GROUP 27C

ELECTRONICALLY CONTROLLED 4WD

CONTENTS

SERVICE PRECAUTIONS

M1274005600068

TOWING

The vehicle must be towed by a tow truck with all four wheels raised. If a vehicle is towed with only the front or rear wheels are raised, the drive system components may be damaged or the vehicle may jump out of a tow truck (cart).

WHEEL AND TYRE

Normally, all four tyres must be same in size, in type, and in brand, except for when a spare tyre is temporarily used. If a wheel or tyre with incorrect size is installed or tyre pressure is excessively out of the specified value, the electronically controlled 4WD system will not operate correctly. In addition, drive system components may be damaged.

DRIVING ON SANDY OR SLUSHY ROAD

As the vehicle is intended for on-road use, long-time driving on a sandy or slushy road must be avoided. If the vehicle is driven on a sandy or slushy road for a long time, the fail-safe function of the electronically controlled 4WD system may activate. In that case, the system will switch the 4WD mode into the 2WD mode to protect the drive train, and illuminate "4WD-E" and "LOCK" indicators or display a warming message.

SPEED MEASUREMENT

When using the chassis dynamometer to measure the speed, always measure it under synchronized condition between front wheels' speed and rear wheels' speed. If the speed is measured with front wheels or rear wheels fixed, or with speed difference between front wheels and rear wheels, drive system components may be damaged.

SERVICE SPECIFICATIONS

M1274000100121

Item	Standard value
Electronic control coupling solenoid resistance Ω (at 20 °C)	2.2 – 4.0
Electronic control coupling stud bolt length mm	21.6 – 24.4

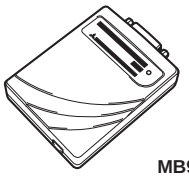
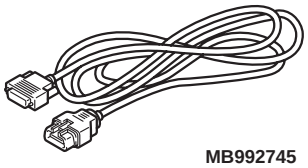
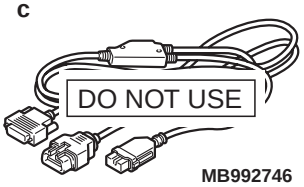
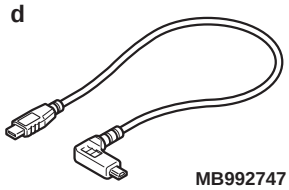
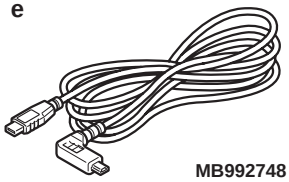
SEALANT

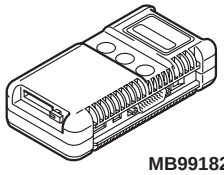
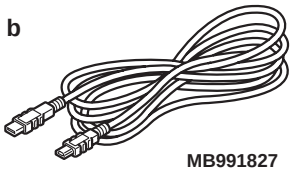
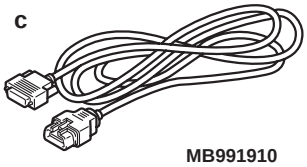
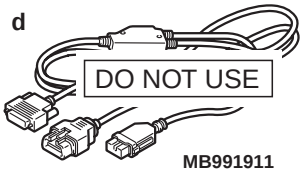
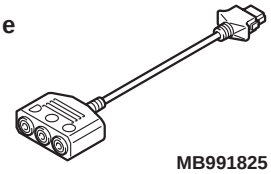
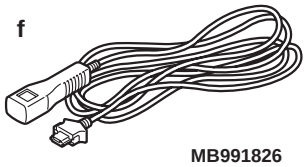
M1272000500145

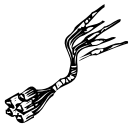
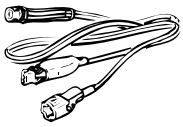
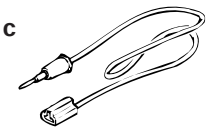
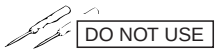
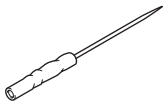
Item	Specified sealant	Remark
Joint between differential carrier and electronic control coupling	ThreeBond 1215, 1216, 1217 or equivalent	Semi-drying sealant

SPECIAL TOOLS

M1274000200128

Tool	Number	Name	Use
a  MB992744 b  MB992745 c  MB992746 d  MB992747 e  MB992748 ACB05421AB	a. MB992744 b. MB992745 c. MB992746 d. MB992747 e. MB992748	a. Vehicle communication interface-Lite (V.C.I.-Lite) b. V.C.I.-Lite main harness A (for vehicles with CAN communication) c. V.C.I.-Lite main harness B (for vehicles without CAN communication) d. V.C.I.-Lite USB cable short e. V.C.I.-Lite USB cable long	Check of the electronically controlled 4WD (the diagnosis code display, service data display, freeze frame data display, actuator test with M.U.T.-III)

Tool	Number	Name	Use
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991825 f  MB991826 MB991955	MB991955 a: MB991824 b: MB991827 c: MB991910 d: MB991911 e: MB991825 f: MB991826	M.U.T.-III sub-assembly a: Vehicle communication interface (V.C.I.) b: USB cable c: M.U.T.-III main harness A (applicable to vehicles with CAN communication) d: M.U.T.-III main harness B (applicable to vehicles without CAN communication) e: Measurement adapter f: Trigger harness	⚠ **CAUTION** **For vehicles with CAN communication, use the M.U.T.-III main harness A to send the simulated vehicle speed. If you connect the M.U.T.-III main harness B instead, the CAN communication does not function correctly.** Check of the electronically controlled 4WD (the diagnosis code display, service data display, freeze frame data display, actuator test with M.U.T.-III)

Tool	Number	Name	Use
a  b  c  d  MB991223	MB991223 a: MB991219 b: MB991220 c: MB991221 d: MB991222	Wiring harness set a: Check harness b: LED harness c: LED harness adapter d: Probe	Continuity check and voltage measurement at the 4WD-ECU wiring harness connector
 MB992006	MB992006	Extra fine probe	

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1274000400047

Refer to GROUP 00 – Contents of Troubleshooting .

PRECAUTIONS FOR DIAGNOSIS

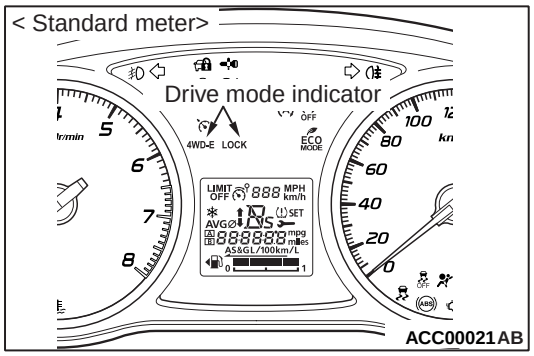
M1274000500088

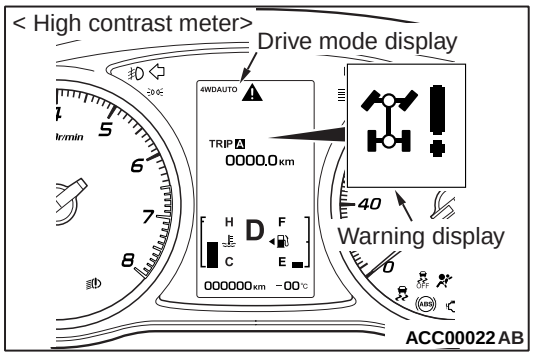
- After troubleshooting, and removing/installing of the electronically controlled 4WD system components, check the diagnosis code using M.U.T.-III. If a diagnosis code is set, erase it and check again that no diagnosis code is set.
- Before performing a troubleshooting, check that all four wheels and tyres are same in size, in type, and in brand. The electronically controlled 4WD system will function correctly only when all four wheels and tyres are same in size, and tyre pressure is specified value.
- If any abnormality occurs in the electronically controlled 4WD system, "4WD-E" and "LOCK" indicators in the combination meter will illuminate or a message will be displayed to warn the driver.
- When the vehicle is used under some severe operational conditions (such as a long-time driving in 4WD on a sandy road, slushy road or road with deep snows or towing or long uphill driving), the electronically controlled 4WD system will illuminate "4WD-E" and "LOCK" indicators or display a message to warn the driver.
- The electronically controlled 4WD system is equipped with the fail-safe function which prohibits 4WD control and shifts to 2WD control if any abnormality occurs in the system. If there is a risk that the vehicle behaviour suddenly changes, the gradual shifting to 2WD control is chosen.

CHECK OF DRIVE MODE INDICATORS

M1274000600160

WARNING INDICATOR





If a malfunction occurs in the electronically controlled 4WD system, either of the followings operates to alert you to check a diagnosis code.

- The drive mode indicators flash simultaneously or alternately <Standard meter>.
- The drive mode display on the multi-information display flashes, and a message is shown on the warning display <High contrast meter>.

DIAGNOSTIC FUNCTION

M1274000700134

HOW TO READ DIAGNOSIS CODE

Refer to GROUP 00 – Diagnostic Function .

HOW TO ERASE DIAGNOSIS CODE

Refer to GROUP 00 – Diagnostic Function .

FAIL-SAFE FUNCTION

FAILURE DETECTION

4WD-ECU performs the following checks at a timing shown in the chart below. 4WD-ECU determines the malfunction occurred when the failure detection conditions are met, and it sets the diagnosis code and executes the countermeasures for trouble. When the failure resume conditions are met, ECU determines the status is normal, and resumes the system.

Start-up (Initial check just after the ignition switch is turned ON.)

1. CPU check
   - Performs the ROM and RAM check.
2. Actuator check
   - After CPU check has been completed, check the driving voltage with the actuator relay OFF.

Always (During ignition ON status other than initial check operation)

1. CPU check
   - Performs CAN communication and interactive check between CPUs.
2. Power supply check
   - Monitors the CPU supply voltage and checks if the voltage is within specifications.
3. Actuator check
   - Checks if the actuator relay turns ON according to the control.
   - Compares the command current value from CPU with the monitored current and checks if they agree.
4. External wire connection check
   - Checks if the input and output of each external wire connection is open, shorted, or stuck.

FREEZE FRAME DATA REFERENCE TABLE

M1274001200080

M.U.T-III can be used to read the freeze frame data (the driving status when the failure occurs) at each diagnosis code detection.

FREEZE FRAME DATA

Item No.	Item	Unit/display contents
1	Odometer	km
4	Accumulated minute	min
5	AWC control mode (4WD control mode)	Mode 1
		Mode 2
		Mode 3
		Mode 4

Item No.	Item	Unit/display contents
6	ABS status	OFF/ON
7	ABS/ASC actuation flag	OFF/ON
8	ASC torque reduction request	OFF/ON
9	Estimated vehicle speed	km/h
10	Brake switch	OFF/ON
11	Parking brake switch	OFF/ON
12	ASC off switch	OFF/ON
14	Steering angle sensor	deg
15	Accelerator position	%
16	FL wheel speed sensor	km/h
17	FR wheel speed sensor	km/h
18	RL wheel speed sensor	km/h
19	RR wheel speed sensor	km/h
20	Centre coupling torque	Nm
21	Yaw rate sensor	deg/s
22	Lateral G-sensor	m/s^2
23	Longitudinal G-sensor	m/s^2
24	Transfer temperature	°C
26	Centre coupling temperature	°C
28	Centre coupling clutch temperature	°C
29	Master cylinder pressure	MPa
33	ASC equipment information	Not present/present
34	Handle side	LH drive/RH drive

DIAGNOSIS CODE CHART

M1274000800186

⚠ CAUTION

On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnosis code(s) associated with other system may be set. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Diagnosis code No.	Diagnostic item	Reference page
C100A	FL wheel speed sensor circuit	P.27C-10
C1011	FL wheel speed sensor signal	P.27C-11
C1014	FL wheel speed sensor performance	P.27C-11
C1015	FR wheel speed sensor circuit	P.27C-10
C101C	FR wheel speed sensor signal	P.27C-11
C101F	FR wheel speed sensor performance	P.27C-11
C1020	RL wheel speed sensor circuit	P.27C-10
C1027	RL wheel speed sensor signal	P.27C-11

Diagnosis code No.	Diagnostic item	Reference page
C102A	RL wheel speed sensor performance	P.27C-11
C102B	RR wheel speed sensor circuit	P.27C-10
C1032	RR wheel speed sensor signal	P.27C-11
C1035	RR wheel speed sensor performance	P.27C-11
C1078	Tyre revolutions range	P.27C-12
C1219	Steering wheel sensor signal <ASC>	P.27C-13
C121A	Steering wheel sensor initialization <ASC>	P.27C-14
C123C	Sensor cluster malfunction <ASC>	P.27C-15
C1242	Straight G sensor signal	P.27C-17
C1610	4WD actuator power supply relay	P.27C-18
C1613	4WD mode switch stuck	P.27C-18
C1614	Parking brake switch stuck ON	P.27C-19
C1616	Cranking signal stuck	P.27C-20
C1621	4WD actuator protection	P.27C-21
C1624	4WD ECU internal	P.27C-22
C1626	4WD voltage failure	P.27C-22
C1628	4WD current failure	P.27C-23
C1629	ASC timeout <ASC>	P.27C-24
C1630	Steering wheel sensor timeout <ASC>	P.27C-24
C1631	ETACS timeout	P.27C-25
C1632	Engine timeout	P.27C-26
C1633	T/M timeout	P.27C-26
C1707	Implausible coding data	P.27C-27
C2100	Power supply low voltage	P.27C-28
C2101	Power supply high voltage	P.27C-29
C2205	Steering wheel sensor internal error <ASC>	P.27C-30
U0100	Engine CAN timeout	P.27C-31
U0101	T/M CAN timeout	P.27C-32
U0121	ABS/ASC CAN timeout	P.27C-32
U0126	Steering wheel sensor CAN timeout <ASC>	P.27C-33
U0141	ETACS CAN timeout	P.27C-34
U0401	Engine CAN message	P.27C-35
U0428	Steering wheel sensor CAN message	P.27C-35
U0431	ETACS CAN message	P.27C-36
U1073	Bus-off	P.27C-37
U1195	Coding not completed	P.27C-37

Diagnosis code No.	Diagnostic item	Reference page
U119A	Chassis No. mismatch	P.27C-38
U1425	T/M CAN message	P.27C-39
U1427	Implausible wheel speed data	P.27C-40
U1428	Sensor Cluster CAN message	P.27C-40

DIAGNOSIS CODE PROCEDURES

Code No.C100A <FL>, C1015 <FR>, C1020 <RL>, C102B <RR>: Wheel Speed Sensor Circuit

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU receives the wheel speed data from ABS/ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- One or more of the wheel speed does not follow

PROBABLE CAUSES
- Malfunction of wheel speed sensor
- Damaged harness wires and connectors
- Malfunction of encoder for wheel speed detection
- Malfunction of ABS/ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is the relevant wheel speed sensor diagnosis code No.C100A <FL>, C1015 <FR>, C1020 <RL>, or C102B <RR> set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the data list of the relevant wheel speed sensor (Refer to P.27C-45).
- Item No.18: FL wheel speed sensor
- Item No.19: FR wheel speed sensor
- Item No.20: RL wheel speed sensor
- Item No.21: RR wheel speed sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU (Refer to P.27C-51).

Code No.C1011 <FL>, C101C <FR>, C1027 <RL>, C1032 <RR>: Wheel Speed Sensor Signal

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU receives the wheel speed data from ABS/ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- An irregular change in the wheel speed sensor is detected

PROBABLE CAUSES
- Malfunction of wheel speed sensor
- Damaged harness wires and connectors
- Malfunction of encoder for wheel speed detection
- Malfunction of ABS/ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is the relevant wheel speed sensor diagnosis code No.C1011 <FL>, C101C <FR>, C1027 <RL>, or C1032 <RR> set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the data list of the relevant wheel speed sensor (Refer to P.27C-45).
- Item No.18: FL wheel speed sensor
- Item No.19: FR wheel speed sensor
- Item No.20: RL wheel speed sensor
- Item No.21: RR wheel speed sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU (Refer to P.27C-51).

Code No.C1014 <FL>, C101F <FR>, C102A <RL>, C1035 <RR>: Wheel Speed Sensor Performance

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU receives the wheel speed data from ABS/ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- One or more of the wheel speed is out of the range of the specified value

PROBABLE CAUSES
- Malfunction of wheel speed sensor
- Damaged harness wires and connectors
- Malfunction of encoder for wheel speed detection
- Malfunction of ABS/ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is the relevant wheel speed sensor diagnosis code No.C1014 <FL>, C101F <FR>, C102A <RL>, or C1035 <RR> set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the data list of the relevant wheel speed sensor (Refer to P.27C-45).
- Item No.18: FL wheel speed sensor
- Item No.19: FR wheel speed sensor
- Item No.20: RL wheel speed sensor
- Item No.21: RR wheel speed sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU (Refer to P.27C-51).

Code No.C1078: Tyre Revolutions Range

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU receives the wheel speed data from ABS/ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Difference in rotation speed between the front and rear wheels exceeds continuously a specific value.

PROBABLE CAUSES
- Tyre with incorrect diameter equipped
- Spare tyre installed
- Improper tyre pressure
- Malfunction of ABS/ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1078 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Check the tyres
Check that the wheels/tyres with the identical size are installed, and that each tyre pressure is within the value specified on the tyre pressure label.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Install the wheels/tyres with the identical size, or adjust the tyre pressure. Then go to Step 5.

STEP 4. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 5.

STEP 5. M.U.T.-III data list.
Check the following data list. (Refer to P.27C-45).
- Item No.18: FL wheel speed sensor
- Item No.19: FR wheel speed sensor
- Item No.20: RL wheel speed sensor
- Item No.21: RR wheel speed sensor

Q: Is the check result normal?
YES : Intermittent malfunction. (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU. (Refer to P.27C-51).

Code No.C1219: Steering Wheel Sensor Signal <ASC>

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**
- **When hydraulic unit (integrated with G and yaw rate sensor) is replaced, calibrate G and yaw rate sensor (refer to GROUP 35C – On-vehicle Service)**

OPERATION
4WD-ECU receives steering wheel data from the steering wheel sensor via CAN communication.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- The tolerance of neutral position of steering wheel sensor exceeds the specified range.
- Abnormality in steering wheel sensor output value
- Incorrect installation is detected by the initial check of the steering wheel sensor signal.
- Abnormality is detected by a comparison of output value from the steering wheel sensor with the output values from wheel speed sensor and G and yaw rate sensor.

PROBABLE CAUSES
- Improper installation of steering wheel sensor
- Malfunction of steering wheel sensor
- Malfunction of G and yaw rate sensor
- Malfunction of wheel speed sensor
- Malfunction of 4WD-ECU
- Vehicle straight-ahead position and steering wheel neutral position is not matched.

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1219 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III diagnosis code.

Q: Is diagnosis code No.C2205 set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III diagnosis code.

Check if the wheel speed sensor-related, G and yaw rate sensor-related, or steering wheel sensor-related diagnosis code is set.

Q: Is the diagnosis code set?

YES : Carry out the appropriate troubleshooting. Then go to Step 9.

NO : Go to Step 5.

STEP 5. Check of steering wheel sensor installation status

Check that the steering wheel sensor is installed correctly (Refer to GROUP 35C – Steering Wheel Sensor).

Q: Is the check result normal?

YES : Go to Step 6.

NO : Install the steering wheel sensor correctly. Then go to Step 6.

STEP 6. Wheel alignment check

Q: Is the check result normal?

YES : After checking the wheel alignment, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU(Refer to P.27C-48). Then, go to Step 7.

NO : After adjusting the wheel alignment, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU(Refer to P.27C-48). Then, go to Step 7.

STEP 7. M.U.T.-III data list.

Check the following data list (Refer toP.27C-45).

- Item No.8: Steering angle sensor

Q: Is the check result normal?

YES : Go to Step 8.

NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then, go to Step 9.

STEP 8. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1219 set?

YES : Replace the 4WD-ECU (Refer to P.27C-51). Then, go to Step 9 .

NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 9. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1219 set?

YES : Return to Step 1.

NO : This diagnosis is complete.

Code No.C121A: Steering Wheel Sensor Initialization <ASC>

⚠ CAUTION

- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**

OPERATION

Steering wheel sensor stores the neutral position learned by the M.U.T.-III. When the neutral position has not been learned, the steering wheel sensor outputs the signal indicating that the learning has not been performed.

DIAGNOSIS CODE SET CONDITION

This diagnosis code is set when the abnormality below is detected:

- the steering wheel sensor has not learned the neutral position

PROBABLE CAUSES

- Steering wheel sensor neutral point not learned
- Malfunction of steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C121A set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Steering wheel sensor calibration.
Perform calibration of the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service).

Q: Has the calibration succeeded?
YES : Go to Step 4.
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then, go to Step 4.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C121A set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then, go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C121A set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C123C: Sensor Cluster Malfunction <ASC>

⚠ CAUTION

- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**
- **When hydraulic unit (integrated with G and yaw rate sensor) is replaced, calibrate G and yaw rate sensor (Refer to GROUP 35C – On-vehicle Service .)**

OPERATION

4WD-ECU receives the G and yaw rate sensor data from ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITIONS

This diagnosis code is set when the abnormality below is detected:

- Abnormality in G and yaw rate sensor output value
- Abnormality is detected by a comparison of output value from the G and yaw rate sensor with the output values from wheel speed sensor and steering wheel sensor.

PROBABLE CAUSES

- Malfunction of G and yaw rate sensor
- Malfunction of wheel speed sensor
- Improper installation of steering wheel sensor
- Malfunction of steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C123C set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III diagnosis code.
Check the ASC diagnosis code. (Refer to GROUP 35C – Troubleshooting).

Q: Is the check result normal?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III other system diagnosis code.
Check if the wheel speed sensor-related, or steering wheel sensor-related diagnosis code is set.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 5.

STEP 5. Check of hydraulic unit (integrated with G and yaw rate sensor) installation status.
Check that the hydraulic unit (integrated with G and yaw rate sensor) is installed correctly (Refer to GROUP 35C – Hydraulic unit (integrated with G and yaw rate sensor)).

Q: Is the check result normal?
YES : Go to Step 6.
NO : Reinstall the hydraulic unit (integrated with G and yaw rate sensor) correctly. Then go to Step 6.

STEP 6. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.22: Yaw rate sensor
- Item No.23: Lateral G sensor

Q: Is the check result normal?
YES : Go to Step 7.
NO : Replace the hydraulic unit (integrated with G and yaw rate sensor) is installed correctly (Refer to GROUP 35C – Hydraulic unit (integrated with G and yaw rate sensor)). Then go to Step 11.

STEP 7. Check of steering wheel sensor installation status.
Check that the steering wheel sensor is installed correctly (Refer to GROUP 35C – Steering Wheel Sensor).

Q: Is the check result normal?
YES : Go to Step 8.
NO : Install the steering wheel sensor correctly. Then go to Step 8.

STEP 8. Wheel alignment check.

Q: Is the check result normal?
YES : After checking the wheel alignment, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU(Refer to P.27C-48). Then go to Step 9.
NO : After adjusting the wheel alignment, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU(Refer to P.27C-48). Then go to Step 9.

STEP 9. M.U.T.-III data list.
Check the following data list (Refer toP.27C-45).
- Item No.8: Steering angle sensor

Q: Is the check result normal?
YES : Go to Step 10.
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then go to Step 10.

STEP 10. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C123C set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 11.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 11. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C123C set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1242: Straight G Sensor Signal

⚠ CAUTION

- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When hydraulic unit (integrated with G and yaw rate sensor) is replaced, calibrate G and yaw rate sensor (refer to GROUP 35C – On-vehicle Service)**

OPERATION

4WD-ECU receives the G and yaw rate sensor data from ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITIONS

This diagnosis code is set when the abnormality below is detected:

- Abnormality in G and yaw rate sensor output value
- The abnormality is detected by comparing the longitudinal G-sensor value output from the G and yaw rate sensor with the value output from the wheel speed sensor.

PROBABLE CAUSES

- Malfunction of G and yaw rate sensor
- Malfunction of wheel speed sensor
- Malfunction of stop lamp switch
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1242 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III other system diagnosis code.
Check if the wheel speed sensor-related diagnosis code is set.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. Check of hydraulic unit (integrated with G and yaw rate sensor) installation status.
Check that the hydraulic unit (integrated with G and yaw rate sensor) is installed correctly (Refer to GROUP 35B – Hydraulic unit (integrated with G and yaw rate sensor) <Vehicles with ABS>GROUP 35C – Hydraulic unit (integrated with G and yaw rate sensor) <Vehicles with ASC>).

Q: Is the check result normal?
YES : Go to Step 5.
NO : Reinstall the hydraulic unit (integrated with G and yaw rate sensor) correctly. Then go to Step 5.

STEP 5. M.U.T.-III data list.
Check the following data list (Refer toP.27C-45).

- Item No.24: Longitudinal G sensor

Q: Is the check result normal?
YES : Go to Step 6.
NO : Replace the hydraulic unit (integrated with G and yaw rate sensor) (Refer to GROUP 35B – Hydraulic unit (integrated with G and yaw rate sensor) <Vehicles with ABS> or GROUP 35C – Hydraulic unit (integrated with G and yaw rate sensor) <Vehicles with ASC>). Then go to Step 7.

STEP 6. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1242 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 7.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 7. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1242 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1610: 4WD Actuator Power Supply Relay

OPERATION
A relay is incorporated in 4WD-ECU, and the power is supplied to the actuator via this relay.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- Battery power supply voltage is less than 6 V.
- Abnormal voltage in the 4WD-ECU.

PROBABLE CAUSES
- Malfunction of 4WD-ECU
- Malfunction of electronic control coupling solenoid
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the wiring harness between electronic control coupling solenoid connector and 4WD-ECU connector terminal SOL+, SOL-.
Check the power supply or earth line for short circuit.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector or the wiring harness.

STEP 2. Check of the electronic control coupling solenoid
Refer to P.27C-49.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the electronic control coupling (Refer to P.27C-53).

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1610 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1610 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1613: 4WD Mode Switch Stuck

OPERATION
The 4WD-ECU controls the driving mode by the signal from the 4WD switch.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The 4WD switch is stuck on

PROBABLE CAUSES
- 4WD switch malfunction
- Damaged harness wires and connectors
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list
Check the following data list (Refer to P.27C-45).
- Item No.41: Mode SW

Q: Is the check result normal?
YES : Go to Step 4.
NO : Go to Step 2.

STEP 2. Check the wiring harness between 4WD switch connector and 4WD-ECU connector terminal sw-1.
Check the output line for short circuit.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the defective connector or the wiring harness.

STEP 3. 4WD switch inspection
Refer to P.27C-52.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the 4WD switch (Refer to P.27C-52). Then go to Step 5.

STEP 4. Check whether the diagnosis code is reset.

Q: Is the diagnosis code No.C1613 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is the diagnosis code No.C1613 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1614: Parking Brake Switch Stuck On

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
The 4WD-ECU receives the parking brake switch signal from the combination meter via CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The parking brake switch is stuck on

PROBABLE CAUSES
- Parking brake switch malfunction
- Damaged harness wires and connectors
- Combination meter malfunction
- Malfunction of 4WD-ECU
- Driving with parking brake ON

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1614 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III data list.
Check the following data list (Refer toP.27C-45).
- Item No.29: Parking brake SW (CAN input)

Q: Is the check result normal?
YES : Go to Step 7.
NO : Go to Step 4.

STEP 4. Check the parking brake switch.
Check the parking brake switch (Refer to GROUP 36 – On-vehicle Service).

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the parking brake switch. (Refer to GROUP 36 – Parking Brake Lever). Then go to Step 7.

STEP 5. Check the wiring harness between combination meter connector and parking brake switch connector.
Check the power supply line for short circuit.

Q: Is the check result normal?
YES : Replace the combination meter (Refer to GROUP 54A – Combination Meter). Then go to Step 6.
NO : Repair the defective connector or the wiring harness. Then go to Step 6.

STEP 6. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1614 set?

YES : Replace the 4WD-ECU. (Refer to P.27C-51). Then go to Step 7.
NO : Intermittent malfunction. (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 7. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1614 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1616: Cranking Signal Stuck

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU receives the signal of the ignition switch from ETACS-ECU via CAN communication.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The cranking signal is set for 5 seconds or more continuously while driving

PROBABLE CAUSES
- Malfunction of the ETACS-ECU
- Ignition switch malfunction
- Damaged harness wires and connectors
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.
YES : Go to Step 7.
NO : Repair the defective connector or the wiring

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1616 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III other system diagnosis code.
- Check the KOS diagnosis code (Refer to GROUP 42B – Troubleshooting) <Vehicles with KOS>.
- Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the following data list (Refer toP.27C-45).
- Item No.30: Ignition SW (CAN input)

Q: Is the check result normal?
YES : Go to Step 8.
NO : Go to Step 5.

STEP 5. Ignition switch check
(1) Disconnect ignition switch connector, and check the continuity between the power supply and start signal at the ignition switch side.
(2) Turn the ignition switch to the "ON" position.

OK: No continuity

Q: Is the check result normal?
YES : Go to Step 6.
NO : Replace the ignition switch. (Refer to GROUP 54A – Ignition Switch). Then go to Step 9.

STEP 6. Check of short circuit in start signal line between ignition switch connector and ETACS-ECU connector.

Q: Is the check result normal?
harness. Then go to Step 9.

STEP 7. M.U.T.-III data list.
Check the data list of the ETACS (Refer to GROUP 54A – ETACS).
- Item No.287: Starter switch

Q: Is the check result normal?
YES : Go to Step 8.
NO : Replace the ETACS-ECU. Then go to Step 8.

STEP 8. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1616 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 9 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 9. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1616 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1621: 4WD Actuator Protection

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
The 4WD-ECU calculates the electronic control coupling temperature by the information of the electronic control coupling control amount, outside temperate, etc. If it is detected that the electronic control coupling temperature becomes extremely high, the high fluid temperature warning is displayed on the warning indicator.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The control is suspended to protect the electronic control coupling.

PROBABLE CAUSES
- Electronic control coupling protection control status
- Severe driving
- Electronic control coupling failure (clutch slippage, etc.)
- Outside temperature signal failure
- Wheel speed signal failure
- Engine-related failure (engine speed signal failure)
- Ignition off time signal failure

DIAGNOSIS PROCEDURE

STEP 1. Check whether the diagnosis code is reset.
(1) To release the electronic control coupling (Centre) protection control, leave the vehicle for 15 minutes or longer after the high fluid temperature warning on the warning indicator disappears.
(2) Erase the diagnosis code.
(3) Carry out the test drive.
NOTE: Do not carry out the severe test drive.
(4) Check if the diagnosis code is set.

Q: Is diagnosis code No.C1621 set?
YES : Go to Step 2.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 2. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1621 set?
YES : Go to Step 4.
NO : This diagnosis is complete.

STEP 4. M.U.T.-III data list
Check the following data list (Refer to P.27C-45).
- Item No.12: Engine speed

Q: Is the check result normal?
YES : Go to Step 5.
NO : Perform the troubleshooting for the engine (Refer to GROUP 13A – Troubleshooting).

STEP 5. M.U.T.-III data list
Check the following data list (Refer to P.27C-45).
- Item No.18: FL Wheel speed sensor
- Item No.19: FR Wheel speed sensor
- Item No.20: RL Wheel speed sensor
- Item No.21: RR Wheel speed sensor

Q: Is the check result normal?
YES : Go to Step 6.
NO : Perform the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

STEP 6. M.U.T.-III data list
Check the following data list (Refer to P.27C-45).
- Item No.34: Ambient temperature (CAN input)
- Item No.35: Ignition off time (CAN input)

Q: Is the check result normal?
YES : Go to Step 7.
NO : Perform the troubleshooting for the ETACS (Refer to GROUP 54A – ETACS, Troubleshooting).

STEP 7. Check of the electronic control coupling
Refer to P.27C-49.

Q: Is the check result normal?
YES : Go to Step 8.
NO : Replace the electronic control coupling (Refer to P.27C-53).

STEP 8. Check whether the diagnosis code is reset.
(1) To release the electronic control coupling protection control, leave the vehicle for 15 minutes or longer after the high fluid temperature warning on the warning indicator disappears.
(2) Erase the diagnosis code.
(3) Carry out the test drive.
NOTE: Do not carry out the severe test drive.
(4) Check if the diagnosis code is set.

Q: Is diagnosis code No.C1621 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51).
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

Code No.C1624: 4WD-ECU Internal

OPERATION
4WD-ECU monitors the malfunction in the ECU.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- RAM/ROM/EEPROM of 4WD-ECU has a failure.

PROBABLE CAUSES
- Malfunction of 4WD-ECU
- Damaged harness wires and connectors

Code No. C1626: 4WD Voltage Failure

OPERATION
The 4WD-ECU monitors the actuator power supply voltage.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Electronic control coupling solenoid voltage monitor value: 10 V or more.

PROBABLE CAUSES
- Malfunction of electronic control coupling solenoid
- Damaged harness wires and connectors
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. Check the wiring harness between electronic control coupling solenoid connector and 4WD-ECU connector terminal SOL+, SOL-.
Check the power supply, earth line for short circuit (for short to the power supply).

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector or the wiring harness. Then go to Step 4.

STEP 2. Check of the electronic control coupling solenoid
Refer to P.27C-49.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the electronic control coupling (Refer to P.27C-53). Then go to Step 4.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1626 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1626 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1628: 4WD Current Failure

OPERATION
The 4WD-ECU monitors the current value of the electronic control coupling solenoid.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- Commanded current to the electronic control coupling does not correspond with the monitored current value.

PROBABLE CAUSES
- Malfunction of electronic control coupling solenoid
- Damaged harness wires and connectors
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. Check the wiring harness between electronic control coupling solenoid connector and 4WD-ECU connector terminal SOL+, SOL-.
Check the power supply, earth line for open or short circuit.

Q: Is the check result normal?
YES : Go to Step 2
NO : Repair the defective connector or the wiring harness. Then go to Step 4.

STEP 2. Check of the electronic control coupling solenoid
Refer to P.27C-49.

Q: Is the check result normal?
YES : Go to Step 3
NO : Replace the electronic control coupling (Refer to P.27C-53). Then go to Step 4.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1628 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1628 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1629: ASC Timeout <ASC>

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the ASC-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The CAN signal of the ASC-ECU cannot be received.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Damaged connectors (ASC-ECU)
- Malfunction of ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1629 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1629 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1630: Steering Wheel Sensor Timeout <ASC>

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**

OPERATION
4WD-ECU communicates with the steering wheel sensor via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The CAN signal of the steering wheel sensor cannot be received.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Damaged connectors (steering wheel sensor)
- Malfunction of the steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.8: Steering angle sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1630 set?
YES : Replace the 4WD-ECU.(Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction. (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1630 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1631: ETACS Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the ETACS-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The CAN signal of the ETACS-ECU cannot be received.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Damaged connectors (ETACS-ECU)
- ETACS-ECU malfunction
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1631 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1631 set?

YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1632: Engine Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the engine-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- The CAN signal of the engine-ECU cannot be received.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Damaged connectors (Engine-ECU)
- Malfunction of Engine-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. M.U.T.-III other system diagnosis code.
Check the engine diagnosis code (Refer to GROUP 13A –Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1632 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1632 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. C1633: T/M Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU communicates with CVT-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:

- the CAN signal of the CVT-ECU cannot be received.

PROBABLE CAUSES

- Malfunction of the CAN bus line
- Damaged connectors (CVT-ECU)
- Malfunction of CVT-ECU
- Malfunction of 4WD-ECU
- Coding failure

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the CVT diagnosis code (Refer to GROUP 23A – CVT, Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. ETACS-ECU coding data check.
Check the transmission coding data stored in ETACS-ECU for any abnormality (Refer to GROUP 00 – Coding Reference Table).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the ETACS-ECU. Then go to Step 5.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1633 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1633 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C1707: Implausible Coding Data

⚠ CAUTION

- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the communication circuit is normal.**
- **When the diagnosis code No.C1707 is set in 4WD-ECU, the diagnosis code may also be set in ETACS-ECU. When the diagnosis code is set in ETACS-ECU, perform the diagnosis of the diagnosis code for ETACS-ECU first.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION

4WD-ECU receives the vehicle information stored in ETACS-ECU via CAN bus lines.

DIAGNOSIS CODE SET CONDITION

This diagnosis code is set when the abnormality below is detected:

- The vehicle information received from ETACS-ECU is not correct.

PROBABLE CAUSES

- Malfunction of the CAN bus line
- ETACS-ECU malfunction
- Malfunction of 4WD-ECU
- ETACS-ECU has been interchanged between two vehicles.

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. ETACS-ECU coding data check
Using the M.U.T.-III, check if there is the engine-related, T/M-related, ASC-related abnormality to the coding data stored in the ETACS-ECU (Refer to GROUP 00 – Coding Reference Table).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair the coding data or replace ETACS-ECU. Then go to Step 6.

STEP 4. Check the part number of ETACS-ECU
Check the part number of ETACS-ECU.

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the ETACS-ECU (Refer to GROUP 54A – ETACS-ECU), and then go to Step 6.

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1707 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 6 .
NO : Intermittent malfunction. (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 6. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C1707 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C2100: Power supply low voltage

⚠ CAUTION
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU power supply is provided from the battery via ETACS-ECU.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- Voltage between the battery and ETACS-ECU: Less than 9 V

PROBABLE CAUSES
- Battery failure
- Malfunction of charging system
- Malfunction of ETACS-ECU (power supply circuit system)
- Damaged harness wires and connectors
- Malfunction of electronic control coupling solenoid
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 2.

STEP 2. Check the battery.
Refer to GROUP 54A – Battery Test .

Q: Is the check result normal?
YES : Go to Step 4.
NO : Charge or replace the battery. Then go to Step 3.

STEP 3. Check the charging system.
Refer to GROUP 16 – Charging System .

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair or replace the charging system component(s).

STEP 4. Voltage measurement at 4WD-ECU connector
Disconnect the connector, and measure the voltage between terminal BAtt and body earth at the wiring harness side.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair the defective connector or the wiring harness. Then go to Step 5.

STEP 5. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.31: Battery voltage (CAN input)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the ETACS-ECU. Then go to Step 10.

STEP 6. Check the wiring harness between 4WD-ECU connector terminal GND1 and body earth.
Check the earth line for open circuit.

Q: Is the check result normal?
YES : Go to Step 7.
NO : Repair the defective connector or the wiring harness. Then go to Step 10.

STEP 7. Check the wiring harness between electronic control coupling solenoid connector and 4WD-ECU connector terminal SOL+, SOL-.
Check the power supply, earth line for short circuit.

Q: Is the check result normal?
YES : Go to Step 8.
NO : Repair the defective connector or the wiring harness. Then go to Step 10.

STEP 8. Check of the electronic control coupling solenoid
Refer to P.27C-49.

Q: Is the check result normal?
YES : Go to Step 9.
NO : Replace the electronic control coupling (Refer to P.27C-53). Then go to Step 10.

STEP 9. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.31: Battery voltage (CAN input)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 10.

STEP 10. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C2100 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C2101: Power supply high voltage

OPERATION
4WD-ECU power supply is provided from the battery via ETACS-ECU.

DIAGNOSIS CODE SET CONDITIONS
This diagnosis code is set when the abnormality below is detected:
- Voltage between the battery and ETACS-ECU: More than 18 V

PROBABLE CAUSES
- Malfunction of charging system
- Loose battery terminal
- Damaged harness wires and connectors
- Malfunction of 4WD-ECU
- ETACS-ECU malfunction

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 2.

STEP 2. Battery terminal check
Check that the battery terminal is not loose.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Securely install the battery terminal. Then go to Step 3.

STEP 3. Check the charging system.
Refer to GROUP 16 – Charging System .

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair or replace the charging system component(s).

STEP 4. Check the battery.
Refer to GROUP 54A – Battery Test .

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the battery. Then go to Step 5.

STEP 5. Voltage measurement at 4WD-ECU connector
Disconnect the connector, and measure the voltage between terminal BATT and body earth at the wiring harness side.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair the defective connector or the wiring harness. Then go to Step 7.

STEP 6. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.31: Battery voltage (CAN input)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 7.

STEP 7. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C2101 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.C2205: Steering Wheel Sensor Internal Error

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**

OPERATION
4WD-ECU communicates with the steering wheel sensor via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The failure status information by the self-diagnosis of the steering wheel sensor.

PROBABLE CAUSES
- Malfunction of the steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C2205 set?
YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.8: Steering angle sensor

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then go to Step 5.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C2205 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.C2205 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0100: Engine CAN Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the engine-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The signal sent from the engine-ECU cannot be received for a certain period.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of power supply circuit system (engine-ECU)
- Malfunction of ECU (engine-ECU)
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. M.U.T.-III other system diagnosis code.
Check the engine diagnosis code (Refer to GROUP 13A –Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0100 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0100 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0101: T/M CAN Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU communicates with CVT-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The signal sent from the CVT-ECU cannot be received for a certain period.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of power supply circuit system (CVT-ECU)
- Malfunction of ECU (CVT-ECU)
- Malfunction of 4WD-ECU
- ETACS coding failure

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the CVT diagnosis code (Refer to GROUP 23A – CVT, Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. ETACS-ECU coding data check.
Check the transmission coding data stored in ETACS-ECU for any abnormality (Refer to GROUP 00 – Coding Reference Table).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the ETACS-ECU. Then go to Step 5.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0101 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0101 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0121: ABS/ASC CAN Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the ABS/ASC-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION

This diagnosis code is set when the abnormality below is detected:

- The signal sent from the ABS/ASC-ECU cannot be received for a certain period.

PROBABLE CAUSES

- Malfunction of the CAN bus line
- Malfunction of power supply circuit system (ABS/ASC-ECU)
- Malfunction of ECU (ABS/ASC-ECU)
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0121 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0121 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0126: Steering Wheel Sensor CAN Timeout <ASC>

⚠ CAUTION

- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**

OPERATION

4WD-ECU communicates with the steering wheel sensor via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION

This diagnosis code is set when the abnormality below is detected:

- The signal sent from the steering wheel sensor cannot be received for a certain period.

PROBABLE CAUSES

- Malfunction of the CAN bus line
- Malfunction of power supply circuit system (steering wheel sensor)
- Malfunction of the steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).

- Item No.8: Steering angle sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0126 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0126 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No. U0141: ETACS CAN Timeout

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the ETACS-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The signal sent from the ETACS-ECU cannot be received for a certain period.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of power supply circuit system (ETACS-ECU)
- Malfunction of ECU (ETACS-ECU)
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines. (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0141 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0141 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0401: Engine CAN Message

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the engine-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Abnormality is detected in the signal received from the engine-ECU.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Engine malfunction
- Malfunction of engine-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III diagnosis code.
Check the engine diagnosis code (Refer to GROUP 13A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.12: Engine speed

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Go to Step 4.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0401 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0401 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0428: Steering Wheel Sensor CAN Message <ASC>

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the steering wheel sensor is replaced, calibrate the steering wheel sensor (Refer to GROUP 35C – On-vehicle Service), and reset the steering wheel sensor correction amount stored in the 4WD-ECU. (Item No. 1: SAS adjusted value P.27C-48).**

OPERATION
4WD-ECU communicates with the steering wheel sensor via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Abnormality is detected in the signal received from the steering wheel sensor.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of the steering wheel sensor
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.8: Steering angle sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Replace the steering wheel sensor (Refer to GROUP 35C – Steering Wheel Sensor). Then go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0428 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0428 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U0431: ETACS CAN Message

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU communicates with the ETACS-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Abnormality is detected in the signal received from ETACS-ECU.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of ETACS-ECU power supply circuit system
- ETACS-ECU malfunction
- Malfunction of 4WD-ECU
- Coding not implemented

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III diagnosis code.
Check if diagnosis code No.U1195 is set (Refer to P.27C-37).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the ETACS data list below (Refer to GROUP 54A – ETACS).
- Item No.252: Ambient temperature sensor
- Item No.254: IG voltage

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the ETACS-ECU. Then go to Step 5.

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0431 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 6.
NO : Intermittent malfunction. (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 6. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U0431 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U1073: Bus-Off

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- CAN C-bus off interruption is detected.

PROBABLE CAUSES
- The CAN bus line is defective.
- Malfunction of 4WD-ECU
- ECU malfunction of other system

Code No.U1195: Coding not Completed

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the diagnosis code No.U1195 is set in 4WD-ECU, the diagnosis code may also be set in ETACS-ECU. When the diagnosis code is set in ETACS-ECU, perform the diagnosis of the diagnosis code for ETACS-ECU first.**
- **When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID .)**

OPERATION
4WD-ECU receives the vehicle information stored in ETACS-ECU via CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Coding has not been performed.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Coding not implemented

- ETACS-ECU malfunction
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ETACS diagnosis code (Refer to GROUP 54A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. ETACS-ECU coding data check
Using the M.U.T.-III, check if there is the engine-related, T/M-related, ASC-related abnormality to the coding data stored in the ETACS-ECU (Refer to GROUP 00 – Coding Reference Table).

Q: Is the check result normal?
YES : Go to Step 4.
NO : Replace the ETACS-ECU. Then go to Step 5.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1195 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1195 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U119A: Chassis No. mismatch

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **When the diagnosis code No.U119A is set in 4WD-ECU, the diagnosis code may also be set in ETACS-ECU. When the diagnosis code is set in ETACS-ECU, perform the diagnosis of the diagnosis code for ETACS-ECU first.**

OPERATION
4WD-ECU receives the chassis number stored in ETACS-ECU via CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- The chassis number received from ETACS-ECU is not correct.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Chassis number not written
- ETACS-ECU malfunction
- Malfunction of engine-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics
Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code
Check the engine diagnosis code (Refer to GROUP 13A – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U119A set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 4.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U119A set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U1425: T/M CAN Message

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with CVT-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Abnormality is detected in the gear shift signal received from the CVT-ECU.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of CVT-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the CVT diagnosis code (Refer to GROUP 23A – CVT, Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III data list.
Check the following data list (Refer to P.27C-45).
- Item No.13: A/T Gear position

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Go to Step 4.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1425 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1425 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U1427: Implausible Wheel Speed Data

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**

OPERATION
4WD-ECU communicates with the ABS/ASC-ECU via the CAN bus lines.

DIAGNOSIS CODE SET CONDITION
This diagnosis code is set when the abnormality below is detected:
- Abnormality is detected in the wheel speed sensor signal received from the ABS/ASC-ECU.

PROBABLE CAUSES
- Malfunction of the CAN bus line
- Malfunction of the wheel speed sensor
- Malfunction of ABS/ASC-ECU
- Malfunction of 4WD-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ABS diagnosis code (Refer to GROUP 35B – Troubleshooting) <Vehicles with ABS> or the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting) <Vehicles with ASC>.

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III data list.
Check the data list of the relevant wheel speed sensor (Refer to P.27C-45).
- Item No.18: FL Wheel speed sensor
- Item No.19: FR Wheel speed sensor
- Item No.20: RL Wheel speed sensor
- Item No.21: RR Wheel speed sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).
NO : Go to Step 4.

STEP 4. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1427 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1427 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

Code No.U1428: Sensor Cluster CAN Message <ASC>

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnosis code may be set. Prior to this diagnosis, diagnose the CAN bus lines.**
- **Whenever the ECU is replaced, ensure that the CAN bus lines are normal.**
- **Do not drop the G and yaw rate sensor or subject it to a shock.**
- **When G and yaw rate sensor is replaced, calibrate G and yaw rate sensor (refer to GROUP 35C – On-vehicle Service)**

OPERATION
4WD-ECU receives the G and yaw rate sensor data from ASC-ECU via the CAN communication.

DIAGNOSIS CODE SET CONDITIONS

This diagnosis code is set when the abnormality below is detected:

- Abnormality is detected in the G and yaw rate sensor signal received from the ASC-ECU.

PROBABLE CAUSES

- Malfunction of G and yaw rate sensor
- Malfunction of G and yaw rate sensor power supply
- Damaged connector(s)
- Malfunction of the CAN bus line
- Malfunction of 4WD-ECU
- Malfunction of ASC-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the CAN bus lines. (Refer to GROUP 54C – Troubleshooting).

STEP 2. M.U.T.-III other system diagnosis code.
Check the ASC diagnosis code (Refer to GROUP 35C – Troubleshooting).

Q: Is the diagnosis code set?
YES : Perform the relevant troubleshooting.
NO : Go to Step 3.

STEP 3. M.U.T.-III diagnosis code.
Check if the diagnosis code No.C123C, C1242 is set (Refer to P.27C-8).

Q: Is the check result normal?
YES : Perform the relevant troubleshooting.
NO : Go to Step 4.

STEP 4. M.U.T.-III data list.
Check the data list below (Refer to P.27C-45).

- Item No.22: Yaw rate sensor
- Item No.23: Lateral G sensor
- Item No.24: Longitudinal G sensor

Q: Is the check result normal?
YES : Go to Step 5.
NO : Replace the hydraulic unit (Refer to GROUP 35C – Hydraulic unit (integrated with G and yaw rate sensor)). Then go to Step 6.

STEP 5. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1428 set?
YES : Replace the 4WD-ECU (Refer to P.27C-51). Then go to Step 6.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

STEP 6. Check whether the diagnosis code is reset.

Q: Is diagnosis code No.U1428 set?
YES : Return to Step 1.
NO : This diagnosis is complete.

TROUBLE SYMPTOM CHART

M1274000900127

⚠ CAUTION
During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Trouble symptom	Inspection procedure	Reference pages or actions
M.U.T.-III cannot communicate with the electronically controller 4WD system.	1	P.27C-42
Shifting the 4WD switch does not change the mode	2	P.27C-43
The tight corner braking phenomenon* appears with the 4WD switch in the 4WD ECO or 4WD AUTO position. *NOTE: The vehicle is tuned so that the tight corner braking phenomenon appears at a certain level with the drive mode in the LOCK position.*	3	P.27C-44

Trouble symptom	Inspection procedure	Reference pages or actions
No diagnosis code is set even when the 4WD-E/LOCK indicator lamps flash.	4	P.27C-45

*NOTE: *Tight corner braking phenomenon: When a 4WD vehicle makes sharp cornering in a paved road at low speed (ex. parallel parking), there is a difference in turning radius between front and rear wheels. If such a difference can no longer be compensated by tyre slippage, the vehicle behaves as if it is under braking.*

SYMPTOM PROCEDURES

Inspection Procedure 1: M.U.T.-III cannot Communicate with the Electronically Controller 4WD System.

COMMENTS ON TROUBLE SYMPTOM

If M.U.T.-III cannot communicate with the electronically controlled 4WD system, the CAN bus lines may have a problem. If the electronically controller 4WD system is not in operation (in case of no 4WD operation), the 4WD-ECU power supply circuit system or 4WD-ECU may have a problem.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- 4WD-ECU malfunction

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics

Use M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting/CAN Bus Diagnostics Table). On completion, go to Step 2.

STEP 2. Voltage measurement at the 4WD-ECU connector

(1) Disconnect the 4WD-ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the 4WD-ECU wiring harness side connector terminals BATT, IG1 (Ignition switch "ON") and the body earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the connector(s) or terminal(s) or wiring harness.

STEP 3. Resistance measurement at the 4WD-ECU connector

(1) Disconnect the 4WD-ECU connector.
(2) Measure the resistance between the 4WD-ECU wiring harness side connector terminals No. GND1 and the body earth.

OK: Continuity exists (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the connector(s) or terminal(s) or wiring harness.

STEP 4. Retest the system.

Q: Does the malfunction occur again?

YES : Replace 4WD-ECU (Refer to P.27C-51). Then go to Step 5 .

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/How to Cope with Intermittent Malfunctions).

STEP 5. Retest the system.

Q: Does the malfunction occur again?

YES : Diagnose again from Step 1.

NO : This diagnosis is complete.

Inspection Procedure 2: Shifting the 4WD Switch does not Change the Mode.

COMMENTS ON TROUBLE SYMPTOM

- If the drive mode cannot be switched by pushing the 4WD switch, the 4WD switch, the wiring harness wires between the 4WD-ECU and the 4WD switch, the wiring harness wire in the earth circuit for the 4WD switch, the 4WD-ECU or the combination meter may have a problem.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of 4WD switch
- 4WD-ECU malfunction
- Combination meter malfunction

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III CAN bus diagnostics.
Use M.U.T.-III to perform the CAN bus diagnosis.

Q: Is the check result normal?
YES : Go to Step 3
NO : Repair the CAN bus lines (Refer to GROUP 54C – Troubleshooting). After repairing the CAN bus line, go to Step 2.

STEP 2. Retest the system.

Q: Does the malfunction occur again?
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/How to Cope with Intermittent Malfunctions).
NO : Go to Step 3

STEP 3. M.U.T.-III actuator test.
Combination meter item No.5: Meter illumination (Refer to GROUP 54A – Combination Meter).

Q: Is the check result normal?
YES : Go to Step 4
NO : Replace the combination meter. (Refer to GROUP 54A – Combination Meter). Then go to Step 8.

STEP 4. Resistance measurement between the 4WD switch connector terminals
(1) Remove the 4WD switch (Refer to P.27C-52).
(2) Measure the resistance between the terminals (Refer to P.27C-52).

Q: Is the check result normal?
YES : Go to Step 5
NO : Replace the 4WD switch (Refer to P.27C-52). Then go to Step 8.

STEP 5. Wiring harness check
(1) Check the wiring harness between the 4WD-ECU connector (terminal sw-1) and the 4WD switch connector.
(2) Check the connector(s) or terminal(s) or wiring harness above for damage or other problem.

Q: Is the check result normal?
YES : Go to Step 6
NO : Repair the connector(s) or terminal(s) or wiring harness.

STEP 6. Resistance measurement at the 4WD switch connector
(1) Disconnect the 4WD switch connector.
(2) Measure the resistance between the 4WD switch wiring harness side connector and the body earth.

OK: Continuity exists (2 Ω or less)

Q: Is the check result normal?
YES : Go to Step 7
NO : Repair the connector(s) or terminal(s) or wiring harness.

STEP 7. M.U.T.-III data list.
Check the following data list. (Refer to P.27C-45).
- Item 1: AWC (4WD) control mode

Q: Is the check result normal?
YES : Go to Step 9
NO : Go to Step 8

STEP 8. Retest the system.

Q: Does the malfunction occur again?
YES : Replace 4WD-ECU (Refer to P.27C-51). Then go to Step 9 .
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/How to Cope with Intermittent Malfunctions).

STEP 9. Retest the system.

Q: Does the malfunction occur again?

YES : Troubleshoot the combination meter multi information display (Refer to GROUP 54A – Troubleshooting/CAN Bus Diagnostics Table). Then diagnose again from Step 1.
NO : This diagnosis is complete.

Inspection Procedure 3: The Tight Corner Braking Phenomenon* Appears with the 4WD switch in the 4WD ECO or 4WD AUTO Position.

NOTE:
- **Tight corner braking phenomenon: When a 4WD vehicle makes sharp cornering in a paved road at low speed (ex. parallel parking), there is a difference in turning radius between front and rear wheels. If such a difference can no longer be compensated by tyre slippage, the vehicle behaves as if it is under braking.*
- *The vehicle is tuned so that the tight corner braking phenomenon appears at a certain level with the drive mode in the LOCK position.*

COMMENTS ON TROUBLE SYMPTOM

If the tight corner braking phenomenon occurs only with the 4WD switch being on the 4WD ECO, 4WD AUTO position, the data received by 4WD-ECU from each ECU, the electronic control coupling, or 4WD-ECU may have a problem.

PROBABLE CAUSES

- Malfunction of electronic control coupling
- Malfunction of data transmitted from ABS or ASC system
- Malfunction of data transmitted from the engine control system
- Wheel speed sensor malfunction
- Steering wheel sensor malfunction
- 4WD-ECU malfunction
- 4WD switch malfunction

DIAGNOSIS PROCEDURE

STEP 1. Check for the tight corner braking phenomenon occurrence during driving on a flat road

Check if the tight corner braking phenomenon occurs during driving on a flat road with the 4WD switch being on the 4WD ECO or 4WD LOCK position.

Q: Does the tight corner braking phenomenon occur?
YES : Go to Step 2.
NO : This diagnosis is complete.

STEP 2. Wiring harness check

(1) Check the wiring harness between the 4WD-ECU connector (terminal SOL+, SOL-) and the electronic control coupling solenoid connector for damage or other problem.
(2) Check the connector(s) or terminal(s) or wiring harness above for damage or other problem.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the connector(s) or terminal(s) or wiring harness.

STEP 3. M.U.T.-III data list

Check the data list for the items below (Refer to P.27C-45).
- Item No.8: Steering angle sensor
- Item No.11: Accelerator position
- Item No.18: FL wheel speed sensor
- Item No.19: FR wheel speed sensor
- Item No.20: RL wheel speed sensor
- Item No.21: RR wheel speed sensor
- Item No.22: Yaw rate sensor
- Item No.23: Lateral G sensor

Q: Is the check result normal?
YES : Go to Step 5.
NO : Perform the troubleshooting of the ABS system (Refer to GROUP 35B – Troubleshooting/Diagnosis Code Chart <Vehicles with ABS>), the ASC system (Refer to GROUP 35C – Troubleshooting/Diagnosis Code Chart <Vehicles with ASC>) or the engine control system (Refer to GROUP 13A – Troubleshooting/Inspection Chart for Diagnosis Code . Then go to Step 4.

STEP 4. Check for the tight corner braking phenomenon occurrence during driving on a flat road

Check if the tight corner braking phenomenon occurs during driving on a flat road with the 4WD switch being on the 4WD ECO.

Q: Does the tight corner braking phenomenon occur?

YES (Coil current in the electronic control coupling solenoid is 0 A) : Measure the coil current when the tight corner braking occurs. If the coil current measures 0 A, replace the electronic control coupling (Refer to P.27C-53). Then go to Step 5.

YES (Coil current in the electronic control coupling solenoid is other than 0 A) : Measure the coil current when the tight corner braking occurs. If the coil current is other than 0 A, go to Step 5.

NO : This diagnosis is complete. Then go to Step 6.

STEP 5. Retest the system.

Q: Does the malfunction occur again?

YES : Replace 4WD-ECU (Refer to P.27C-51). Then go to Step 6 .

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/How to Cope with Intermittent Malfunctions).

STEP 6. Retest the system.

Q: Does the malfunction occur again?

YES : Replace the electronic control coupling (Refer to P.27C-53). Then go to Step 7.

NO : This diagnosis is complete.

STEP 7. Retest the system.

Q: Does the malfunction occur again?

YES : Diagnose again from Step 1.

NO : This diagnosis is complete.

Inspection Procedure 4: No Diagnosis Code is set even when the 4WD-E/LOCK Indicator Lamps flash.

COMMENTS ON TROUBLE SYMPTOM

- In case that the 4WD-E/LOCK indicator flashes but no diagnosis code is set, the 4WD-ECU power supply circuit system may have a problem.
- If the 4WD-ECU power supply voltage is approximately 6 V or less when the system is in operation (always), the CPU of 4WD-ECU automatically shuts down. At this time, if the 4WD control is in operation, the system will switch the drive mode into 2WD gradually to protect the drive train. 4WD-ECU cannot set the diagnosis code because the CPU shuts down. In addition, the combination meter determines the 4WD-ECU time-out, and flashes both 4WD-E/LOCK indicators.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- 4WD-ECU malfunction

DIAGNOSIS PROCEDURE

STEP 1. Check if 4WD/LOCK Indicator Lamps flash simultaneously

(1) Turn the ignition switch from the "LOCK" (OFF) position to the "ON" position.

(2) Check that the 4WD-E/LOCK indicator lamps flash simultaneously when the drive mode selector is switched to 4WD ECO, or 4WD LOCK position.

Q: Does the 4WD-E/LOCK Indicator Lamps flash simultaneously?

YES :
- When the drive system fluid temperature warning display illuminates in the combination meter, cool down the electronic control coupling.
- When the drive system fluid temperature warning display does not illuminate in the combination meter, referring to "Inspection Procedure 1: M.U.T.-III cannot Communicate with the Electronically Controller 4WD System<ECU power supply circuit system check> ", perform the check P.27C-42.

NO : Referring to the Inspection Chart for Trouble Symptoms, perform the check P.27C-41.

DATA LIST REFERENCE TABLE

M1274001000161

M.U.T.-III can read the following items among various control data (input data from each ECU and switch) used by the electronic control 4WD system.

THE SYSTEM IS NORMAL.

Item No.	Display on M.U.T.-III	Check conditions	Normal condition
1	AWC control mode (4WD control mode)	4WD is selected (displayed on multi information display).	4WD ECO
			4WD AUTO
			4WD LOCK
5	Centre coupling current	Perform a test run of the vehicle.	0 – 3 A
6	AWC protection control (4WD protection control)	Correct	OFF
		Malfunction	ON
7	AWC system fail (4WD system fail)	Correct	OFF
		Malfunction	ON
8	Steering angle sensor	Steering wheel steered	Within a predetermined steering angle
9	Steering angle speed	Steering wheel: Without steering wheel operation	0 deg/s
		Steering wheel: With steering wheel operation	Changes depending on the turning speed.
10	Steering angle sensor (status)	Normal	Correct
		Faulty	Malfunction
		Neutral point not learned	Neutral not learned
		Neutral point not learned or failed	Neutral not learned and Malfunction
11	Accelerator position	Release the accelerator pedal	Approximately 0%
		Depress the accelerator pedal	0 – 100%
		Accelerator pedal fully opened	Approximately 100%
12	Engine speed	Idling and test run	0 – Maximum engine speed
13	A/T gear position	Gear range: P	P
		Gear range: R	R
		Gear range: N	N
		Gear range: 1st	1st
		Gear range: 2nd	2nd
		Gear range: 3rd	3rd
		Gear range: 4th	4th
		Gear range: 5th	5th
		Gear range: 6th	6th
		Gear range: 7th	7th

Item No.	Display on M.U.T.-III	Check conditions	Normal condition
14	FL wheel speed (raw value)	– (reference because of r/min)	–
15	FR wheel speed (raw value)		
16	RL wheel speed (raw value)		
17	RR wheel speed (raw value)		
18	FL wheel speed sensor	Perform a test run of the vehicle.	Nearly the same as the speedometer display
19	FR wheel speed sensor		
20	RL wheel speed sensor		
21	RR wheel speed sensor		
22	Yaw rate sensor	When the vehicle is stationary	Approximately 0 deg/s
		Perform a test run of the vehicle.	–90 – 90 deg/s
23	Lateral G sensor	Vehicle is stopped (horizontal state).	Approximately 0 m/s^2
		Perform a test run of the vehicle.	–10.24 – 10.08 m/s^2
24	Longitudinal G sensor	Vehicle is stopped (horizontal state).	Approximately 0 m/s^2
		Perform a test run of the vehicle.	–10.24 – 10.08 m/s^2
28	Brake switch (CAN input)	Brake pedal: Depressed	ON
		Brake pedal: Released	OFF
29	Parking brake SW (CAN input)	Parking brake lever: Pulled	ON
		Parking brake lever: Released	OFF
30	Ignition SW (CAN input)	Ignition switch: ACC	ACC
		Ignition switch: ON	ON
		Ignition switch: START	START
31	Battery voltage (CAN input)	Ignition switch: ON	6 – 17 V
32	IOD fuse (CAN input)	Fuse inserted	ON
		Fuse removed	OFF
33	Odometer (CAN input)	Ignition switch: ON	0 – 1,677,721.4 km
34	Ambient temperature (CAN input)	Ignition switch: ON	-30 °C – 85 °C
35	Ignition off time (CAN input)	After ignition switch: OFF for one minute or more, ignition switch: ON	0 – 254 min
38	IG1	Ignition switch: ON	ON
		Ignition switch: OFF	OFF
39	ECU power supply voltage	Ignition switch: ON	10 – 18.75 V
40	Output load voltage	Ignition switch: ON	10 – 18.75 V
41	Mode SW	4WD SW : OFF	OFF
		4WD SW : ON	ON
44	SAS (adjusted value)	Ignition switch: ON	–15 – 15 deg
45	Chassis Number writing counter	Ignition switch: ON	Writing count

Item No.	Display on M.U.T.-III	Check conditions		Normal condition
46	Chassis Number (original) lock	Ignition switch: ON	Locked	Lock
			Unlocked	Unlock
47	Mileage counter	Ignition switch: ON		Counter value
48	Coding counter	Ignition switch: ON		0 – 255 times

SYSTEM SHUT-DOWN

M.U.T.-III display data does not agree with the actual data when 4WD-ECU deactivates the 4WD control function by the fail-safe function.

SPECIAL FUNCTION

M1274013500011

RESET

Item No.	Display on M.U.T.-III	Initialization contents
1	SAS adjusted value	Resets the steering wheel sensor neutral position learned value.
3	Centre coupling estimated temp.	Reset the estimated temperature of centre coupling.

TEST

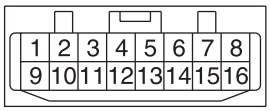
Item No.	Display on M.U.T.-III	Test content	Normal conditions
4	Control OFF	The electronic control coupling (centre) operation stops	Refer to the electronic control coupling (centre) operation check.
6	Centre coupling operation check	Drive the electronic control coupling (centre) with control current of 3 A.	Maximum 60 seconds

1. The test can be performed only when all the following conditions are satisfied.
   - Every wheel speed sensor input is 20 km/h or less.
   - No system malfunction is detected.
   - The steering angle of steering wheel is within ±30° from the neutral position.
2. With the test, when any of the conditions below is met, the forced activation will be cancelled.
   - Any of the wheel speed sensors detects an input of 20 km/h or more (excluding item No. 4 "Control OFF").
   - A system malfunction is detected.
   - The forced activation time has elapsed.
   - M.U.T.-III is removed.
   - M.U.T.-III clear key is operated.

The sensor neutral position learned value initialization can be performed only when the vehicle is stopped.

CHECK AT ECU TERMINALS

M1274001300139



ACB05609

Terminal No.	Terminal code	Inspection Item	Check condition		Normal condition
1	SOL+	Electronic control coupling solenoid (centre)	Using M.U.T.-III, perform "Test Item No. 4: Control OFF" of "SPECIAL FUNCTION"		1 V or less
			Using M.U.T.-III, perform "Test Item No. 6: Centre coupling operation check" of "SPECIAL FUNCTION"		Approximately 8 V
3	BATT	Power supply	Always		System voltage
4	IG1	Ignition switch	Ignition switch: ON		System voltage
			Ignition switch: OFF		1 V or less
5	CANH	CAN-H	–		–
9	SOL-	Electronic control coupling solenoid (centre)	Always		1 V or less
10	GND1	Earth	Always		1 V or less
13	CANL	CAN-L	–		–
16	SW-1	4WD switch signal	Ignition switch: ON	4WD switch: ON	System voltage
				4WD switch: OFF	1 V or less

ON-VEHICLE SERVICE

CHECK OF ELECTRONIC CONTROL COUPLING

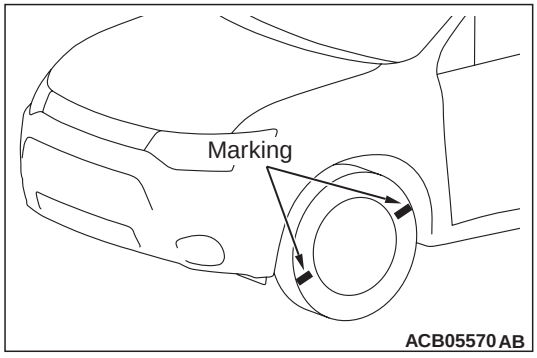
M1274005700225

SIMPLE OPERATION CHECK OF ELECTRONIC CONTROL COUPLING

⚠ CAUTION

The following checks in the 4WD mode must be completed within one minute in total to protect the 4WD drive system components and parking brake.

1. Raise the vehicle.



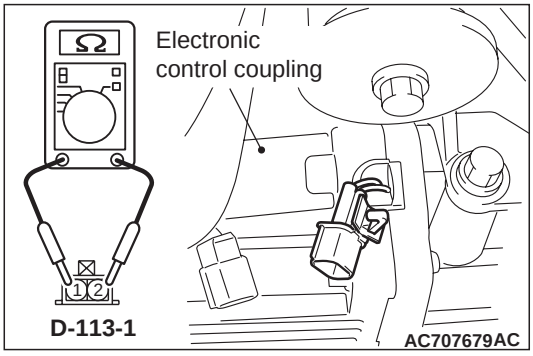
2. Mark the front and rear tyres for easy identification of tyre rotation.
3. Adjust the parking brake lever to the normal conditions. (Refer to GROUP 36 – On-vehicle Service, Parking Brake Lever Stroke Check and Adjustment).
4. Pull the parking brake lever by two notches. Then start the engine.

   NOTE: Activating the parking brake slightly prevents the drive force transferring to the rear wheels by a friction in the electronic control coupling. If the following 2WD mode is checked without the parking brake activation, the drive force is transferred to the rear wheels by a friction in the electronic control coupling.
5. Execute the special test (item No. 4: control off) (Refer to P.27C-48) to switch the drive mode into 2WD forcibly.
6. Move the shift lever into the selector lever into D position.
7. Depress the accelerator pedal gradually, and maintain the vehicle speed at approximately 10 km/h. (Make sure that the rear wheels do not rotate).
8. Stop the engine.
9. Start the engine again, and move the shift lever into the selector lever into D position.

10. Depress the accelerator pedal gradually, and maintain the vehicle speed at approximately 10 km/h.
11. Switch the 4WD switch to "4WD AUTO" position, and check that the rear wheels are rotating.

After the above checks are completed, if the rear wheel rotation satisfies the above conditions, it is judged that the electronic control coupling operates correctly. If the rear wheel rotation does not satisfy the above conditions, replace the electronic control coupling. (Refer to P.27C-53.)

RESISTANCE MEASUREMENT BETWEEN ELECTRONIC CONTROL COUPLING SOLENOID CONNECTOR TERMINALS



Disconnect the electronic control coupling solenoid connector, and measure the resistance value between the connector terminals on the unit side. If the measured resistance value is out of the standard value range, replace the electronic control coupling. (Refer to P.27C-53.)

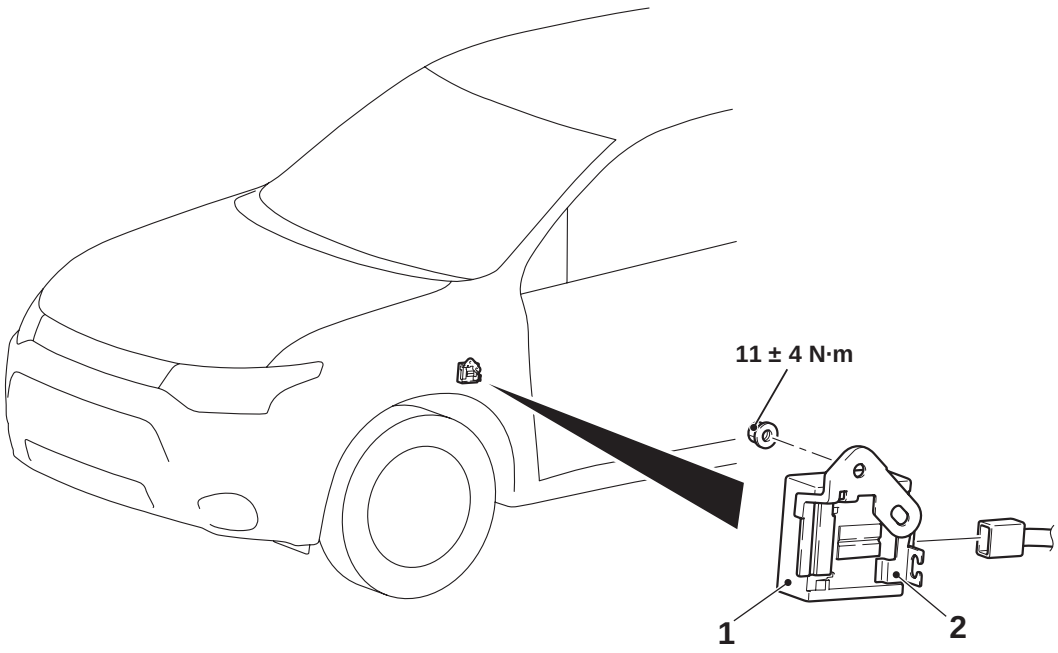
Standard value: 2.2 – 4.0 Ω

4WD-ECU

REMOVAL AND INSTALLATION

M1274001600141

Pre-removal and post-installation operation
Removal and installation of the bottom cover assembly and glove box (Refer to GROUP 52A – Instrument Panel Assembly .)



ACB04915AB

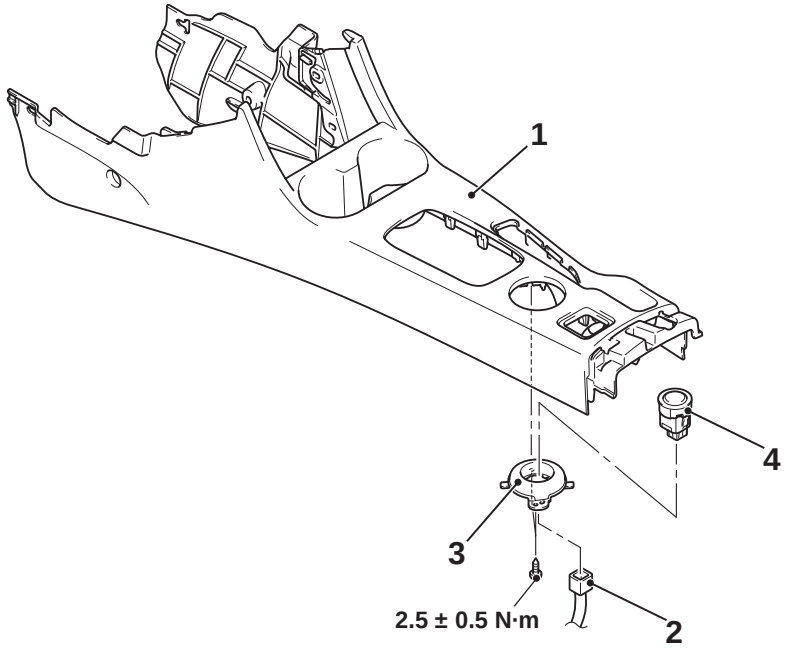
Removal steps

1. 4WD-ECU
2. 4WD-ECU bracket

4WD SWITCH

REMOVAL AND INSTALLATION

M1274009800019



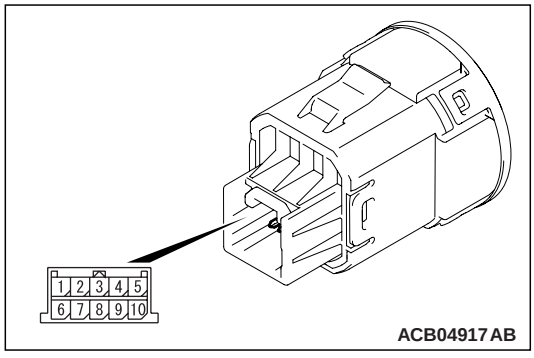
ACB04916 AB

Removal steps

1. Front floor console panel (Refer to GROUP 52A Front Floor Console Assembly)
2. Connector connection
3. Bezel
4. 4WD switch

4WD SWITCH CHECK

M1274009900016



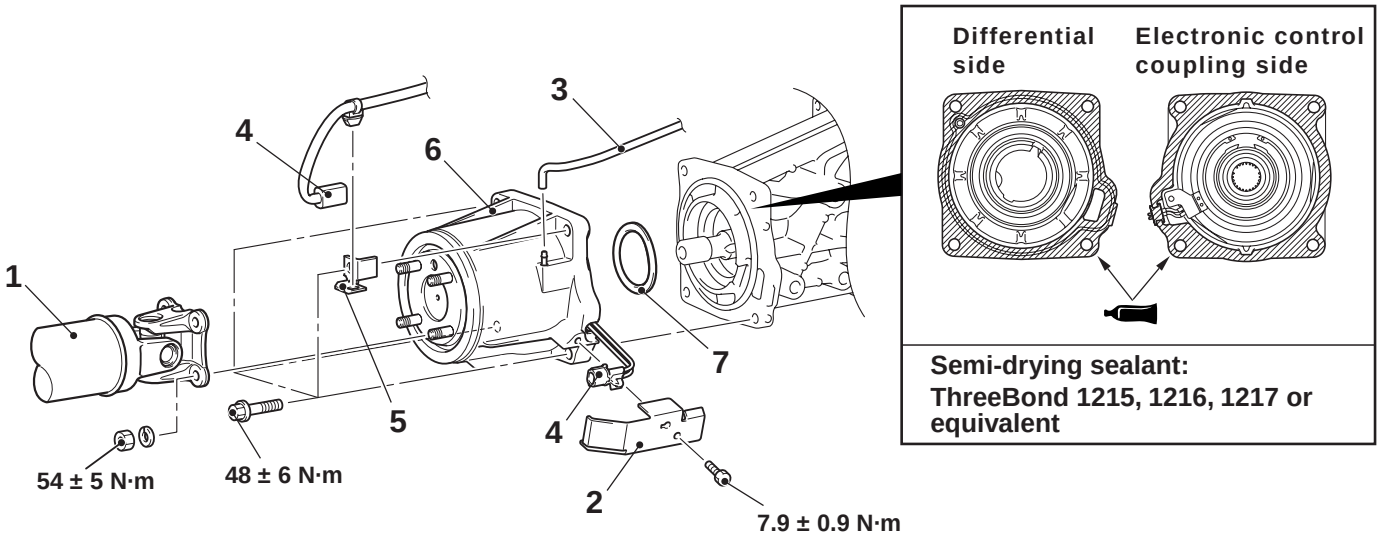
ACB04917 AB

Item	When the 4WD switch is released (Not being operated)	When the 4WD switch is pressed
Continuity between terminal No. 2 and No. 6	No continuity	Continuity exists (2 Ω or less)
Continuity between terminal No. 3 and No. 10	Continuity exists	Continuity exists

ELECTRONIC CONTROL COUPLING

REMOVAL AND INSTALLATION

M1274002100150



ACB04914AB

Removal steps

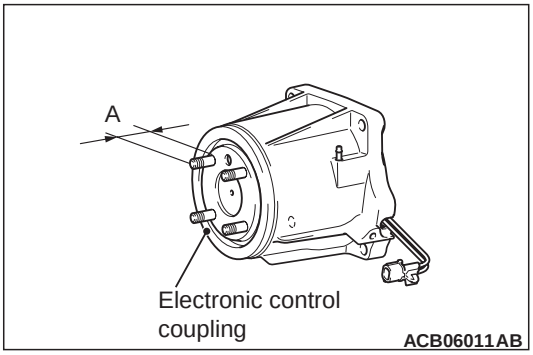
1. Propeller shaft assembly (Refer to GROUP 25 – Propeller Shaft).
2. Cover
3. Breather hose connection
4. Connector connection
5. Bracket

>>**A**<< 6. Electronic control coupling

7. Wave washer

INSTALLATION SERVICE POINT

>>A<< ELECTRONIC CONTROL COUPLING INSTALLATION



ACB06011AB

1. Check that the length of the electronic control coupling stud bolt (A) is within the standard value range.

   Standard value: 21.6 – 24.4 mm

2. If it exceeds either of the limits, clean the threads for the electronic control coupling and replace the stud bolt.

   Tightening torque: 13 ± 2 N·m