signal that is output from ECM via CAN communication. (Improper signal is input engine speed.) | Engine speed signal error |
| DTC CONFIR | MATION PROCEDURE | | |
| 1.RECHECK | DTC | | F |
| Image: Second systemImage: Second systemImage: Second systemImage: Second systemYESYESNO>> INS | ULT-III nition switch from OFF to VAS main control unit self <u>" detected?</u> pceed to diagnosis proced SPECTION END | ON. -diagnosis. ure. Refer to <u>STC-117, "Diagnosis Procedure"</u> | ST |
| Diagnosis P | rocedure | | INFOID:000000005650439 |
| 1.PERFORM | ECM SELF-DIAGNOSIS | | |
| Bwith CONSU Perform ECM Is any error sys YES >> Ch NO >> GC 2.PERFORM | ULT-III self-diagnosis. <u>stem detected?</u> eck the error system.) TO 2. SELF-DIAGNOSIS (4WAS | S MAIN CONTROL UNIT) | K |
| B With CONSU Perform 4WAS Is DTC "U1000 YES >> Ch NO >> GC 3.PERFORM | ULT-III main control unit self-diag <u>" or "U1010" detected?</u> eck the error system.) TO 3. SELF-DIAGNOSIS (4WAS | nosis. S MAIN CONTROL UNIT) | M |
| With CONS | ULT-III | | N |
| Perform 4WAS Is DTC "C1921 YES >> Re NO >> GC | main control unit self-diag <u>" detected?</u> place 4WAS main control) TO 4. | nosis. unit. Refer to <u>STC-181, "Exploded View"</u> . | C |
| | | | Ρ |
| | | | |

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158,</u> "Reference Value".

Is each data the standard value?

YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

STC-117

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Special Repair Requirement

INFOID:000000005650440

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

C1923 STEERING ANGLE SEN

Items

Description

Steering angle sensor signal is transmitted from steering angle sensor to 4WAS main control unit via CAN В communication.

Diagnostic item is detected when...

DTC Logic

DTC

DTC DETECTION LOGIC

| DIC | (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|---------------------------------------|--|--|---|
| C1923 | STEERING ANGLE SEN [NO CHANGE] | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN com- munication. [Steering angle sensor input signal error is detected when driving at 60 km/h (37MPH) or more.] | Steering angle sensor in- put signal error |
| DTC CONF | IRMATION PROCEDURE | | F |
| 1.RECHEC | K DTC | | ST |
| With CON Drive at Perform Is DTC "C19 | ISULT-III 60 km/h (38MPH) or more fo 4WAS main control unit self 23" detected? | or 3 minutes or more. -diagnosis. | Н |
| YES >> NO >> | Proceed to diagnosis proced | lure. Refer to <u>STC-119, "Diagnosis Procedure"</u> | |
| Diagnosis | Procedure | | INFOID:000000005650443 |
| 1 .PERFOR | M ABS ACTUATOR AND EL | ECTRIC UNIT (CONTROL UNIT) SELF-DIAG | J |
| With CON Perform AB | SULT-III S actuator and electric unit (| control unit) self-diagnosis. | K |
| Is any error a YES >> NO >> | <u>system detected?</u> Check the error system. GO TO 2. | | L |
| 2.PERFOR | M SELF-DIAGNOSIS (4WAS | S MAIN CONTROL UNIT) | |
| With CON Perform 4W | ISULT-III AS main control unit self-diag | gnosis. | M |
| Is DTC "U10 YES >> NO >> | 000" or "U1010" detected? Check the error system. GO TO 3. | | Ν |
| 3.PERFOR | M SELF-DIAGNOSIS (4WAS | S MAIN CONTROL UNIT) | |
| With CON Perform 4W | ISULT-III AS main control unit self-diag | gnosis. | 0 |
| Is DTC "C19 YES >> NO >> | 23" detected? Replace 4WAS main control GO TO 4. | unit. Refer to STC-181, "Exploded View". | Ρ |
| 4.INFORM | ATION CHECK | | |
| | | | |

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to STC-158. "Reference Value".

Is each data the standard value?

INFOID:000000005650441

INFOID:000000005650442

Possible cause

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C1923 STEERING ANGLE SEN

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

- YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.
- NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Special Repair Requirement

INFOID:000000005650444

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history).
 - **CAUTION:**
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING STEERING ANGLE SENSOR

1.PERFORM ACTIVE TEST (LOCK OPERATION)

With CONSULT-III

- T. Stop vehicle with front wheels in the straight-ahead position.
- 2. Turn the ignition switch ON. CAUTION: Never start engine.
- 3. Select "LOCK OPERATION" item on "ACTIVE" of 4WAS front control unit.
- 4. Perform "RELEASE" of "ACTIVE TEST".
- CAUTION:
 - Turn steering wheel 90°, and then check that front tire does not move.
 - Never turn steering wheel 1 turn or more while performing "RELEASE".
- 5. Place steering wheel in neutral position.
- 6. Perform "LOCK" item on "ACTIVE TEST" of 4WAS front control unit.
- 7. Steer 30° leftward slowly. Steer 30° rightward and return the steering wheel to the straight-ahead position.
- 8. Complete active test of 4WAS front control unit.

>> GO TO 2.

2. STEERING ANGLE SENSOR NEUTRAL POSITION ADJUSTMENT

With CONSULT-III

- 1. Adjust steering angle sensor neutral position. Refer to <u>BRC-8, "ADDITIONAL SERVICE WHEN REPLAC-</u> <u>ING CONTROL UNIT : Special Repair Requirement"</u>.
- 2. Turn the ignition switch OFF.

>> GO TO 3.

 ${f 3.}$ RETURN TO 4WAS FRONT ACTUATOR INITIAL POSITION

1. Start engine. CAUTION:

Check condition with the vehicle stopped.

- 2. Turn steering wheel to the left by 90° slowly, and then turn to the right by 90°.
- 3. Again, turn steering wheel to the left by 90° slowly, and then turn to the right by 90° so that it faces straight ahead.
- 4. Stop vehicle with front wheels in the straight-ahead position after driving vehicle for a short time. (Engine starting)

>> GO TO 4.

4.CHECK 4WAS FRONT ACTUATOR

With CONSULT-III

1. Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control unit. CAUTION:

Never touch steering wheel while performing.

| 4WAS STR ANG : –3.5 – 3.5deg | А |
|--|-----|
| 2. Turn the ignition switch OFF. | |
| Is the inspection result normal? | В |
| NO >> GO TO 1. | |
| 5.PERFORM ACTIVE TEST (SLOW MODE) | С |
| With CONSULT-III | 0 |
| 1. Start engine. | |
| Check condition with the vehicle stopped. | D |
| Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit. Perform "MODE START" of "ACTIVE TEST". | |
| 4. Turn steering wheel to the left slowly until it stops. | Е |
| Furn steering wheel to the right slowly until it stops. Does "OK" display on both the left and right sides on "SLOW MODE" items of the monitor? | |
| YES >> GO TO 6. | F |
| NO >> Refer to STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Paparis Paguirsment (Pattern 4)" | |
| 6.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT) | STC |
| ®With CONSULT-III | |
| Perform 4WAS front control unit self-diagnosis. | Н |
| Is malfunction detected? | |
| NO >> GO TO 7. | |
| 7.ERASE ERROR RECORD | I |
| With CONSULT-III | 1 |
| Erase memories of self-diagnosis results for 4WAS front control unit and 4WAS main control unit. | 0 |
| >> END | 1Z |
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C1924 STEERING ANGLE SEN

Description

Steering angle sensor signal is transmitted from steering angle sensor to 4WAS main control unit via CAN communication.

DTC Logic

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|---------------------------------------|---|---|
| C1924 | STEERING ANGLE SEN [NO NEUT STATE] | Driving continuously at 10 km (6 mile) or more while the steering angle sensor value is not L10° - R10°. (Not detected in 4WAS front control unit fail-safe mode) | Steering angle sensor in- put signal error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- T. Drive continuously for 10 km (6 mile) or more.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1924" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>STC-122, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DRIVING

Drive for a short time.

Does the vehicle drive with front wheels in the straight-ahead position?

YES >> GO TO 2.

NO >> Adjust the wheel alignment. Refer to <u>FSU-8, "Inspection"</u>.

2.PERFORM SELF-DIAGNOSIS OF ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT-III

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

Is malfunction detected?

YES >> Check malfunctioning circuit.

NO >> GO TO 3.

3.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "U1000" or "U1010" detected?

- YES >> Check malfunctioning circuit.
- NO >> GO TO 4.

4.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "C1924" detected?

YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

NO >> GO TO 5.

STC-122

2010 G37 Coupe

INEOID:000000005650446

INFOID:000000005650445

INF0ID:000000005650447

C1924 STEERING ANGLE SEN

| < DTC/0 | CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|--|--|---|
| 5.CHE | CK INFORMATION | |
| With Check th "Referent Is each | CONSULT-III he "DATA MONITOR" value of each DTC detected with the self-diagnosis function. <u>nce Value"</u> . <u>data standard?</u> | . Refer to <u>STC-158.</u> |
| NO | >> Check pin terminal and connection of each namess connector for non-standar >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u> . | a conditions. |
| Specia | al Repair Requirement | INFOID:000000005650448 |
| BEFOR • Recort CAUT | RE REPLACING 4WAS MAIN CONTROL UNIT d the self-diagnosis results (history). TON: | |
| Neveral after Erase ues | er erase the memory (history) of self-diagnosis results when replacing 4WAS r diagnosis. se the memory of the self-diagnosis results (record) after printing out or rec of "DATA MONITOR". | a main control unit |
| AFTER | REPLACING STEERING ANGLE SENSOR | |
| 1.PER | FORM ACTIVE TEST (LOCK OPERATION) | |
| With 1. Stop 2. Turn CAU New | CONSULT-III p vehicle with front wheels in the straight-ahead position. n the ignition switch ON. UTION: ver start engine. | |
| Sele Per CAI Tu | ect "LOCK OPERATION" item on "ACTIVE" of 4WAS front control unit. form "RELEASE" of "ACTIVE TEST". UTION: urn steering wheel 90°, and then check that front tire does not move. | |
| 5. Plac 6. Per 7. Stee 8. Cor | ce steering wheel in neutral position. form "LOCK" item on "ACTIVE TEST" of 4WAS front control unit. er 30° leftward slowly. Steer 30° rightward and return the steering wheel to the strai nplete active test of 4WAS front control unit. | ght-ahead position. |
| 2.ster | >> GO TO 2. ERING ANGLE SENSOR NEUTRAL POSITION ADJUSTMENT | |
| With Adju <u>SEN</u> 2. Turn | CONSULT-III ust steering angle sensor neutral position. Refer to <u>BRC-8, "ADJUSTMENT OF S</u> <u>NSOR NEUTRAL POSITION : Special Repair Requirement"</u> . n the ignition switch OFF. | STEERING ANGLE |
| 3.RET | >> GO TO 3. URN TO 4WAS FRONT ACTUATOR INITIAL POSITION | |
| Star CAI Che Turi Aga ahe Stop star | rt engine. UTION: eck condition with the vehicle stopped. In steering wheel to the left by 90° slowly, and then turn to the right by 90°. ain, turn steering wheel to the left by 90° slowly, and then turn to the right by 90° so had. In vehicle with front wheels in the straight-ahead position after driving vehicle for a ting) | that it faces straight short time. (Engine |

>> GO TO 4.

4.CHECK 4WAS FRONT ACTUATOR

(B) With CONSULT-III

1. Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control unit. CAUTION:

Never touch steering wheel while performing.

4WAS STR ANG : -3.5 - 3.5deg

2. Turn the ignition switch OFF.

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 1.

5.PERFORM ACTIVE TEST (SLOW MODE)

With CONSULT-III

Start engine. CAUTION: Check condition with the vehicle stopped.

- 2. Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit.
- 3. Perform "MODE START" of "ACTIVE TEST".
- 4. Turn steering wheel to the left slowly until it stops.
- 5. Turn steering wheel to the right slowly until it stops.

Does "OK" display on both the left and right sides on "SLOW MODE" items of the monitor?

- YES >> GO TO 6.
- NO >> Refer to <u>STC-32</u>, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special <u>Repair Requirement (Pattern 4)</u>".

6.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT)

With CONSULT-III

Perform 4WAS front control unit self-diagnosis.

Is malfunction detected?

YES >> Check malfunctioning circuit.

NO >> GO TO 7.

7.ERASE ERROR RECORD

With CONSULT-III

Erase memories of self-diagnosis results for 4WAS front control unit and 4WAS main control unit.

>> END

C1926, C1932 STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

C1926, C1932 STEERING ANGLE SENSOR

Items

(CONSULT-III screen terms)

Description

Steering angle sensor signal is transmitted from steering angle sensor to 4WAS main control unit via CAN B communication.

Diagnostic item is detected when...

DTC Logic

DTC

INFOID:000000005650450

Possible cause

INFOID:000000005650449

DTC DETECTION LOGIC

| C1926 | STEERING ANGLE SEN | Malfunction is detected in steering angle sensor signal that is output from steering angle sensor via CAN com- munication. (When improper signal inputs to steering angle sensor and steering angle sensor itself detects the malfunc- tion) | Steering angle sensor er- ror | E | |
|---|--|---|---|----|--|
| C1932 | STEERING ANGLE SEN | If the steering angle sensor error is detected. (Steering angle sensor output value is abnormal.) | Steering angle sensor in- put signal error | | |
| DTC CONFIR | MATION PROCEDURE | | | ST | |
| 1.RECHECK | ЭТС | | | Н | |
| With CONSU Start the er CAUTION: Stop the v Turn the store | JLT-III ngine. ehicle. eering wheel leftward slov | vlv. Steer until the turning stops. | | I | |
| Turn the steering wheel rightward slowly. Steer to the straight-forward position. Perform 4WAS main control unit self-diagnosis. | | | | | |
| <u>Is DTC "C1926</u> YES >> Pro NO >> INS | <u>" or "C1932" detected?</u> oceed to diagnosis proced SPECTION END | ure. Refer to <u>STC-125, "Diagnosis Procedure'</u> | 1 | K | |
| Diagnosis P | rocedure | | INFOID:000000005650451 | | |
| 1.PERFORM | ABS ACTUATOR AND EL | ECTRIC UNIT (CONTROL UNIT) SELF-DIAG | BNOSIS | L | |
| With CONSULT-III Perform ABS actuator and electrical unit (control unit) self-diagnosis. Is any error system detected? | | | | | |
| YES >> Check the error system. NO >> GO TO 2. | | | | | |
| 2.PERFORM | SELF-DIAGNOSIS (4WAS | S MAIN CONTROL UNIT) | | | |
| Perform 4WAS | JLT-III main control unit self-diag | gnosis | | 0 | |
| <u>IS DIC "U1000</u> YES >> Ch | <u>or "U1010" detected?</u> eck the error system. | | | Р | |

NO >> GO TO 3.

3. perform self-diagnosis (4was main control unit)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis

Is DTC "C1926" or "C1932" detected?

C1926 >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

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C1926, C1932 STEERING ANGLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

C1932 >> Replace steering angle sensor. Refer to <u>BRC-108</u>, "Exploded View".

NO >> GO TO 4.

4.INFORMATION CHECK

With CONSULT-III

Check the "DATA MONITOR" value of each DTC detected with the self-diagnosis function. Refer to <u>STC-158.</u> "Reference Value".

Is each data the standard value?

- YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.
- NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Special Repair Requirement

INFOID:000000005650452

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history).
 CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
- Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING STEERING ANGLE SENSOR

1.PERFORM ACTIVE TEST (LOCK OPERATION)

With CONSULT-III

- T. Stop vehicle with front wheels in the straight-ahead position.
- 2. Turn the ignition switch ON. CAUTION:

Never start engine.

- 3. Select "LOCK OPERATION" item on "ACTIVE" of 4WAS front control unit.
- 4. Perform "RELEASE" of "ACTIVE TEST".
 - CAUTION:
 - Turn steering wheel 90°, and then check that front tire does not move.
 - Never turn steering wheel 1 turn or more while performing "RELEASE".
- 5. Place steering wheel in neutral position.
- 6. Perform "LOČK" item on "ACTIVE TEST" of 4WAS front control unit.
- 7. Steer 30° leftward slowly. Steer 30° rightward and return the steering wheel to the straight-ahead position.
- 8. Complete active test of 4WAS front control unit.

>> GO TO 2.

2. STEERING ANGLE SENSOR NEUTRAL POSITION ADJUSTMENT

With CONSULT-III

- 1. Adjust steering angle sensor neutral position. Refer to <u>BRC-8</u>, "ADJUSTMENT OF STEERING ANGLE <u>SENSOR NEUTRAL POSITION : Special Repair Requirement"</u>.
- 2. Turn the ignition switch OFF.

>> GO TO 3.

3. RETURN TO 4WAS FRONT ACTUATOR INITIAL POSITION

1. Start engine. CAUTION:

Check condition with the vehicle stopped.

- 2. Turn steering wheel to the left by 90° slowly, and then turn to the right by 90° .
- 3. Again, turn steering wheel to the left by 90° slowly, and then turn to the right by 90° so that it faces straight ahead.
- 4. Stop vehicle with front wheels in the straight-ahead position after driving vehicle for a short time. (Engine starting)

C1926, C1932 STEERING ANGLE SENSOR

| < DTC/CIRCUIT DIAGNOSIS > | [WITH 4WAS] |
|---|-------------------------------|
| >> GO TO 4. | |
| 4. CHECK 4WAS FRONT ACTUATOR | |
| With CONSULT-III Check "4WAS STR ANG" item on "DATA MONITOR" of 4WAS front control unit. CAUTION: Never touch steering wheel while performing. | |
| 4WAS STR ANG : –3.5 – 3.5deg | |
| 2. Turn the ignition switch OFF. | |
| Is the inspection result normal? | |
| YES >> GO TO 5. NO >> GO TO 1. | |
| 5.PERFORM ACTIVE TEST (SLOW MODE) | |
| With CONSULT-III Start engine. CAUTION: Check condition with the vehicle stormed | |
| Select "SLOW MODE" item on "ACTIVE TEST" of 4WAS front control unit. Perform "MODE START" of "ACTIVE TEST". Turn steering wheel to the left slowly until it stops. Turn steering wheel to the right slowly until it stops. | |
| Does "OK" display on both the left and right sides on "SLOW MODE" items of the monitor? YES >> GO TO 6. NO >> Refer to STC-32, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJU | <u>)</u> JSTMENT : Special |
| 6.PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT) | |
| With CONSULT-III Perform 4WAS front control unit self-diagnosis. | |
| <u>Is malfunction detected?</u> YES >> Check malfunctioning circuit. NO >> GO TO 7. | |
| I.ERASE ERROR RECORD | |
| With CONSULT-III Erase memories of self-diagnosis results for 4WAS front control unit and 4WAS main control | rol unit. |
| >> END | |
| | |
| | |
| | |
| | |

C1930 4WAS FRONT CONTROL UNIT

Description

It transmits the value calculated by 4WAS main control unit to 4WAS front control unit via 4WAS communication line (line for 4WAS system only). 4WAS front control unit controls 4WAS front actuator according to the received command value.

DTC Logic

INFOID:000000005650454

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|---|--|
| C1930 | 4WAS FRONT ECU | An error is detected on 4WAS front control unit side. (4WAS front control unit fail-safe mode) | 4WAS front control unit fail-safe mode |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "C1930" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>STC-128. "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000005650455

1.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is any DTC other than "C1930" detected?

YES >> Check the error system.

NO >> Perform 4WAS front control unit self-diagnosis.

< DTC/CIRCUIT DIAGNOSIS >

C1931 4WAS FRONT CONTROL UNIT COMMUNICATION

Description

- 4WAS front control unit and 4WAS main control unit transmit/receive information to/from each other for optimum control of the 4WAS system with the specified 4WAS system line (4WAS communication line) between 4WAS front control unit and 4WAS main control unit.
- Be careful to repair wirings because 4WAS system specified line adopts twisted-pair wires. Refer to <u>STC-179. "Precautions for Harness Repair"</u>.

DTC Logic

INFOID:000000005650457

DTC DETECTION LOGIC

| DTC | (CONSU | Items LT-III screen terr | ns) | Diagnostic iter | m is detected when | Possible cause | Е |
|---|---------------------------------------|-----------------------------|---|--|--------------------------------|--|-------|
| C1931 | 4WAS FR | RONT ECU COM | M 4WAS c is detect (An erro unit.) | ommunication li ted. r signal is detec | ne* data communication error | 4WAS communication line*/4WAS front control unit/4WAS main control unit error | F |
| *: Communicatio | n line betwee | n 4WAS front co | ntrol unit and | 4WAS main cor | ntrol unit. | | |
| DTC CONFI | RMATION | I PROCEDU | RE | | | | STC |
| 1.RECHECK | K DTC | | | | | | |
| With CONS 1. Turn the 2 Perform 4 | SULT-III ignition swi 4WAS mair | tch from OFF | to ON. | sis | | | Η |
| Is DTC "C193 | 1" detected | d? | son alagnot | | | | I |
| YES >> F | Proceed to a | diagnosis pro | cedure. Ref | er to STC-12 | 29, "Diagnosis Procedure | | |
| NO >> II | NSPECTIO | N ĔND | | | | - | |
| Diagnosis | Procedu | re | | | | INFOID:000000005650458 | J |
| 4 | | | | | | | |
| I.CHECK C | OMMUNIC | ATION LINE | (1) | | | | K |
| 1. Turn the | ignition swi | tch OFF. | | | | | |
| 2. Disconne | ect ABS act | uator and ele | ctric unit (Co or harness | ontrol unit) ha | arness connector. | | |
| 4. Disconne | ect 4WAS fr | ont control ur | hit harness | connector. | | | L |
| 5. Disconne | ect 4WAS m | nain control u | nit harness | connector. | | | |
| 6. Check th | e continuit | y between Al | 3S actuator | and electric | ; unit (control unit) harne | ess connector and yaw | М |
| 1816/3106 | 0 3611301 1 | | 50101. | | | | 1 V I |
| ABS actuator | and electric | | | | | | |
| unit (cont | rol unit) | Yaw rate/sid | e G sensor. | Continuity | | | Ν |
| Connector | Terminal | Connector | Terminal | | | | |
| E41 | 25 | M143 | 2 | Existed | | | 0 |
| L+1 | 45 | 10143 | 3 | LAISteu | | | 0 |
| Is the inspect | ion result n | ormal? | | | | | |
| YES >> 0 | O TO 2. | | | | | | Ρ |
| NO >> F | tepair or re tepair". | eplace the ha | rnesses an | d connector | s. Reter to <u>STC-179, "P</u> | recautions for Harness | |

2.CHECK COMMUNICATION LINE (2)

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

[WITH 4WAS]

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< DTC/CIRCUIT DIAGNOSIS >

| ABS a | Continuity | |
|-----------|-------------|-------------|
| Connector | | |
| E41 | 25 – Ground | Not ovistod |
| | 45 – Ground | NOT EXISTED |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

3.CHECK COMMUNICATION LINE (3)

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

| ABS a | Continuity | |
|-----------|------------|-------------|
| Connector | | |
| E41 | 25 – 45 | Not existed |

Is the inspection result normal?

YES >> GO TO 4.

4.CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check the continuity between ABS actuator and electric unit (control unit) connector. Refer to <u>STC-86, "Component Inspection [ABS Actuator and Electric Unit (Control Unit)]</u>".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace ABS actuator and electric unit (control unit). Refer to <u>BRC-105, "Exploded View"</u>.

5.CHECK YAW RATE/SIDE G SENSOR

Check the continuity between yaw rate/side G sensor connector. Refer to <u>STC-86, "Component Inspection</u> (Yaw Rate/Side G Sensor)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace yaw rate/side G sensor. Refer to <u>BRC-107, "Exploded View"</u>.

6.CHECK CAN DIAGNOSIS SUPPORT MONITOR (4WAS FRONT CONTROL UNIT)

With CONSULT-III

- 1. Connect ABS actuator and electric unit (control unit) harness connector.
- 2. Connect yaw rate/side G sensor harness connector.
- 3. Connect 4WAS front control unit harness connector.
- 4. Connect 4WAS main control unit harness connector.
- 5. Start the engine.

CAUTION: Stop the vehicle.

- 6. Perform CAN diagnosis support monitor of 4WAS front control unit.
- 7. Replace 4WAS main control unit error history. Refer to <u>STC-41, "CONSULT-III Function</u> [4WAS(FRONT)]".

What is the indicated item?

All items are "OK">>GO TO 7.

"TRANSMIT DIAG" is other than "OK">>GO TO 7.

"4WAS(MAIN)" is other than "OK">>GO TO 8.

1.CHECK 4WAS FRONT CONTROL UNIT CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS front control unit harness connector.
- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.

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NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

< DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between 4WAS front control unit harness connector and ABS actuator and electric unit (control unit) harness connector.

| 4WAS from | t control unit | ABS actuator and electric unit (control unit) | | Continuity |
|-----------|----------------|--|----|------------|
| Connector | Terminal | Connector | | |
| M42 | 14 | E / 1 | 25 | Evictod |
| 10142 | 25 | E41 | 45 | EXISIEU |

5. Check that 4WAS front control unit connector No. 14 terminal and No. 25 are connected properly and not deformed.

Is the inspection result normal?

- YES >> Replace 4WAS front control unit. Refer to STC-180, "Exploded View".
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness E Repair".

8. CHECK 4WAS MAIN CONTROL UNIT CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Disconnect ABS actuator and electric unit (control unit) harness connector.
- 4. Check the continuity between 4WAS main control unit harness connector and ABS actuator and electric unit (control unit) harness connector.

| 4WAS main control unit | | ABS actuator and electric unit (control unit) | | Continuity |
|------------------------|----------|---|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| B5/ | 31 | E41 | 45 | Eviptod |
| D34 | 32 | | 25 | LAISIEU |

5. Check that 4WAS main control unit connector No. 31 terminal and No. 32 are connected properly and not deformed.

Is the inspection result normal?

- YES >> Replace 4WAS main control unit. Refer to STC-181, "Exploded View".
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness K <u>Repair</u>".

Component Inspection [ABS Actuator and Electric Unit (Control Unit)]

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

- 1. Turn the ignition switch OFF.
- 2. Remove ABS actuator and electric unit (control unit). Refer to <u>BRC-105. "Exploded View"</u>.
- 3. Check the resistance between ABS actuator and electric unit (control unit) connector terminals.

| ABS actuator and electric unit (control unit) | Resistance (Approx.) |
|--|-------------------------|
| Terminal | |
| 25 – 45 | 120 Ω |
| Is the inspection result normal? | |
| YES >> INSPECTION END NO >> Replace ABS actuator an | d electric unit (contro |
| Component Inspection (Yaw F | Rate/Side G Sen |
| | |

1.CHECK YAW RATE/SIDE G SENSOR

1. Turn the ignition switch OFF.

Remove yaw rate/side G sensor. Refer to <u>BRC-107, "Exploded View"</u>.

3. Check the resistance between yaw rate/side G sensor connector terminals.

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[WITH 4WAS]

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< DTC/CIRCUIT DIAGNOSIS >

| Yaw rate/side G sensor | Posistanco (Approx.) | |
|------------------------|----------------------|--|
| Terminal | | |
| 2 – 3 | 120 Ω | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace yaw rate/side G sensor.

Special Repair Requirement

INFOID:000000005650461

BEFORE REPLACING 4WAS FRONT CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS front control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history). CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

AFTER REPLACING 4WAS FRONT CONTROL UNIT

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1000 CAN COMM CIRCUIT

Description

INFOID:000000005650462

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- 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.
- 4WAS front control unit and 4WAS main control unit transmit/receive information to/from each other for optimum control of the 4WAS system with the specified 4WAS system line (4WAS communication line) between 4WAS front control unit and 4WAS main control unit.
- Be careful to repair wirings because 4WAS system specified line adopts twisted-pair wires. Refer to <u>STC-179, "Precautions for Harness Repair"</u>.

DTC Logic

DTC DETECTION LOGIC

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| DTC | (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause | STC | |
|--|---|---|--|-----|--|
| U1000 | | When 4WAS main control unit is not transmitting or re- ceiving CAN communication signal for 2 seconds or more. | CAN communication er- ror | | |
| | CAN COMM | When 4WAS main control unit is not transmitting or re- ceiving 4WAS communication signal for 2 seconds or more. | 4WAS communication line*/4WAS main control unit/4WAS front control unit error | | |
| *: Communication | line between 4WAS front contro | I unit and 4WAS main control unit | | | |
| DTC CONFIR | MATION PROCEDURE | | | J | |
| 1.RECHECK | DTC | | | 0 | |
| With CONS Turn the ig Perform 4 | ULT-III Inition switch from OFF to WAS main control unit self | ON. -diagnosis. | | K | |
| <u>Is DTC "U1000" detected?</u> YES >> Proceed to diagnosis procedure. Refer to <u>STC-133, "Diagnosis Procedure"</u> . NO >> INSPECTION END | | | | | |
| Diagnosis F | Procedure | | INFOID:000000005650464 | M | |
| 1.CHECK SE | LF-DIAGNOSIS RUSULT | (4WAS MAIN CONTROL UNIT) | | | |
| With CONS | ULT-III | | | Ν | |
| <u>Is DTC "U1931</u> YES >> Re NO >> Pe | <u>" detected with "U1000"?</u> efer to <u>STC-129, "Diagnosi</u> erform CAN diagnosis. | s Procedure". | | 0 | |
| Special Repair Requirement | | | | | |
| BEFORE REF • Record the s CAUTION: | PLACING 4WAS MAIN (elf-diagnosis results (histo | CONTROL UNIT ry). | | Ρ | |
| Never eras after diagr | se the memory (history) (nosis. | of self-diagnosis results when replacing 4W | AS main control unit | | |

• Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

STC-133

U1010 CONTROL UNIT (CAN)

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

INFOID:000000005650467

DTC DETECTION LOGIC

| DTC | Items (CONSULT-III screen terms) | Diagnostic item is detected when | Possible cause |
|-------|-------------------------------------|--|---|
| U1010 | CONTROL UNIT (CAN) | When detecting error during the initial diagnosis of CAN controller of 4WAS main control unit. | CAN communication line/ 4WAS main control unit/ ECM/ABS actuator and electric unit (control unit) error |

DTC CONFIRMATION PROCEDURE

1.RECHECK DTC

With CONSULT-III

- Turn the ignition switch from OFF to ON.
- 2. Perform 4WAS main control unit self-diagnosis.

Is DTC "U1010" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>STC-134, "Diagnosis Procedure"</u>.
- NO >> INSPECTION ĔND

Diagnosis Procedure

1.4WAS MAIN CONTROL UNIT

Check that there is no malfunction in 4WAS main control unit harness connector or disconnection.

Is the inspection result normal?

- YES >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.
- NO >> Repair or replace the harnesses and connectors. Refer to <u>STC-179</u>, "Precautions for Harness <u>Repair"</u>.

Special Repair Requirement

INFOID:000000005650469

INFOID:000000005650468

BEFORE REPLACING 4WAS MAIN CONTROL UNIT

- Record the self-diagnosis results (history).
 CAUTION:
 - Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit after diagnosis.
 - Erase the memory of the self-diagnosis results (record) after printing out or recording all the values of "DATA MONITOR".

POWER SUPPLY AND GROUND CIRCUIT

| < DTC/CIRCUIT DIAGNOSIS > | |
|---------------------------|--|
| | |

POWER SUPPLY AND GROUND CIRCUIT

Description

4WAS system power supply

Diagnosis Procedure (4WAS Front Control Unit)

1.CHECK 4WAS FRONT CONTROL UNIT POWER SUPPLY

1. Turn the ignition switch OFF.

2. Disconnect 4WAS front control unit harness connector.

3. Check the voltage between 4WAS front control unit harness connectors and the ground.

| 4WAS front control unit | | Voltage (Approx.) |
|-------------------------|-------------|-------------------|
| Connector | Terminal | vollage (Approx.) |
| M41 | 11 – Ground | Battery voltage |
| M42 | 15 – Ground | 0 V |

4. Turn the ignition switch ON. CAUTION:

Never start the engine.

5. Check the voltage between 4WAS front control unit harness connectors and the ground.

| 4WAS front control unit | | Voltage (Approx.) | |
|-------------------------|-------------|-------------------|--|
| Connector | Terminal | voliage (Applox.) | |
| M41 | 11 – Ground | Pottory voltago | |
| M42 | 15 – Ground | Ballery vollage | |

Is the inspection result normal?

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

- >> Check the following items. Repair or replace the malfunctioning parts.
 - 40A fusible link (#I) open
 - Short among 40A fusible link (#I) connector, 4WAS front control unit harness connector No. 11 terminal and the ground
 - Open between the battery and 4WAS front control unit harness connector No. 11 terminal
 - 10A fuse (#3) open
 - Short among 10A fuse (#3) connector, 4WAS front control unit harness connector No. 15 terminal and the ground
 - Short among 10A fuse (#3) connector, unified meter and A/C amp No. 53 terminal and the ground
 - Open between the ignition switch and 4WAS front control unit harness connector No. 15 terminal
 - Battery or ignition switch

2.CHECK 4WAS FRONT CONTROL UNIT GROUND

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

| | Continuity | |
|-----------|-------------|------------|
| Connector | Terminal | Continuity |
| M41 | 12 – Ground | |
| MAD | 18 – Ground | Existed |
| 10142 | 34 – Ground | |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace the harnesses and connectors.

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure (4WAS Main Control Unit)

[WITH 4WAS]

INFOID:000000005650472

1.CHECK 4WAS MAIN CONTROL UNIT POWER SUPPLY

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4WAS main control unit | | Voltage (Approx.) | |
|------------------------|-------------|-------------------|--|
| Connector | Terminal | vollage (Applox.) | |
| B54 | 27 – Ground | 0 V | |

4. Turn the ignition switch ON. CAUTION:

Never start the engine.

5. Check the voltage between 4WAS main control unit harness connectors and the ground.

| 4WAS main control unit | | Voltage (Approx.) | |
|------------------------|-------------|-------------------|--|
| Connector | Terminal | vollage (Applox.) | |
| B54 | 27 – Ground | Battery voltage | |

Is the inspection result normal?

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

- >> Check the following items. Repair or replace the malfunctioning parts.
 - 10A fuse (#45) open
 - Short among 10Å fuse (#45) connector, 4WAS main control unit harness connector No. 27 terminal and the ground
 - Open between the ignition switch and 4WAS main control unit harness connector No. 27 terminal
 - Ignition switch

2.CHECK 4WAS REAR MOTOR POWER SUPPLY CIRCUIT (1)

- 1. Turn the ignition switch OFF.
- 2. Remove 4WAS rear motor relay.
- 3. Check the continuity between 4WAS rear motor relay harness connector and the ground.

| | Continuity | |
|-----------|------------|-------------|
| Connector | Terminal | Continuity |
| B53 | 1 – Ground | Not existed |
| 533 | 2 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the harnesses and connectors.

3.CHECK 4WAS REAR MOTOR POWER SUPPLY CIRCUIT (2)

Check the voltage between 4WAS rear motor relay harness connector and the ground.

| 4WAS rear motor relay | | Voltage (Approx.) | |
|-----------------------|------------|-------------------|--|
| Connector | Terminal | vollage (Approx.) | |
| B53 | 3 – Ground | Battery voltage | |

Is the inspection result normal?

YES >> GO TO 4.

NO

- >> Check the following items. Repair or replace the malfunctioning parts.
 - 20A fuse (#37) open
 - Short among 20A fuse (#37) connector, 4WAS rear motor relay harness connector No. 3 terminal and the ground

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| | POWER S | UPPLY AND GF | |
|-------------------|---------------------------------------|-------------------------------|--|
| < DTC/CIRC | Open between the better | and ANAS roor mot | will 4WAS |
| | | | T (3) |
| | | | |
| 2. Check c | ontinuity between the noise | suppressor harness | connector and the ground. |
| | | | |
| Connector | Noise suppressor | Continuity | |
| Connector | 2 Ground | | C |
| B51 | 5 – Ground | Not existed | |
| | 1 – Ground | Not existed | D |
| B52 | 2 – Ground | Existed | |
| Is the inspec | tion result normal? | Existed | |
| YFS >> | GO TO 5 | | E |
| NO >> | Repair or replace the harnes | sses and connectors | |
| 5. CHECK 4 | WAS REAR MOTOR POW | ER SUPPLY CIRCUI | T (4) F |
| 1. Connect | t 4WAS main control unit ha | rness connector. | |
| 2. Turn the | ignition switch ON. | | |
| | DN: tart the engine | | STO |
| 3. Check th | he voltage between 4WAS n | nain control unit harn | ess connectors. |
| | 5 | | Н |
| 4 | WAS main control unit | | |
| Connector | Terminal | vollage (Approx.) | |
| B54 | 25 – Ground | Battery voltage | |
| 4. Turn the | e ignition switch OFF. | | |
| Is the inspec | tion result normal? | | J |
| YES >> | GO TO 6. | | |
| | | i unit. Refer to <u>510-1</u> | 81, Exploded view. |
| U.CHECK 4 | IWAS REAR MOTOR RELA | Ŷ | K |
| Check 4WAS | S rear motor relay. Refer to | STC-138, "Compone | nt Inspection (4WAS Rear Motor Relay)". |
| Is the inspec | ction result normal? | | L |
| YES >> NO >> | GO TO 7. Replace 4WAS rear motor r | elav | |
| | | | |
| | with between the poice our | proport connector to | minala Defer to STC 129. "Component Increa |
| tion (Noise S | Suppressor)". | pressor connector te | minals. Relef to <u>STC-136, Component Inspec-</u> |
| Is the inspec | tion result normal? | | Ν |
| YES >> | GO TO 8. | | |
| NO >> | Replace the noise suppress | or. | |
| 8.CHECK 4 | WAS REAR MOTOR POW | ER SUPPLY | 0 |
| 1. Connect | t 4WAS main control unit ha | rness connector. | |
| 2. Install 4 | WAS rear motor relay. | | P |
| 4. Turn the | e ignition switch ON. | | 1 |
| CAUTIC | DN: | | |

Never start the engine.5. Check the voltage between 4WAS main control unit harness connectors and the ground.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[WITH 4WAS]

| 4WAS main control unit | | Voltago (Approx.) |
|------------------------|-------------|-------------------|
| Connector | Terminal | vollage (Applox.) |
| B54 | 37 – Ground | Battery voltage |

Is the inspection result normal?

YES >> INSPECTION END.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

Component Inspection (4WAS Rear Motor Relay)

INFOID:000000005650473

1.CHECK 4WAS REAR MOTOR RELAY

- 1. Turn the ignition switch OFF.
- 2. Remove 4WAS rear motor relay connector.
- 3. Apply 12 V to 4WAS rear motor relay connector No. 1 terminal and No. 2 terminal. CAUTION:
 - Never make the terminals short.

• Connect the fuse between the terminals when applying the voltage.

4. Check the continuity between 4WAS rear motor relay connector terminals.

| 4W | Continuity | |
|----------|---|-------------|
| Terminal | Condition | Continuity |
| 2 5 | Apply the voltage between No. 1 terminal and No. 2 terminal. | Existed |
| 5 - 5 | Do not apply the voltage be- tween No. 1 terminal and No. 2 terminal. | Not existed |

5. Check the resistance between 4WAS rear motor relay connector terminals.

| 4WAS rear motor relay | - Resistance (Approx.) | |
|-----------------------|------------------------|--|
| Terminal | | |
| 1 – 2 | 50 Ω | |

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace 4WAS rear motor relay.

Component Inspection (Noise Suppressor)

1.NOISE SUPPRESSOR INSPECTION

- 1. Turn the ignition switch OFF.
- 2. Remove the noise suppressor.
- 3. Check continuity between the noise suppressor connector terminals.

| Noise su | Continuity | | |
|----------------------------------|------------|-------------|--|
| Terminal | | | |
| 3 | 1 | Existed | |
| 3 | 5 | Not existed | |
| 3 | 2 | Not existed | |
| 5 | 2 | Existed | |
| 5 | 1 | Not existed | |
| Is the inspection result normal? | | | |

YES >> INSPECTION END

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace the noise suppressor.

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POWER STEERING SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

POWER STEERING SOLENOID VALVE

Description

• The power steering oil pressure in the gear housing assembly is controlled.

Diagnosis Procedure

1.CHECK POWER STEERING SOLENOID VALVE SIGNAL

With CONSULT-III

1. Start the engine.

2. Check "POWER STR SOL" item on "DATA MONITOR" of 4WAS main control unit.

| Monitor item | Condition | Display value |
|---------------|--|----------------|
| POWER STR SOL | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | Approx. 1.10 A |
| | Vehicle speed: 100 km/h (62 MPH) | Approx. 0.42 A |

Without CONSULT-III

1. Start the engine.

2. Check the voltage between 4WAS main control unit harness connector and the ground.

| 4WAS main control unit | | | Voltage (Ap- |
|------------------------|---------------|--|--------------|
| Connector | Terminal | Condition | prox.) |
| B54 | 36 – Ground - | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | 4.4 – 6.6 V |
| | | Vehicle speed: 100 km/h (62 MPH) | 2.4 – 3.6 V |

3. Check that there is no malfunction in 4WAS main control unit harness connector or disconnection.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

2.CHECK POWER STEERING SOLENOID VALVE CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect 4WAS main control unit harness connector.
- 3. Disconnect the power steering solenoid valve harness connector.
- 4. Check the continuity between 4WAS main control unit harness connector and power steering solenoid valve harness connector.

| 4WAS mair | n control unit | Power steering solenoid valve | | Continuity |
|-----------|----------------|-------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| B54 | 36 | F45 | 1 | Existed |

5. Check the continuity between power steering solenoid valve harness connector and the ground.

| | Continuity | |
|-----------|------------|------------|
| Connector | Terminal | Continuity |
| F45 | 2 – Ground | Existed |

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace the harnesses and connectors.

INFOID:000000005650475

[WITH 4WAS]

3.CHECK POWER STEERING SOLENOID VALVE А 1. Check the resistance between power steering solenoid valve connector terminals. Power steering solenoid valve В Resistance (Approx.) Connector Terminal F45 1 - 24 – 6 Ω 2. Check for click sound (power steering solenoid valve activation sound) when applying approximately 12 V between the power steering solenoid valve connector terminals. **CAUTION:** D • Never make the terminals short. Assign the positive terminal to No. 1 terminal, and the negative terminal to No. 2 terminal. Connect the fuse between the terminals when applying the voltage. Is the inspection result normal? Е YES >> INSPECTION END NO >> Repair the steering gear. Refer to ST-30, "2WD : Exploded View". F Component Inspection INFOID:000000005650477 1. POWER STEERING SOLENOID VALVE INSPECTION STC 1. Turn the ignition switch OFF. 2. Disconnect the power steering solenoid valve harness connector. Check the resistance between power steering solenoid valve connector terminals. 3. Н Power steering solenoid valve Resistance (Approx.) Connector Terminal F45 1 - 24-6Ω Check for click sound (power steering solenoid valve activation sound) when applying approximately 12 V 4. between the power steering solenoid valve connector terminals. **CAUTION:** Never make the terminals short. Assign the positive terminal to No. 1 terminal, and the negative terminal to No. 2 terminal. Con-Κ nect the fuse between the terminals when applying the voltage. Is the inspection result normal? YES >> INSPECTION END L NO >> Repair the steering gear.<u>ST-30, "2WD : Exploded View"</u>. M Ν Ρ

4WAS WARNING LAMP

< DTC/CIRCUIT DIAGNOSIS >

4WAS WARNING LAMP

Description

- Turn 4WAS warning lamp ON when ignition switch turns ON from OFF. Then, turn 4WAS warning lamp OFF after the engine is started.
- The check of 4WAS system is performed.
- 4WAS system stops (error) when turning 4WAS warning lamp ON.

Diagnosis Procedure

1.PERFORM UNIFIED METER AND A/C AMP. SELF-DIAGNOSIS

With CONSULT-III

Perform the self-diagnosis of the unified meter and A/C amp.

Is any error system detected?

YES >> Check the error system.

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT)

With CONSULT-III

Perform 4WAS main control unit self-diagnosis.

Is DTC "U1000" or "U1010" detected?

YES >> Check the error system.

NO >> GO TO 3.

3.PERFORM COMBINATION METER CIRCUIT

- 1. Turn the ignition switch OFF.
- 2. Disconnect the unified meter and A/C amp. harness connector.
- 3. Disconnect the combination meter harness connector.
- 4. Check the continuity between the unified meter and A/C amp. harness connector and the combination meter harness connector terminal.

| Continuity | Combination meter | | and A/C amp. | Unified meter |
|------------|-------------------|-----------|--------------|---------------|
| Continuity | Terminal | Connector | Terminal | Connector |
| Existed | 3 | M53 | 7 | M66 |
| | 2 | M53 | 27 | M66 |

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace the harnesses and connectors.

4.CHECK 4WAS WARNING LAMP SIGNAL

With CONSULT-III

- 1. Connect the unified meter and A/C amp. harness connector.
- 2. Connect the combination meter harness connector.
- 3. Disconnect 4WAS front control unit harness connector.
- Turn the ignition switch ON.
 CAUTION: Never start the engine.

5. Check "WARNING LAMP" item on DATA MONITOR of 4WAS main control unit.

Does the item on "DATA MONITOR" indicate "On"?

YES >> GO TO 5.

NO >> Replace 4WAS main control unit. Refer to <u>STC-181, "Exploded View"</u>.

5.CHECK COMBINATION METER

With CONSULT-III

INFOID:000000005650478

4WAS WARNING LAMP

[WITH 4WAS] < DTC/CIRCUIT DIAGNOSIS > Perform the trouble diagnosis of the combination meter. Refer to MWI-50, "COMBINATION METER : Diagnosis Procedure". А Is the inspection result normal? YES >> INSPECTION END NO >> Replace the combination meter. Refer to MWI-128, "Exploded View". В Special Repair Requirement INFOID:000000005650480 С **BEFORE REPLACING 4WAS MAIN CONTROL UNIT** · Record the self-diagnosis results (history). **CAUTION:** D • Never erase the memory (history) of self-diagnosis results when replacing 4WAS main control unit

• Erase the memory of the self-diagnosis results (record) after printing out or recording all the val-

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after diagnosis.

ues of "DATA MONITOR".

ECU DIAGNOSIS INFORMATION 4WAS FRONT CONTROL UNIT

Reference Value

VALUES ON THE DIAGNOSIS TOOL

CONSULT-III MONITOR ITEM

| Monitor item | | Value/Status | |
|---------------|--|---|----------------------|
| 4WAS STR ANG | Steering wheel turned right | | Approx. 0 – 550 deg |
| | Straight-ahead | | Approx. 0 deg |
| | Steering wheel turned I | eft | Approx. 0 – –550 deg |
| | Vehicle stopped | | 0 km/h (0 MPH) |
| VEHICLE SPEED | Vehicle running CAUTION: Check air pressure of | Approximately equal to the indi- cation on speedometer (Inside of ±10%) | |
| | The steering wheel is n | not steered. | Approx. 0 – 1 A |
| MOTOR CORRENT | The steering wheel is s | teering. | Approx. 0 – 60 A |
| | The steering wheel is n | not steered. | Approx. 0 – 1 A |
| | The steering wheel is s | teering. | Approx. 0 – 60 A |
| | Steering wheel turned t | to the right (with vehicle stopped). | Approx. 0 – 60 deg |
| ACTR ROTA ANG | Straight-ahead | | Approx. 0 deg |
| | Steering wheel turned t | to the left (with vehicle stopped). | Approx. 0 – –60 deg |
| LG VOLT | Engine running (idling) | | Approx. 0 – 16 V |
| THERM TEMP | Engine running (idling) | | −40 − 100°C |
| | Ignition switch: ON | Engine running (idling) | Battery voltage |
| MOTOR VOLI | ignition switch. Or | Engine stopped. | Battery voltage |
| | Ignition switch: ON | Engine running (idling) | Battery voltage |
| | | Engine stopped. | Battery voltage |
| | Steering wheel turned to the right (with vehicle stopped). | | Approx. 0 – 60 deg |
| ACTR ANG COMM | Straight-ahead | | Approx. 0 deg |
| | Steering wheel turned to the left (with vehicle stopped). | | Approx. 0 – –60 deg |
| | The steering wheel is not steered. | | 0 deg/s |
| ACTR ROTA SED | The steering wheel is steering. | | Other than 0 deg/s |
| DUTY COMMAND | Engine running (idling) | | 0 - 100% |
| LOCK DTY COMM | Engine running (idling) | | 0 – 100% |
| | Ignition switch: ON | Engine running (idling) | Approx. 0 – 20 V |
| | Ignition switch: ON | Engine stopped. | 0 V |
| | Ignition switch: ON | Engine running (idling) | Approx. 0 – 20 V |
| | | Engine stopped. | 0 V |
| MTR W VOLT | Institute quaitable ONI | Engine running (idling) | Approx. 0 – 20 V |
| | Ignition switch. ON | Engine stopped. | 0 V |
| ACT TEMP ESTM | Engine running (idling) | | −40 − 100°C |
| MTR PHZ CRNT | The steering wheel is steering. | | Approx. 0 – 20 A |
| ACTR DEVI ANG | The steering wheel is steering. | | Approx. –10 – 10 deg |
< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| Monitor item | Condition | Value/Status | ٥ |
|---------------|--|---------------------|-----|
| | Steer the steering wheel leftward slowly. Steer until the steering stops. | Approx. 0 – –60 deg | A |
| ACTR ANGE SUB | Steer the steering wheel rightward slowly. Steer until the steering stops. | Approx. 0 – 60 deg | В |
| | The steering wheel is not steered. | 0 deg/s | |
| STR ANGL SPD | The steering wheel is steering. | Other than 0 deg/s | C |
| OVRLD JDG TMG | It displays record of 4WAS system (entire 4WAS system) high load. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | 0 |
| ACT PRTCT TMG | It displays record of 4WAS system (4WAS front actuator) over- heating. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | D |
| ECU PRTCT TMG | It displays record of 4WAS system (4WAS front control unit) over- heating. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | E |
| DRV TMPO TMG | It displays record of 4WAS system (terminal power supply convert- er of 4WAS front motor) intermittent abnormal. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | F |
| MTR PW TMP TM | It displays record of 4WAS system (terminal voltage of 4WAS front motor) intermittent abnormal. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | STO |
| LOW VOLT TMG | It displays record of 4WAS system (terminal voltage of 4WAS front control unit and 4WAS front actuator) low voltage. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | Η |
| HIGH VOLT TMG | It displays record of 4WAS system (terminal voltage of 4WAS front control unit and 4WAS front actuator) extreme voltage. (It displays time of occurrence before turning ignition switch ON.) | 0 – 39 | I |
| | 4WAS system (the entire 4WAS system) heavy load condition judgment (Condition detected in past and present.) | On | J |
| OVRED JDG FEG | 4WAS system (the entire 4WAS system) heavy load condition judgment (Condition not detected in past and present.)* | Off | K |
| | 4WAS front actuator overheat condition judgment (Condition detected in past and present.) | On | I |
| | 4WAS front actuator overheat condition judgment (Condition not detected in past and present.)* | Off | L |
| ECU PRTCT FLG | 4WAS front control unit overheat condition judgment (Condition detected in past and present.) | On | M |
| | 4WAS front control unit overheat condition judgment (Condition not detected in past and present.)* | Off | NI |
| DRV TMPO FLG | 4WAS system (4WAS front motor terminal power supply convert- er) intermittent error. (Condition detected in past and present.) | On | N |
| | 4WAS system (4WAS front motor terminal power supply convert- er) intermittent error. (Condition not detected in past and present.)* | Off | 0 |
| | 4WAS system (4WAS front motor terminal voltage) intermittent er- ror. (Condition detected in past and present.) | On | Ρ |
| | 4WAS system (4WAS front motor terminal voltage) intermittent er- ror. (Condition not detected in past and present.)* | Off | |

< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| Monitor item | | Condition | Value/Status |
|---------------|---|--|--------------------------|
| | 4WAS system (4WAS f terminal voltage) voltag (Condition detected in p | ront control unit and 4WAS front actuator e-dropped condition past and present.) | On |
| LOW VOLT FLG | 4WAS system (4WAS f terminal voltage) voltag (Condition not detected | ront control unit and 4WAS front actuator e-dropped condition in past and present.)* | Off |
| | 4WAS system (4WAS free terminal voltage) over-v (Condition detected in p | ront control unit and 4WAS front actuator oltage condition past and present.) | On |
| | 4WAS system (4WAS fi terminal voltage) over-v (Condition not detected | Off | |
| MTR SEN U OUT | The steering wheel is s | teering. | $Hi \Leftrightarrow Low$ |
| MTR SEN V OUT | The steering wheel is s | teering. | Hi ⇔ Low |
| MTR SEN W OUT | The steering wheel is s | Hi ⇔ Low | |
| | 4WAS main control unit | On | |
| MAIN ECU FAIL | 4WAS system is in the (When 4WAS main con | Off | |
| | 4WAS main control unit | On | |
| M-ECU TMPO FL | 4WAS system is in the (When 4WAS main con | Off | |
| | 4WAS front lock sole- | Lock released condition | 0 |
| LOCK MODE | noid valve (lock struc- ture) condition | Lock condition | 1, 2, 3, 4, 5 |
| NEUTRAL OUT | 4WAS front actuator mi trolled. | On | |
| | 4WAS front actuator mis | Off | |
| EX OPERAT | 4WAS system enters in load condition and temp | On | |
| | 4WAS system is in the | normal condition. | Off |
| | ACTIVE TEST "SLOW | MODE" judgment condition | Ok |
| SLOW MODE | (Steer the steering when the turning stops.) | _ | |

*: "Off" is indicated if the self-diagnosis result memory is erased.

TERMINAL LAYOUT



< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| Termir | nal No. | Wiro | Description | | | | Α |
|--------|---------|-------|---|------------------|---|-----------------|-----|
| + | - | color | Signal name | Input/ Output | Condition | Value (Approx.) | |
| 1 | | G | 4WAS front motor V terminal | _ | _ | _ | В |
| 2 | Ground | W | Front wheel angle sensor W terminal voltage | Output | Ignition switch: ON | 0 – 5 V | С |
| 3 | _ | В | 4WAS front lock so- lenoid valve ground | _ | _ | _ | D |
| 4 | Ground | Y | Front wheel angle sensor U terminal voltage | Output | Ignition switch: ON | 0 – 5 V | |
| 5 | _ | BR | 4WAS front motor U terminal | — | _ | — | - E |
| 6 | _ | L | 4WAS front motor W terminal | — | _ | — | F |
| 7 | _ | GR | Front wheel angle sensor ground | _ | _ | — | |
| 8 | Ground | G/R | Front wheel angle sensor V terminal voltage | Output | Ignition switch: ON | 0 – 5 V | STO |
| | | | 4WAS front lock so- | | Ignition switch: ON | Battery voltage | Н |
| 10 | Ground | R | lenoid valve power supply | Output | Ignition switch: OFF (Wait 10 min. or more.) | 0 V | |
| 11 | Cround | C | Power oupply | loout | Ignition switch: ON | Battery voltage | |
| 11 | Ground | ĸ | Power supply | input | Ignition switch: OFF | Battery voltage | |
| 12 | Ground | В | 4WAS front motor ground | _ | Always | 0 V | J |
| 14 | _ | V | BUS-L | _ | _ | — | _ |
| 15 | Ground | G | Ignition switch pow- | Innut | Ignition switch: ON | Battery voltage | K |
| 15 | Gibund | 9 | er supply | input | Ignition switch: OFF | 0 V | |
| 18 | Ground | В | Ground | _ | Always | 0 V | |
| 25 | | LG | BUS-H | _ | | _ | L |
| 34 | Ground | В | Ground | | Always | 0 V | |

CAUTION:

When using circuit tester to measure voltage for inspection, never forcibly extend any connector terminals.

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< ECU DIAGNOSIS INFORMATION >

Wiring Diagram - 4WAS SYSTEM -



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37 38 35 36 Signal Name [Specification] Signal Name [Specification] REAR WHEEL STEERING ANGLE SENSOR 9 101112314 25222323 3 4 5 6 7 8 1516171819 202122323 HE U Color of Wire 10 0 Color of Wire BR B/W < B ⊢ B B B ≤ < Connector Name ype > Connector Name Connector No. H.S. Terminal No. H.S. Terminal No. 8 33 33 9 Connec 25 26 28 ß ſ 3242526272837383940 1323334353637 Signal Name [Specification] Signal Name [Specification] 4WAS REAR MOTOR RELAY 4WAS MAIN CONTROL UNIT CAN-H P/S SC P/S SC R-ANG (R-ANG / IGN-GND 2X1 1 2 3 4 5 6 7 8 9 10 21 22 23 11 12 13 14 15 16 17 18 19 20 29 30 31 ო 353 B54 Color of Wire SB Color of Wire nnector No. ype nector Name a R B > R Connector Name ЪЩ 服 H.S. H.S. 38 erminal No. ernina No. E Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] 345 4WAS REAR MOTOR NOISE SUPPRESSOR NOISE SUPPRESSOR 1 2 B52 B51 Color of Wire Color of Wire P Color of Wire <u>ہ</u> Connector No. Connector Name Connector Name Connector Name onnector No. H.S. Ferminal No. H.S. Terminal No. H.S.H Terminal No. ~ 1 ß Æ Æ Signal Name [Specification] Signal Name [Specification] 3 4 7 8 3 2 1 6 5 4 26 WIRE TO WIRE WIRE TO WIRE г г 4WAS SYSTEM Color of Wire Color of Wire ≻뿝뚭 tor Type > 7 Connector Name RGR onnector Name ő H.S. ALS. erminal No. erminal No. 倨 倨

JCGWM0320G

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[WITH 4WAS]

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JCGWM0321GI

| 4WAS FRONT CONTROL UNIT |
|-------------------------------|
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| |



JCGWM0322G

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[WITH 4WAS]

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JCGWM0324G

INFOID:000000005650483

4WAS system (front)

Fail Safe

- 4WAS system enters in the fail-safe mode (4WAS system is stopped), and 4WAS warning lamp turns ON if an error is detected in 4WAS system (4WAS front control unit and 4WAS main control unit) component part.
- 4WAS system enters in the protection function mode (4WAS system is temporarily stopped) if 4WAS system continues the heavy load condition and the overheat condition.4WAS system reactivates automatically if the

4WAS FRONT CONTROL UNIT

[WITH 4WAS]

< ECU DIAGNOSIS INFORMATION >

heavy load condition and the overheat condition are resolved.4WAS warning lamp continues turning OFF in the protection function mode.

| Mode | Warn- ing Iamp | DTC | Detected area (Error area) | Error area and root cause | E |
|------------------|----------------------|---|--|--|----|
| Dutu | Turn- OFF | _ | 4WAS front control unit | 4WAS front control unit overheat condition | _ |
| tion function | Turn- OFF | | 4WAS front actuator | 4WAS front actuator overheat condition | C |
| | Turn- OFF | | 4WAS front control unit | 4WAS front control unit heavy load condition | |
| | Turn- ON | C1621 C1622 | 4WAS front actuator | 4WAS front control unit or 4WAS front motor error is detected. | - |
| | Turn- ON | C1627 | 4WAS front actuator | 4WAS front actuator error | E |
| | Turn- ON | C1628 | Front wheel steering angle sensor | Front wheel steering angle sensor error | F |
| | Turn- ON | C1631 C1632 | 4WAS front control unit | 4WAS front control unit or 4WAS front control unit power supply error is detected. | |
| | Turn- OFF | C1633 | 4WAS front control unit | 4WAS front control unit error | SI |
| _ | Turn- ON | C1651 | 4WAS front control unit | 4WAS front control unit or the ignition power supply error is detected. | ŀ |
| | Turn- ON | C1652 | 4WAS front control unit | 4WAS front control unit or 4WAS front motor power supply error is detected. | |
| | Turn- ON | C1654 | 4WAS front control unit | The main relay power supply inside 4WAS front control unit error is detected. | I |
| | Turn- ON | C1655 | 4WAS front control unit | 4WAS front control unit or 4WAS front motor power supply error is detected. | |
| Fail-safe | Turn- ON | C1661 | 4WAS front lock solenoid valve (lock structure) | 4WAS front control unit or 4WAS front lock solenoid valve error is detected. | |
| | Turn- ON | C1667 | 4WAS front actuator | The inside 4WAS front actuator error is detected. | ŀ |
| | Turn- ON | C1668 | 4WAS front actuator | The inside 4WAS front actuator error is detected. | L |
| | Turn- ON | C1669 | 4WAS front actuator | The power steering oil pressure or the inside 4WAS front actuator error is detected. | |
| | Turn- ON | C1671 | 4WAS front actuator | 4WAS front actuator adjustment is not performed. | Ν |
| - | Turn- ON | C1672 | 4WAS main actuator | 4WAS front actuator adjustment is incomplete. | Ν |
| | Turn- ON | C1684 C1685 U1000 U1002 U1010 | 4WAS communication line*/ 4WAS main control unit/4WAS front control unit | 4WAS communication line*/4WAS main control unit/4WAS front control unit error | C |
| | Turn- ON | C1686 | 4WAS main control unit | 4WAS main control unit fail-safe mode | F |

*: Communication line between 4WAS front control unit and 4WAS main control unit.

DTC Inspection Priority Chart

INFOID:000000005650484

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

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< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| Priority | Detected items (DTC) |
|----------|---|
| 1 | U1000 CANCOMM CIRCUIT* U1002 SYSTEM COMM(CAN)* U1010 CONTROL UNIT(CAN)* |
| 2 | C1671 ACT ADJ NOT PRFRM C1672 INCOMP ACTUATR ADJ |
| 3 | C1631 CONTROL UNIT C1632 CONTROL UNIT |
| 4 | C1651 IGN POWER SUPPLY C1652 MOTOR POWER SUPPLY C1654 ACTUATOR RELAY C1655 PRE-DRIVER |
| 5 | C1621 ACTUATOR C1622 ACTUATOR C1627 ACTUATOR C1628 ACTUATOR C1661 LOCK SOLENOID C1667 LOCK INSERTION C1668 LOCK HLD GAP DETCT C1669 INCOMP LOCK RELEAS |
| 6 | C1684 4WAS MAIN ECU COMM C1685 4WAS MAIN ECU COMM C1686 4WAS MAIN ECU |
| 7 | C1633 CONTROL UNIT |

*: 4WAS communication line

DTC Index

INFOID:000000005650485

| DTC | Items (CONSULT-III screen terms) | Reference |
|-------|-------------------------------------|---------------------|
| C1621 | ACTUATOR | STC-49, "DTC Logic" |
| C1622 | ACTUATOR | STC-49, "DTC Logic" |
| C1627 | ACTUATOR | STC-52, "DTC Logic" |
| C1628 | ACTUATOR | STC-54, "DTC Logic" |
| C1631 | CONTROL UNIT | STC-57, "DTC Logic" |
| C1632 | CONTROL UNIT | STC-57, "DTC Logic" |
| C1633 | CONTROL UNIT | STC-60, "DTC Logic" |
| C1651 | IGN POWER SUPPLY | STC-62, "DTC Logic" |
| C1652 | MOTOR POWER SUPPLY | STC-64, "DTC Logic" |
| C1654 | ACTUATOR RELAY | STC-66, "DTC Logic" |
| C1655 | PRE-DRIVER | STC-68, "DTC Logic" |
| C1661 | LOCK SOLENOID | STC-70, "DTC Logic" |
| C1667 | LOCK INSERTION | STC-72, "DTC Logic" |
| C1668 | LOCK HLD GAP DETCT | STC-74, "DTC Logic" |
| C1669 | INCOMP LOCK RELEAS | STC-75, "DTC Logic" |
| C1671 | ACT ADJ NOT PRFRM | STC-76, "DTC Logic" |
| C1672 | INCOMP ACTUATR ADJ | STC-78, "DTC Logic" |
| C1684 | 4WAS MAIN ECU COMM | STC-79, "DTC Logic" |
| C1685 | 4WAS MAIN ECU COMM | STC-79, "DTC Logic" |
| C1686 | 4WAS MAIN ECU | STC-83, "DTC Logic" |
| U1000 | CAN COMM CIRCUIT | STC-84, "DTC Logic" |

< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| DTC | Items (CONSULT-III screen terms) | Reference | А |
|-------|-------------------------------------|---------------------|---|
| U1002 | SYSTEM COMM(CAN) | STC-84, "DTC Logic" | |
| U1010 | CONTROL UNIT (CAN) | STC-88, "DTC Logic" | R |

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< ECU DIAGNOSIS INFORMATION >

4WAS MAIN CONTROL UNIT

Reference Value

VALUES ON THE DIAGNOSIS TOOL

CONSULT-III MONITOR ITEM

| Monitor item | Condition | Value/Status |
|----------------|---|--|
| | Vehicle stopped | 0 km/h (0 MPH) |
| VHCL SPEED SE | Start the engine. Wait a minute. Drive the vehicle. | Approximately equal to the indi- |
| | CAUTION: Check air pressure of tire under standard conditions. | cation on speedometer (Inside of ±10%) |
| | Steering wheel turned right | Approx. 0 – R550° |
| STEERING ANG | Straight-ahead | Approx. 0° |
| | Steering wheel turned left | Approx. 0 – L550° |
| | Engine stopped | 0 rpm |
| ENGINE SPEED | Engine running | Approximately equal to the indi- |
| | (Engine speed: 400 rpm or more) | cation on tachometer |
| STR ANGL SPD | The steering wheel is not steered. | 0 deg/s |
| | The steering wheel is steering. | 1 – 3,000 deg/s |
| POWER STR SOL | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | Approx. 1.10 A |
| | Vehicle speed: 100 km/h (62 MPH) | Approx. 0.42 A |
| | 4WAS rear actuator turns right completely | Approx. 4.4 V |
| RR ST ANG-MAI | 4WAS rear actuator is neutral | Approx. 2.4 V |
| | 4WAS rear actuator turns left completely | Approx. 0.4 V |
| | 4WAS rear actuator turns right completely | Approx. 4.4 V |
| RR ST ANG-SUB | 4WAS rear actuator is neutral | Approx. 2.6 V |
| | 4WAS rear actuator turns left completely | Approx. 0.4 V |
| RR ST ANG-VOL | Ignition switch: ON | Approx. 5 V |
| C/U VOLTAGE | Ignition switch: ON | Battery voltage |
| MOTOR VOLTAGE | Ignition switch: ON | Battery voltage |
| MOTOR CURRENT | 4WAS rear motor running | 0 – 20 A |
| MTR CRNT OPE | 4WAS rear actuator neutral condition and vehicle straight-ahead position. | Approx. –2 – 2 A |
| | 4WAS rear motor running | Approx. –20 – 20 A |
| | 4WAS rear actuator turned right | Approx. 0 – 1 deg |
| RR ANGLE OPE | 4WAS rear actuator is neutral | Approx. 0 deg |
| | 4WAS rear actuator turned left | Approx. 0 – –1 deg |
| | Steering wheel turned to the right (with vehicle stopped). | Approx. 0 – R60 $^{\circ}$ |
| FR ANGLE OPE | Straight-ahead | Approx. 0° |
| | Steering wheel turned to the left (with vehicle stopped). | Approx. 0 – L60 $^{\circ}$ |
| STOP I AMP SW/ | Brake pedal: Depressed | On |
| STOL LAWI SW | Brake pedal: Released | Off |
| HICAS RELAY | Ignition switch: ON | On |
| FAIL SAFE | Fail-safe condition | On |
| | Normal | Off |
| | 4WAS warning lamp: ON | On |
| | 4WAS warning lamp: OFF | Off |

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< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

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| Monitor item | Condition | Value/Status | , |
|--------------|--|--------------|---|
| | 4WAS front control unit fail-safe mode | On | F |
| | Normal | Off | |
| | 4WAS front control unit enters in the protection function mode | On | E |
| FRITEGO EX | Normal | Off | |

TERMINAL LAYOUT



PHYSICAL VALUES

| Termi | inal No. | | Description | | | | ST | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------|------------|---------|--|------------------|---|-----------------|---------------|--|--|-------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------------|--|--|-------|---|
| + | - | color | Signal name | Input/ Output | Condition | Value (Approx.) | ŀ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | — | L | CAN-H | — | | _ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Ground | BR | Rear wheel steering angle sensor ground | _ | Always | 0 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <u> </u> | | Rear wheel steering | 0 / / | Ignition switch: ON | 5 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Ground | vv | angle sensor power supply | Output | Ignition switch: OFF | 0 V | J | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | _ | | 4WAS rear actuator assembly turns right completely. | 4.4 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 7 Ground R | round R | Rear wheel steering angle sensor (sub) output voltage | Output | 4WAS rear actuator assembly is neu- tral | 2.6 V | K | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | ourput ronago | | 4WAS rear actuator assembly turns left completely. | 0.4 V | L | | | | | | | | | | | | | | | | | | | | | | |
| 8 | — | Р | CAN-L | — | | _ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 4WAS rear actuator assembly turns right completely. | 4.4 V | N | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Ground | G | Rear wheel steering angle sensor (main) output voltage | Output | 4WAS rear actuator assembly is neu- tral | 2.4 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | output tonage | | 4WAS rear actuator assembly turns left completely. | 0.4 V | Ν |
| | Cround | | Oton Jomn owitch | lanut | Brake pedal: Depressed | Battery voltage | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | Ground | GR | Stop lamp switch | input | Brake pedal: Released | 0 V | U | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | Ground | SB | 4WAS rear motor | Input | Ignition switch: ON | Battery voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | Ground | 30 | relay | mput | Ignition switch: OFF | 0 V | Ρ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | Ground | V | Ignition switch | Input | Ignition switch: ON | Battery voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>∠1</i> | Ground | v | ignation switch | input | Ignition switch: OFF | 0 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 | | BR | 4WAS communica- tion-H | _ | _ | _ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | _ | Y | 4WAS communica- tion-L | _ | _ | _ | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| Termi | nal No. | Wire | Description | | | | | | | | | | | | |
|------------|--------------|--------|------------------------|---|--|-----------------|---|---|---|---|---|-----------------|--------|---|-----------------|
| + | - | color | Signal name | Input/ Output | Condition | Value (Approx.) | | | | | | | | | |
| 34 | Ground | В | Ground | — | Always | 0 V | | | | | | | | | |
| 36 | 36 Ground LG | LG | Power steering so- | Output | Vehicle speed: 0 km/h (0 MPH) (Engine is running) | 4.4 – 6.6 V | | | | | | | | | |
| | | | | | Vehicle speed: 100 km/h (62 MPH) | 2.4 – 3.6 V | | | | | | | | | |
| 27 | Ground | П | 4WAS rear motor | Input | Ignition switch: ON | Battery voltage | | | | | | | | | |
| 51 | 37 Ground P | Г | power supply | input | Ignition switch: OFF | 0 V | | | | | | | | | |
| 38 | 38 Ground Y | Ground | Ground | Ground | Ground | Ground | X | V | V | v | v | 4WAS rear motor | Output | While 4WAS rear motor activates rightward | Battery voltage |
| 50 | | I | (right) | output | While 4WAS rear motor activates left- ward | 0 V | | | | | | | | | |
| 30 | Ground | G | 4WAS rear motor | Output | While 4WAS rear motor activates rightward | 0 V | | | | | | | | | |
| 39 Giodila | (left) | (left) | Output | While 4WAS rear motor activates left- ward | Battery voltage | | | | | | | | | | |
| 40 | Ground | В | 4WAS rear motor ground | | Always | 0 V | | | | | | | | | |

CAUTION:

When using circuit tester to measure voltage for inspection, never forcibly extend any connector terminals.

< ECU DIAGNOSIS INFORMATION >

Wiring Diagram - 4WAS SYSTEM -

[WITH 4WAS]





JCGWM0319G

< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]





< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

JCGWM0321G

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< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

JCGWM0322GI



< ECU DIAGNOSIS INFORMATION >

JCGWM0323G

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Fail Safe

INFOID:000000005650488

4WAS system (Main)

- 4WAS system enters in the fail-safe mode (4WAS system stopped) and 4WAS warning lamp turns ON if an error is detected in 4WAS system (4WAS main control unit) component part.
- 4WAS system enters in the protection function mode (4WAS system temporarily stopped) if 4WAS system continues the heavy load condition or the sensor self-check condition. (4WAS system reactivates automati-

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< ECU DIAGNOSIS INFORMATION >

cally if the heavy load condition and the self-check condition are resolved.) 4WAS warning lamp stays OFF in the protection function mode.

| Mode | Warn- ing Iamp | DTC | Detected area (Error area) | Error area and root cause | |
|-----------|----------------------|---|---|--|--|
| | Turn- ON | C1900 C1901 C1905 C1906 C1907 C1908 C1922 C1925 C1927 C1928 C1933 | 4WAS main control unit | 4WAS main control unit error | |
| | Turn- ON | C1902 C1903 C1904 C1910 C1913 | 4WAS rear motor | 4WAS rear motor error | |
| | Turn- ON | C1909 | 4WAS main control unit | 4WAS main control unit | |
| | Turn- ON | C1911 C1912 | 4WAS rear motor | 4WAS rear motor power supply error | |
| | Turn- ON | C1914 | Rear wheel steering sensor | Rear wheel steering sensor power supply error | |
| | Turn- ON | C1915 C1916 | Rear wheel steering sensor | Rear wheel steering sensor output voltage error | |
| Fail-safe | Turn- OFF | C1917 | Rear wheel steering sensor | Rear wheel steering sensor (main and sub) output signal value error signal | |
| | Turn- ON | C1918 | Rear wheel steering sensor | Rear wheel steering sensor (main and sub) output signal error | |
| | Turn- ON | C1919 | ABS actuator and electric unit (control unit) | Vehicle speed signal error | |
| _ | Turn- ON | C1920 C1923 C1924 | Steering angle sensor | Steering angle sensor input signal error | |
| | Turn- ON | C1921 | ECM | Engine speed signal error | |
| | Turn- ON | C1926 | Steering angle sensor | Steering angle sensor error | |
| | Turn- ON | C1930 | 4WAS front control unit | 4WAS front control unit fail-safe mode | |
| - | Turn- ON | C1931 | 4WAS communication line*/ 4WAS front control unit/4WAS main control unit | 4WAS communication line*/4WAS front control unit/4WAS main control unit error | |
| | Turn- ON | C1932 | Steering angle sensor | Steering angle sensor input signal error | |
| | Turn- ON | U1000 | CAN communication line* | CAN communication error | |
| | Turn- ON | U1010 | CAN communication line*/ 4WAS main control unit/ECM/ ABS actuator and electric unit (control unit) | CAN communication line/4WAS main control unit/ECM/ABS actua- tor and electric unit (control unit) error | |

*: Communication line between 4WAS front control unit and 4WAS main control unit.

< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

EPS system

• EPS system (4WAS main control unit) enters the fail-safe mode (that allows the steering force to be controlled without impairing the drive ability) if the input from each sensor is not within the specified range. Then, 4WAS warning lamp turns ON.



| Mode | Warn- ing lamp | DTC | Detected area (Error area) | Error part and root cause | E |
|-----------|----------------------|-------|---|----------------------------|---|
| Fail-safe | Turn- ON | C1919 | ABS actuator and electronic unit (control unit) | Vehicle speed signal error | F |

DTC Inspection Priority Chart

INFOID:000000005650489

STC

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

| Priority | Detected items (DTC) | |
|----------|--|--------|
| 1 | U1000 CAN COMM U1010 CONTROL UNIT (CAN) | _ |
| 2 | C1900 CONTROL UNIT [ABNORMAL1] C1901 CONTROL UNIT [ABNORMAL2] C1905 CONTROL UNIT [ABNORMAL3] C1906 CONTROL UNIT [ABNORMAL5] C1907 CONTROL UNIT [ABNORMAL4] C1908 CONTROL UNIT [ABNORMAL7] C1909 CONTROL UNIT [ABNORMAL6] C1922 CONTROL UNIT [ABNORMAL8] C1925 AD CONVERTER | J K |
| | C1927 CONTROL UNIT [ABNORMAL5] C1928 CONTROL UNIT [ABNORMAL9] C1933 CONTROL UNIT | L |
| | C1902 MOTOR OUTPUT [REV CURRENT] C1903 MOTOR OUTPUT [NO CURRENT] C1904 MOTOR OUTPUT [OVERCURRENT] C1910 MOTOR OUTPUT [MOTOR LOCK] C1911 MOTOR VOLTACE II OWV/OUTACE1 | M |
| 3 | C1911 MOTOR VOLTAGE [LOW VOLTAGE] C1912 MOTOR VOLTAGE [BAD OBSTRCT] C1913 MOTOR OUTPUT [ABNORML SIG] C1914 RR ST ANGLE SENSOR [ABNORML VOL] C1915 RR ST ANGLE SENSOR [MAIN SIGNAL] C1916 RR ST ANGLE SENSOR [SUB SIGNAL] | N |
| | C1917 RR ST ANGLE SENSOR [OFFSET SIG1] C1918 RR ST ANGLE SENSOR [OFFSET SIG2] | 0 |
| 4 | C1919 VEHICLE SPEED SEN [NO SIGNAL] C1920 STEERING ANGLE SEN [NO SIGNAL] C1921 ENG REV SIGNAL C1923 STEERING ANGLE SEN [NO CHANGE] C1924 STEERING ANGLE SEN [NO NEUT STATE] C1926 STEERING ANGLE SEN C1932 STEERING ANGLE SEN | P |
| 5 | C1930 4WAS FRONT ECU C1931 4WAS FRONT ECU COMM | |

< ECU DIAGNOSIS INFORMATION >

DTC Index

INFOID:000000005650490

[WITH 4WAS]

| DTC | Items (CONSULT-III screen terms) | Reference |
|-------|---------------------------------------|----------------------|
| C1900 | CONTROL UNIT [ABNORMAL1] | STC-89, "DTC Logic" |
| C1901 | CONTROL UNIT [ABNORMAL2] | STC-89, "DTC Logic" |
| C1902 | MOTOR OUTPUT [REV CURRENT] | STC-91, "DTC Logic" |
| C1903 | MOTOR OUTPUT [NO CURRENT] | STC-91, "DTC Logic" |
| C1904 | MOTOR OUTPUT [OVERCURRENT] | STC-91, "DTC Logic" |
| C1905 | CONTROL UNIT [ABNORMAL3] | STC-94, "DTC Logic" |
| C1906 | CONTROL UNIT [ABNORMAL5] | STC-89, "DTC Logic" |
| C1907 | CONTROL UNIT [ABNORMAL4] | STC-89, "DTC Logic" |
| C1908 | CONTROL UNIT [ABNORMAL7] | STC-94, "DTC Logic" |
| C1909 | CONTROL UNIT [ABNORMAL6] | STC-96, "DTC Logic" |
| C1910 | MOTOR OUTPUT [MOTOR LOCK] | STC-91, "DTC Logic" |
| C1911 | MOTOR VOLTAGE [LOW VOLTAGE] | STC-98, "DTC Logic" |
| C1912 | MOTOR VOLTAGE [BAD OBSTRCT] | STC-98, "DTC Logic" |
| C1913 | MOTOR OUTPUT [ABNORML SIG] | STC-91, "DTC Logic" |
| C1914 | RR ST ANGLE SENSOR [ABNORML VOL] | STC-103, "DTC Logic" |
| C1915 | RR ST ANGLE SENSOR [MAIN SIGNAL] | STC-106, "DTC Logic" |
| C1916 | RR ST ANGLE SENSOR [SUB SIGNAL] | STC-106. "DTC Logic" |
| C1917 | RR ST ANGLE SENSOR [OFFSET SIG1] | STC-109, "DTC Logic" |
| C1918 | RR ST ANGLE SENSOR [OFFSET SIG2] | STC-109, "DTC Logic" |
| C1919 | VEHICLE SPEED SEN [NO SIGNAL] | STC-112, "DTC Logic" |
| C1920 | STEERING ANGLE SEN [NO SIGNAL] | STC-114, "DTC Logic" |
| C1921 | ENG REV SIGNAL | STC-117, "DTC Logic" |
| C1922 | CONTROL UNIT [ABNORMAL8] | STC-94, "DTC Logic" |
| C1923 | STEERING ANGLE SEN [NO CHANGE] | STC-119, "DTC Logic" |
| C1924 | STEERING ANGLE SEN [NO NEUT STATE] | STC-122, "DTC Logic" |

< ECU DIAGNOSIS INFORMATION >

[WITH 4WAS]

| DTC | Items (CONSULT-III screen terms) | Reference | A |
|-------|-------------------------------------|----------------------|-----|
| C1925 | AD CONVERTER | STC-94, "DTC Logic" | - |
| C1926 | STEERING ANGLE SEN | STC-125, "DTC Logic" | D |
| C1927 | CONTROL UNIT [ABNORMAL5] | STC-89, "DTC Logic" | - D |
| C1928 | CONTROL UNIT [ABNORMAL9] | STC-94, "DTC Logic" | С |
| C1930 | 4WAS FRONT ECU | STC-128, "DTC Logic" | - |
| C1931 | 4WAS FRONT ECU COMM | STC-129, "DTC Logic" | D |
| C1932 | STEERING ANGLE SEN | STC-125, "DTC Logic" | - |
| C1933 | CONTROL UNIT | STC-89, "DTC Logic" | - |
| U1000 | CAN COMM | STC-133, "DTC Logic" | E |
| U1010 | CONTROL UNIT (CAN) | STC-134, "DTC Logic" | - |

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4WAS WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

4WAS WARNING LAMP DOES NOT TURN ON

Description

• 4WAS warning lamp does not turn ON when turning ignition switch ON from OFF.

Diagnosis Procedure

1. CHECK 4WAS SYSTEM POWER SUPPLY AND GROUND CIRCUIT

With CONSULT-III

Perform the trouble diagnosis of the power supply and ground circuit.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the specific malfunctioning part.

2.CHECK 4WAS WARNING LAMP

With CONSULT-III

Perform the trouble diagnosis of 4WAS warning lamp. Refer to STC-142, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check that there is no malfunction in each harness connector pin terminal or disconnection.

NO >> Repair or replace the specific malfunctioning part.

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[WITH 4WAS]

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INFOID:000000005650492

| 4WAS WARNING LAMP DOES NOT TURN OFF | 1 |
|---|--------|
| 4WAS WARNING LAMP DOES NOT TURN OFF | - |
| Description | А |
| 4WAS system stops (error) when turning 4WAS warning lamp ON. | В |
| Diagnosis Procedure | 14 |
| 1.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT) | С |
| With CONSULT-III Perform 4WAS main control unit self-diagnosis. Is any DTC detected other than "C1930" or "C1931"? YES >> GO TO 2. NO >> GO TO 3. | D |
| 2. PERFORM TROUBLE DIAGNOSIS (4WAS MAIN CONTROL UNIT) | E |
| With CONSULT-III Check the error system detected from the self-diagnosis. Perform 4WAS main control unit self-diagnosis again after the inspection. | F |
| <u>Is any error system detected?</u> YES >> Check the error system. NO >> GO TO 3. 3. PERFORM SELF-DIAGNOSIS (4WAS FRONT CONTROL UNIT) | STC |
| With CONSULT-III | - H |
| Perform 4WAS front control unit self-diagnosis. <u>Is any error system detected?</u> YES >> Check the error system. NO >> GO TO 4 | I |
| 4.PERFORM SELF-DIAGNOSIS (4WAS MAIN CONTROL UNIT) | J |
| With CONSULT-III Perform 4WAS main control unit self-diagnosis. | - K |
| YES >> Check the error system. NO >> Check that there is no malfunction in each harness connector pin terminal or disconnection. | L |
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STEERING WHEEL MISS ALIGNMENT

< SYMPTOM DIAGNOSIS >

STEERING WHEEL MISS ALIGNMENT

Description

- The steering wheel position (center) is in the wrong position at driving.
- 4WAS system stops temporarily.

NOTE:

- The steering wheel position (center) is in the wrong position under the following condition. (4WAS system is in the protection mode. This is normal status.)
- When steering frequently
- When driving on a rough road
- When the assist of power steering is not sufficient
- When the battery voltage is weak
- When driving under the status that there is a difference in the steering wheel

Diagnosis Procedure

INFOID:000000005650496

1.CHECK SYMPTOM

Stop the vehicle in the straight-ahead position after driving for a period of time.

Does the steering wheel position (center) misalign?

- YES >> INSPECTION END (Entered in 4WAS system protection function mode in past. 4WAS system is normal at present.)
- NO >> GO TO 2.

2.4 WAS FRONT ACTUATOR INITIALIZATION

1. Start the engine.

CAUTION:

Stop the vehicle.

- Steer 90° leftward slowly. Steer 90° rightward and return the steering wheel to the straight-ahead position. Repeat the above 10 times.
- 3. Stop the vehicle in the straight-ahead position after driving for a period of time.

Does the steering wheel position (center) misalign?

- YES >> INSPECTION END (Entered in 4WAS system protection function mode in past. 4WAS system is normal at present.)
- NO >> GO TO 3.

3.4WAS SYSTEM CONDITION

With CONSULT-III

1. Start the engine.

CAUTION:

Stop the vehicle.

2. Check "EX OPERAT" item on "DATA MONITOR" of 4WAS front control unit.

Does the item on "DATA MONITOR" indicate "On"?

```
YES >> GO TO 7.
```

```
NO >> GO TO 4.
```

4.CHECK STEERING SYSTEM

Check the steering system. Refer to ST-14, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace the specific malfunctioning part.

5.CHECK WHEEL ALIGNMENT

Check the wheel alignment. Refer to FSU-8, "Inspection" (front side), RSU-6, "Inspection" (rear side).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace the specific malfunctioning part.

INFOID:000000005650495

STEERING WHEEL MISS ALIGNMENT

| < SYMPTOM DIAGNOSIS > | [WITH 4WAS] | |
|--|--|---|
| 6. PERFORM 4WAS FRONT ACTUATOR ADJUSTM | IENT | |
| Perform 4WAS front actuator adjustment. Refe <u>POSITION ADJUSTMENT : Special Repair Requi</u> Stop the vehicle in the straight-ahead position after <u>Does the steering wheel position (center) misalign?</u> YES >> INSPECTION END. NO >> GO TO 7. | r to <u>STC-30, "4WAS FRONT ACTUATOR NEUTRAL</u> irement (Pattern 3)". er driving for a period of time. | E |
| CHECK 4WAS SYSTEM IGNITION POWER SUPP | PLY | |
| Perform the trouble diagnosis of the ignition power sup Is the inspection result normal? YES >> GO TO 8. NO >> Repair or replace the specific malfunction 8.CHECK 4WAS SYSTEM 4WAS FRONT MOTOR F | pply. Refer to <u>STC-62, "Diagnosis Procedure"</u> . ing part. POWER SUPPLY | E |
| Perform the trouble diagnosis of 4WAS front motor po <u>Is the inspection result normal?</u> YES >> GO TO 9. NO >> Repair or replace the specific malfunction Q CHECK 4WAS SYSTEM HISTORY | wer supply. Refer to <u>STC-64, "Diagnosis Procedure"</u> . ing part. | F |
| Turn the ignition switch OFF. CAUTION: Wait 30 minutes or more after turning the ignit Start the engine. CAUTION: Stop the vehicle. Check "EX OPERAT" on 4WAS front control unit " | t ion switch OFF. 'DATA MONITOR". | F |
| Monitor item Condition | Display value | , |
| EX OPERAT 4WAS system enters in the protection function due to the heavy load condition and temporarily abnormal voltage. | On | ŀ |
| Is the value of DATA MONITOR "On"? YES >> Replace 4WAS front control unit. Refer • Perform 4WAS front actuator adjustmer 30. "4WAS FRONT ACTUATOR NE | to <u>STC-180, "Exploded View"</u> . nt after replacing 4WAS front control unit. Refer to <u>STC-</u> UTRAL POSITION ADJUSTMENT : Special Repair | l |
| Requirement (Pattern 3)". NO >> INSPECTION END | | Ν |
| | | ľ |
| | | C |

STEERING SYSTEM VIBRATION AND NOISE

< SYMPTOM DIAGNOSIS >

STEERING SYSTEM VIBRATION AND NOISE

Description

- Vibration or noise occurs in the steering wheel while driving the vehicle. **NOTE:**
 - Vibration or noise occurs in the steering wheel in the following conditions. (4WAS system is not malfunction.)
 - 4WAS system starts and ends (when the engine speed is ON⇔OFF).
 - System protection mode
 - When steering frequently
 - When driving on a rough road
 - · When the assist of power steering is not sufficient
 - When the battery voltage is weak

Diagnosis Procedure

INFOID:000000005650498

IWITH 4WAS1

INFOID:000000005650497

1.CHECK 4WAS SYSTEM

With CONSULT-III

1. Start the engine. CAUTION:

Stop the vehicle.

2. Check "OVRLD JDG FLG", "ACT PRTCT FLG", "ECU PRTCT FLG", "LOW VOLT FLG", "HIGH VOLT FLG", "EX OPERAT" items on "DATA MONITOR" of 4WAS front control unit.

Does all items on "DATA MONITOR" indicate "Off"?

- YES >> INSPECTION END (Vibration and sound occurs in 4WAS system protection function mode. This is normal.)
- NO >> GO TO 2.

2.STOP 4WAS FRONT ACTUATOR CONTROL

1. Turn the ignition switch OFF.

- 2. Disconnect 4WAS front actuator harness connector.
- CAUTION:

Disconnect 4WAS front actuator harness connector 10 minutes after turning the ignition switch OFF.

- 3. Drive the vehicle for a period of time. Check the symptom.
 - CAUTION:

Erase the self-diagnosis memory after the inspection is completed to detect 4WAS front control unit DTC "C1661". [Erase the self diagnosis memory of 4WAS main control unit, ABS actuator and electric unit (control unit) and ICC sensor integrated simultaneously.]

Does symptom not occur?

- YES >> Replace 4WAS front actuator. Refer to <u>STC-182, "Removal and Installation"</u>.
- NO >> Perform the symptom diagnosis for the steering system. Refer to <u>ST-3, "NVH Troubleshooting</u> <u>Chart"</u>.

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIATION) [WITH 4WAS] < SYMPTOM DIAGNOSIS >

UNBALANCE STEERING WHEEL TURNING FORCE (TORQUE VARIA-TIONI

| TION) | · · · · · · · · · · · · · · · · · · · | | А |
|--|---|------------------------|-----|
| Description | | INFOID:000000005650499 | R |
| The steering force does not change s The steering force is heavy when stee The steering force is light when drivin | moothly according to the vehicle speed. ering. g at high speed. | | С |
| Diagnosis Procedure | | INFOID:000000005650500 | |
| 1.CHECK 4WAS SYSTEM VEHICLES | SPEED SIGNAL | | D |
| Perform the trouble diagnosis of the vel | hicle speed signal. Refer to <u>STC-112. "Diagnos</u> | sis Procedure". | |
| Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace the speci | ific malfunctioning part. | | Ε |
| Z .CHECK STEERING SYSTEM | 4.4 "Increation" | | F |
| Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace the speci- | <u>-14, "Inspection"</u> . | | STC |
| 3. CHECK 4WAS SYSTEM POWER S | TEERING SOLENOID VALVE | | |
| Perform the trouble diagnosis of the por | wer steering solenoid valve. Refer to STC-140. | "Diagnosis Procedure". | Η |
| Is the inspection result normal?YES>> Check that there is no malfNO>> Repair or replace the species | unction in each harness connector pin termina | l or disconnection. | I |
| | | | J |
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< PRECAUTION > 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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" 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 AIR BAG".
- 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.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution Necessary for Steering Wheel Rotation after Battery Disconnect

INFOID:000000005843153

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables. **NOTE:**

Supply power using jumper cables if battery is discharged.

- 2. Turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
- 3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
- 4. Perform the necessary repair operation.

PRECAUTIONS

[WITH 4WAS]

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- When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
- 6. Perform self-diagnosis check of all control units using CONSULT-III.

Precautions for Removal and Installation of 4WAS Components

- Set the vehicle to the straight-ahead position when checking 4WAS and removing each component.
- Remove the battery terminal 10 minutes after turning the ignition switch OFF from ON and perform the cremoval of each component when removing the 4WAS front control unit.
- Perform the neutral position adjustment for the steering angle sensor after the replacement of steering angle sensor. Refer to <u>BRC-8</u>, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement".
- Refer to <u>STC-29, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Description"</u> for the replacement of 4WAS front control unit.
- Refer to <u>STC-29, "4WAS FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Description"</u> for the replacement of 4WAS front actuator.

Precautions for Harness Repair

4WAS COMMUNICATION LINE

< PRECAUTION >

• Solder the repaired area and wrap tape around the soldered area. **NOTE:**

A fray of twisted lines must be within 110 mm (4.33 in).



NG: Bypass connection

• Bypass connection is never allowed at the repaired area. **NOTE:**

Bypass connection may cause 4WAS communication error as spliced wires that are separate from the main line or twisted lines lose noise immunity.

• Replace the applicable harness as an assembly if error is detected on the shield lines of 4WAS communication line.



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[WITH 4WAS]

REMOVAL AND INSTALLATION 4WAS FRONT CONTROL UNIT

Exploded View

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1. 4WAS front control unit

C:Vehicle front Refer to <u>GI-4. "Components"</u> for symbols in the figure.

Removal and Installation

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REMOVAL

- 1. Turn the ignition switch OFF.
- 2. Remove the instrument driver lower panel. Refer to <u>IP-12, "A/T MODELS : Exploded View"</u>(A/T models), <u>IP-22, "M/T MODELS : Exploded View"</u>(M/T models).
- Disconnect 4WAS front control unit connectors.
 CAUTION: Disconnect 4WAS front control unit connectors 10 minutes after turning the ignition switch OFF.
- 4. Remove the bolts of 4WAS front control unit.
- 5. Remove the 4WAS front control unit (1).



INSTALLATION

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

• Perform 4WAS front actuator adjustment after replacing 4WAS front control unit. Refer to <u>STC-30, "4WAS</u> <u>FRONT ACTUATOR NEUTRAL POSITION ADJUSTMENT : Special Repair Requirement (Pattern 3)"</u>.
4WAS MAIN CONTROL UNIT

< REMOVAL AND INSTALLATION >

4WAS MAIN CONTROL UNIT

Exploded View

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1. 4WAS main control unit

C:Vehicle front Refer to <u>GI-4, "Components"</u> for symbols in the figure.

Removal and Installation

- 1. Turn the ignition switch OFF.
- 2. Remove the rear wheel house finisher. Refer to INT-28, "Exploded View".
- Disconnect 4WAS main control unit connectors, 4WAS rear motor relay connector and noise suppressor connectors.
- 4. Remove the 4WAS main control unit bolt and nuts.
- 5. Remove the 4WAS main control unit (1).



INSTALLATION Install in the reverse order of removal.

< REMOVAL AND INSTALLATION >

[WITH 4WAS]

INFOID:000000005650509

4WAS FRONT ACTUATOR ASSEMBLY

Removal and Installation

Refer to ST section for installation/removal. Refer to ST-26, "WITH 4WAS : Removal and Installation".

< REMOVAL AND INSTALLATION >

4WAS REAR ACTUATOR ASSEMBLY

Exploded View

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[WITH 4WAS]



1. 4WAS rear actuator assembly

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

Removal and Installation

REMOVAL

- Remove coil spring and lower link. Refer to RSU-8, "Exploded View". 1.
- 2. Disconnect harness connector from 4WAS rear actuator and rear suspension member.
- 3. Remove fixing bolts and nuts of 4WAS rear actuator (1), and then remove 4WAS rear actuator from rear suspension member.



INSTALLATION

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

- When installing 4WAS rear actuator to rear suspension member, check the mounting surfaces of 4WAS rear actuator and rear suspension member for oil, dirt, sand, or other foreign materials.
- Check rear wheel alignment. Refer to <u>RSU-6, "Inspection"</u>.