

GROUP 13C

TRACTION CONTROL SYSTEM (TCL)

CONTENTS

GENERAL DESCRIPTION.....	13C-2	RESISTANCE AND CONTINUITY BETWEEN ABS-ECU AND WHEEL SPEED SENSOR	13C-39
TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS	13C-3	VOLTAGE AND SIGNAL CHECK AT ABS-ECU USING AN OSCILLOSCOPE ...	13C-41
INTRODUCTION TO TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS	13C-3	SPECIAL TOOLS	13C-45
TROUBLESHOOTING STRATEGY	13C-3	ON-VEHICLE SERVICE	13C-47
DIAGNOSIS FUNCTION.....	13C-3	TCL INDICATOR LIGHT CHECK	13C-47
DIAGNOSTIC TROUBLE CODE CHART..	13C-8	TCL OPERATION CHECK	13C-47
DIAGNOSTIC TROUBLE CODE PROCEDURES.....	13C-10	TCL SWITCH CHECK.....	13C-48
SYMPTOM CHART.....	13C-23	WHEEL SPEED SENSOR CHECK.....	13C-48
SYMPTOM PROCEDURES	13C-23	TCL SWITCH	13C-49
DATA LIST REFERENCE TABLE	13C-36	REMOVAL AND INSTALLATION	13C-49
ACTUATOR TEST REFERENCE TABLE..	13C-37	WHEEL SPEED SENSOR	13C-49
CHECK AT ABS/TCL-ECU RESISTANCE AND TERMINAL VOLTAGE	13C-38	REMOVAL AND INSTALLATION	13C-49
		ABS/TCL-ECU	13C-49
		REMOVAL AND INSTALLATION	13C-49

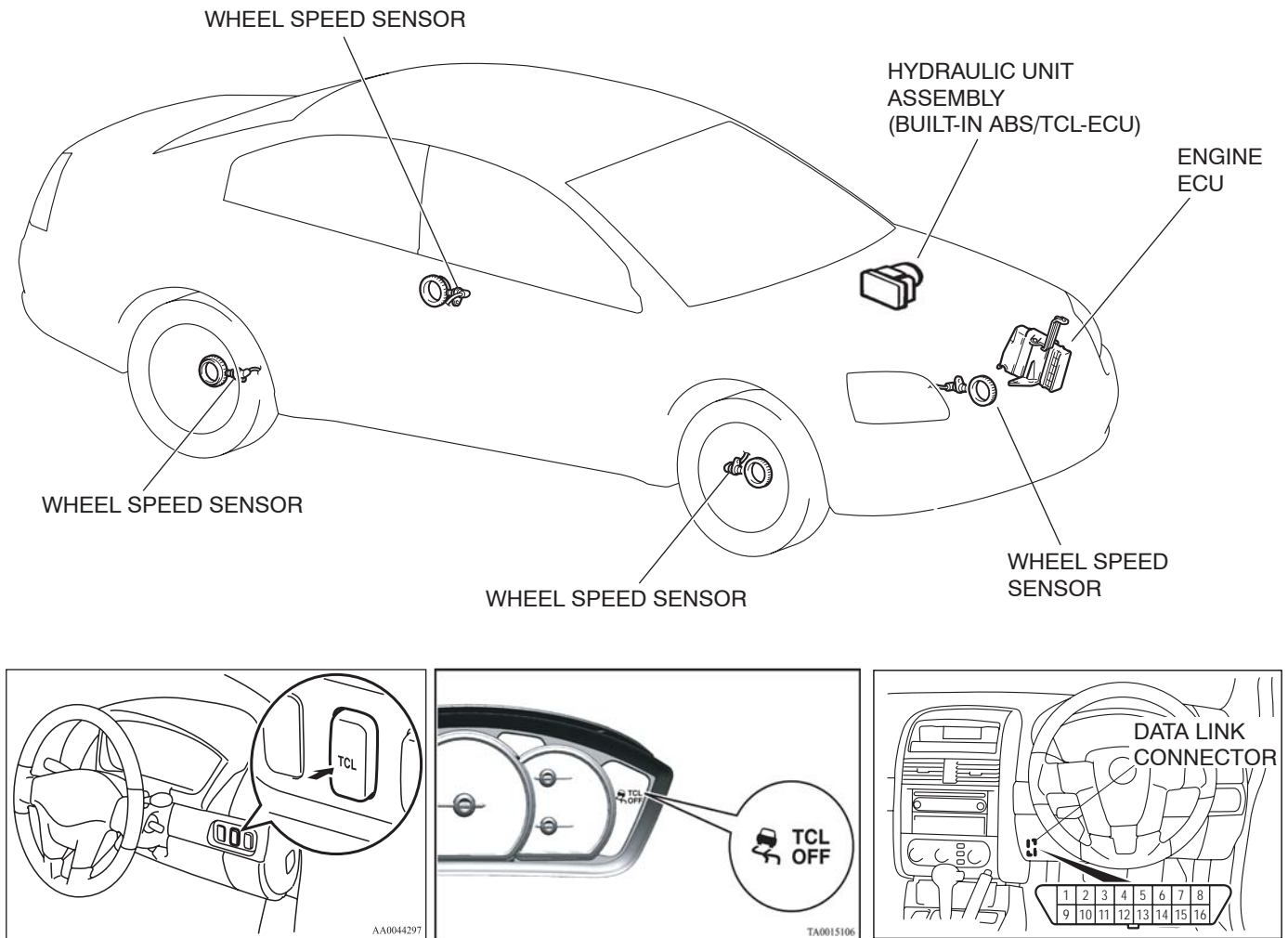
GENERAL DESCRIPTION

M1136000100029

Traction Control systems are a significant safety feature designed to prevent wheel spin during acceleration. This results in improved vehicle stability and steer ability. When excessive wheel spin is detected, the system will automatically reduce engine torque via the engine management system. The Engine ECU can reduce throttle position, cut fuel injection and retard ignition to one or more cylinders depend-

ing on how much torque reduction is required and will continue to occur until the wheels are no longer spinning. During traction control operation the TCL warning lamp will flash to inform the driver that the vehicle is under traction control. This will continue until traction control is finished.

CONSTRUCTION DIAGRAM



TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS

INTRODUCTION TO TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS

M1136004600026

TCL Diagnostic Trouble Code Detection Conditions

TCL diagnostic trouble codes (TCL DTCs) are set under different conditions, depending on the malfunction detected. Most TCL DTCs will only be set during vehicle operation. Some TCL DTCs will also be set during the TCL self-check immediately after the engine is started. When you check if an TCL DTC

will be displayed again after the DTC has been erased, you should recreate the TCL DTC set conditions. Depending on the detection timing and set conditions for the specific TCL DTC, you must either drive the vehicle or turn the engine off and restart it. To set the proper conditions for that DTC again, refer to "TCL DTC SET CONDITIONS" for each TCL DTC that you are trying to reset.

TROUBLESHOOTING STRATEGY

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will check most of the possible causes of a TCL problem.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Check the vehicle for any TCL DTC. (Refer to [P.13C-3](#), Diagnosis Function – How to Read and Erase Diagnostic Trouble Codes).
4. If you can verify the condition but no TCL DTCs are set, and the malfunction may be intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions [P.00-14](#)).
5. If you can verify the condition but there is no TCL DTCs, or the system cannot communicate with diagnostic tool MB991958 (MUT-III sub assembly), and find the fault. (Refer to [P.13C-23](#), Symptom Chart).

M1136003100062

6. If there is a TCL DTC, record the number of the code, then erase the code from vehicle memory using the diagnostic tool MB991958 (MUT-III sub assembly). (Refer to [P.13C-3](#), Diagnosis Function – How to Read and Erase Diagnostic Trouble Codes).
7. Re-create the TCL DTC set conditions to see if the same TCL DTC will set again. (Refer to [P.13C-3](#), Diagnosis Function – How to Read and Erase Diagnostic Trouble Codes).
 - If the same TCL DTC sets again, perform the diagnostic procedures for the set code. (Refer to [P.13C-8](#), Diagnostic Trouble Code Chart).

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

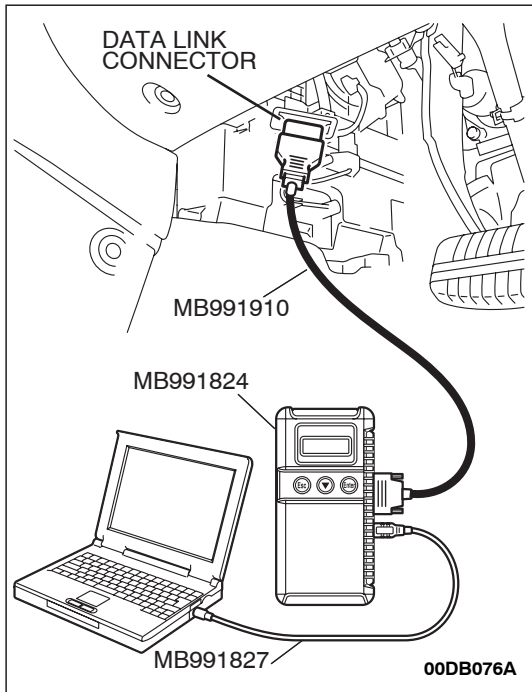
DIAGNOSIS FUNCTION

M1136003200025

HOW TO CONNECT THE DIAGNOSTIC TOOL (MUT-III)

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.

7. Start the MUT-III system on the personal computer.

NOTE: Disconnect the diagnostic tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

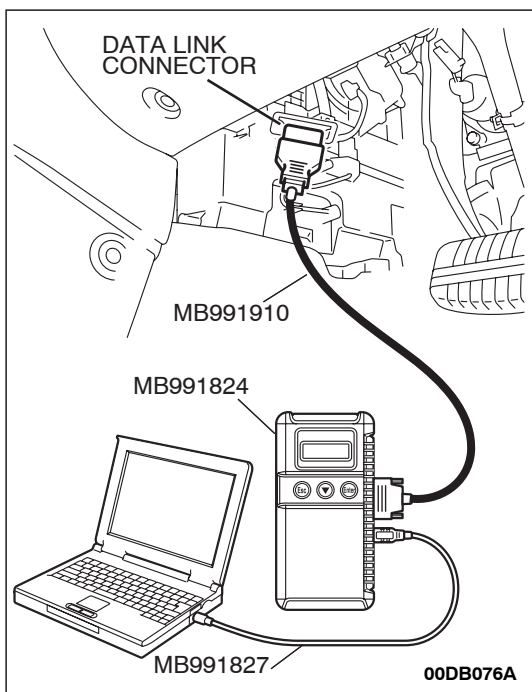
- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if diagnostic tool MB991958 does not display.

1. Connect diagnostic tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System Select".
5. Choose "TCL".
6. Select "Diagnostic Trouble Code".
7. If a DTC is set, it is shown.
8. Choose "DTC erase" to erase the DTC.
9. Turn the ignition switch to the "LOCK" (OFF) position.
10. Disconnect diagnostic tool MB991958.



HOW TO READ DATA LIST

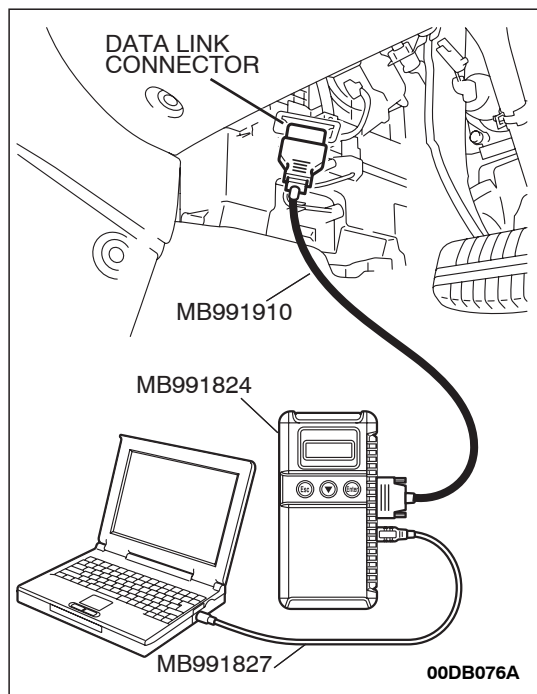
Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

1. Connect diagnostic tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System Select."
5. Choose "TCL" .
6. Select "Data List."
7. Choose an appropriate item.
8. Turn the ignition switch to the "LOCK" (OFF) position.
9. Disconnect diagnostic tool MB991958.



HOW TO PERFORM ACTUATOR TEST

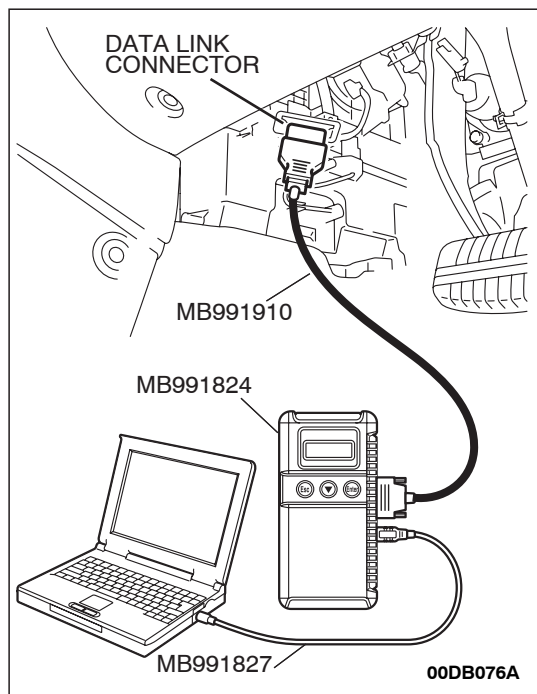
Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

1. Connect diagnostic tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System Select."
5. Choose "TCL" .
6. Choose "Actuator Test" from "TCL" screen.
7. Choose an appropriate item.
8. Turn the ignition switch to the "LOCK" (OFF) position.
9. Disconnect diagnostic tool MB991958.



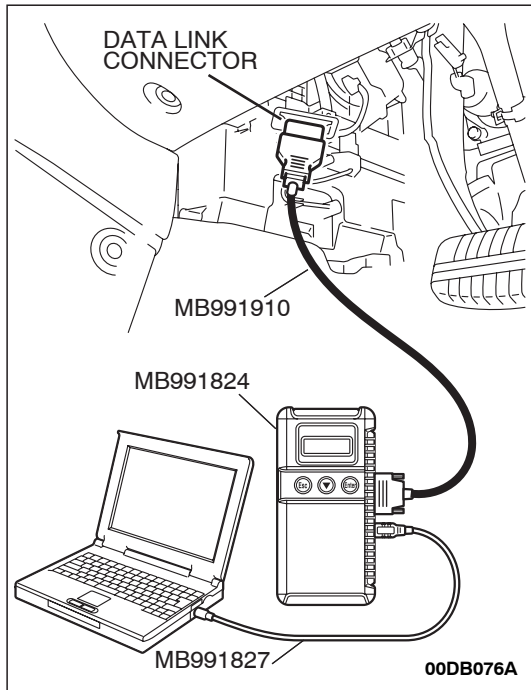
HOW TO DIAGNOSE THE CAN BUS LINE

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.



1. Connect diagnostic tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select the "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle whose CAN bus lines will be diagnosed.
 - If the information is correct, go to step 8.
 - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle which is diagnosed CAN bus line.
 - If they match, go to step 8.
 - If not, go to step 5.
8. Press the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.
10. Turn the ignition switch to the "LOCK" (OFF) position.
11. Disconnect diagnostic tool MB991958.

DIAGNOSTIC TROUBLE CODE CHART

M1136003300022

CAUTION

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

Follow the inspection chart that is appropriate for the diagnostic trouble code.

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

DTC	INSPECTION ITEM	DIAGNOSTIC CONTENT	REFERENCE PAGE
C1200	Front right wheel speed sensor	Open circuit or short circuit	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1200 P.35B-10
C1201	Front right wheel speed sensor	Abnormal output signal	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1201 P.35B-26
C1205	Front left wheel speed sensor	Open circuit or short circuit	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1205 P.35B-10
C1206	Front left wheel speed sensor	Abnormal output signal	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1206 P.35B-26
C1210	Rear right wheel speed sensor	Open circuit or short circuit	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1210 P.35B-10
C1211	Rear right wheel speed sensor	Abnormal output signal	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1211 P.35B-26
C1215	Rear left wheel speed sensor	Open circuit or short circuit	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1215 P.35B-10

DTC	INSPECTION ITEM	DIAGNOSTIC CONTENT	REFERENCE PAGE
C1216	Rear left wheel speed sensor	Abnormal output signal	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1216 P.35B-26
C1225	Deviation between wheel speeds		P.35B-40 or refer to the above appropriate abnormal output sensor signal P.35B-26
C1226*	ABS front right solenoid inlet valve		-
C1231*	ABS front right solenoid outlet valve		-
C1236*	ABS front left solenoid valve inlet valve		-
C1241*	ABS front left solenoid valve outlet valve		-
C1246*	ABS rear right solenoid valve inlet valve		-
C1251*	ABS rear right solenoid valve outlet valve		-
C1256*	ABS rear left solenoid valve inlet valve		-
C1261*	ABS rear left solenoid valve outlet valve		-
C1266*	ABS hydraulic unit motor stuck		-
C1273*	ABS hydraulic unit motor drive circuit stuck off		-
C1274*	ABS hydraulic unit motor drive circuit stuck on		-
C1276*	ABS valve relay malfunction		-
C1278*	ABS solenoid valve power circuit stuck off		-
C1279*	ABS solenoid valve power circuit stuck on		-
C1607	ABS/TCL-ECU failure		GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1607 P.35B-62
C1640	Variant code value not valid. (TCL only)		Incorrect code programmed into ABS-ECU. Replace ABS-ECU modulator.
C1860	ABS/TCL-ECU power supply	Abnormal rise in voltage	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1860 P.35B-63
C1861	ABS/TCL-ECU power supply	Abnormal drop in voltage	GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures C1861 P.35B-63

DTC	INSPECTION ITEM	DIAGNOSTIC CONTENT	REFERENCE PAGE
U1073	CAN communications system bus off		GROUP 35B, ABS Diagnosis – Diagnostic Trouble Code Procedures U1073 P.35B-68
U1100	CAN communications system time out error engine related data		P.13C-10
U1101	CAN communications system time out error A/T related data		P.13C-14
U1400	Dynamic range error APS1		P.13C-22
U1415	CAN invalid signal Gear Position		GROUP 23A Diagnostic Trouble Code Chart P.23A-34

*NOTE: Since the TCL is controlled with the same ABS/TCL-ECU used to control the ABS, the codes (with a *) used only for the ABS also appear.*

*The inspection contents for the codes (with a *) used only for the ABS do not described in this group.*

DIAGNOSTIC TROUBLE CODE PROCEDURES

U1100 CAN Communications System Time Out Error Engine Related Data

CAUTION

- If DTC U1100 is set in the ABS/TCL-ECU, always diagnose the CAN main bus line. If there is any fault in the CAN bus lines, an incorrect DTC may be set.
- Whenever the ABS/TCL-ECU is replaced, ensure that the communication circuit is normal.

NOTE: *If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.*

DTC SET CONDITION

The ABS/TCL-ECU receives engine system-related signals from the ENGINE-ECU via CAN bus lines.

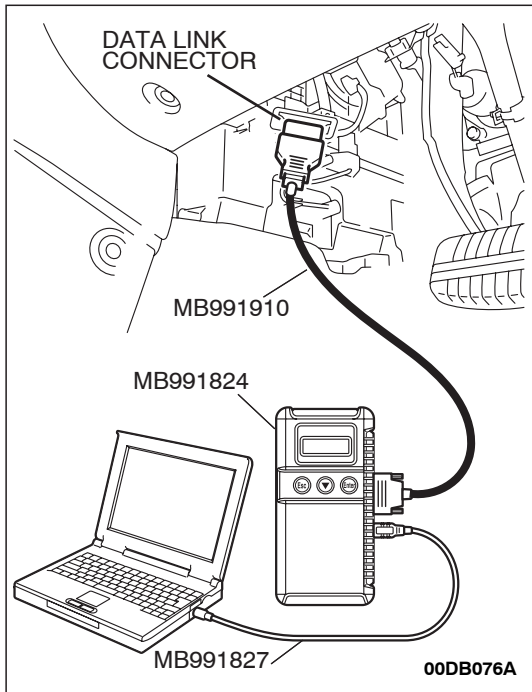
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THESE DTCS ARE TO SET ARE:)

- Damaged harness or connector.
- Malfunction of the ENGINE-ECU.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



STEP 1. Using diagnostic tool MB991958, diagnose the CAN bus line.

CAUTION

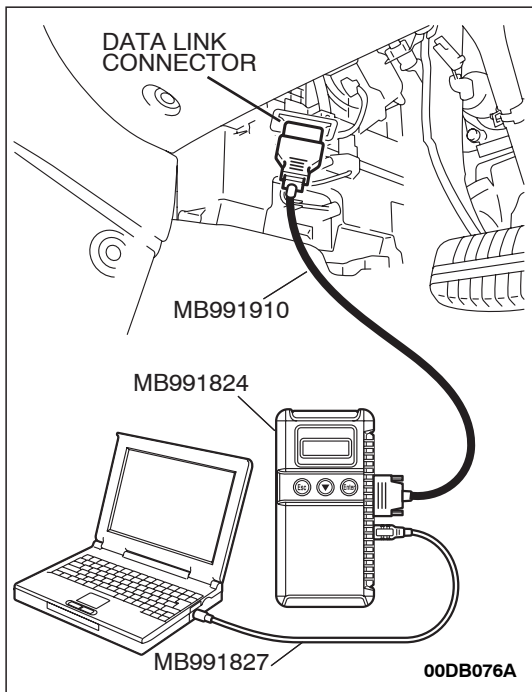
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose the CAN bus line. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.

NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis – Can Bus Diagnostic Chart P.54C-15). Then go to Step 6.



STEP 2. Using diagnostic tool MB991958, read the diagnostic trouble code.

CAUTION

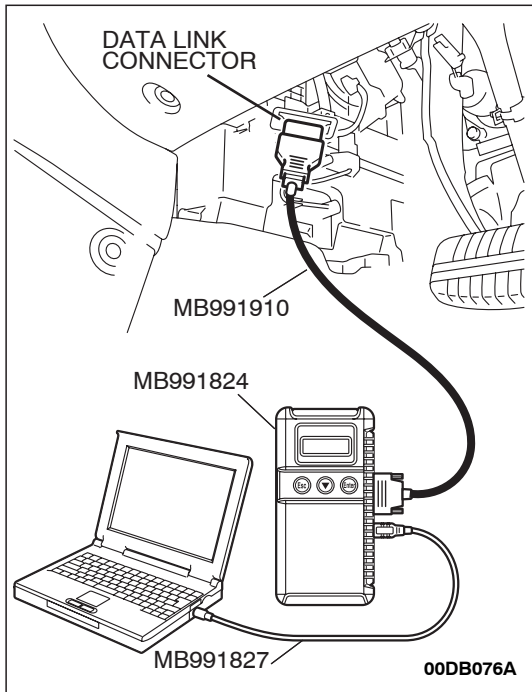
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Check for MPI system diagnostic trouble code. (Refer to GROUP 13A, MPI Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code P.13A-6).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is any DTC set?

YES : Repair the MPI control system. (Refer to GROUP 13A, MPI Diagnosis – Diagnostic Trouble Code Chart P.13A-17). Then go to Step 6.

NO : Go to Step 3.



STEP 3. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

(1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).

(2) Turn the ignition switch to the "ON" position.

(3) Check if a DTC, which relates to CAN communication-linked systems below, is set.

ETACS-ECU

- DTC (U1100): ENGINE-ECU time-out (related to engine). (Refer to GROUP 54B, SWS Diagnosis – General Description – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.54B-10](#)).

Combination meter

- DTC (U1100): ENGINE-ECU time-out (related to engine). (Refer to GROUP 54A, Combination Meter Assembly Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.54A-46](#)).

Multi-center display

- DTC (U1100): ENGINE-ECU time-out (related to engine). (Refer to GROUP 54A, Multi-center Display – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.54A-251](#)).

A/C-ECU

- DTC (U1100): ENGINE-ECU time-out (related to engine). (Refer to GROUP 55, Auto A/C Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.55-6](#) <Vehicle with auto A/C>).

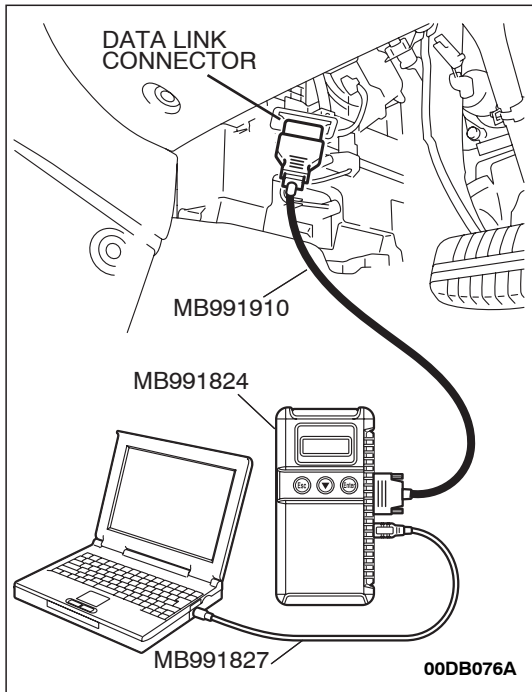
(4) Turn the ignition switch to the "LOCK" (OFF) position.

(5) Disconnect diagnostic tool MB991958.

Q: Is DTC (U1100) set?

YES : Go to Step 4.

NO : Go to Step 5.



STEP 4. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

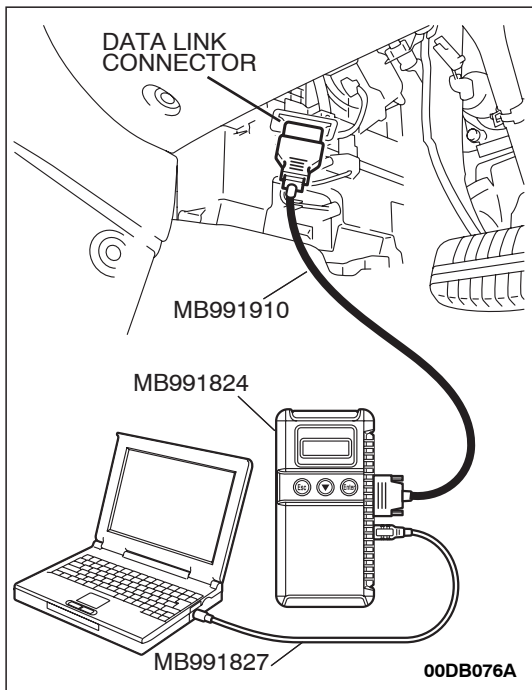
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1100 set?

YES : Replace the Engine-ECU. [Refer to GROUP 13A, Engine-ECU P.13A-675]. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-14).



STEP 5. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

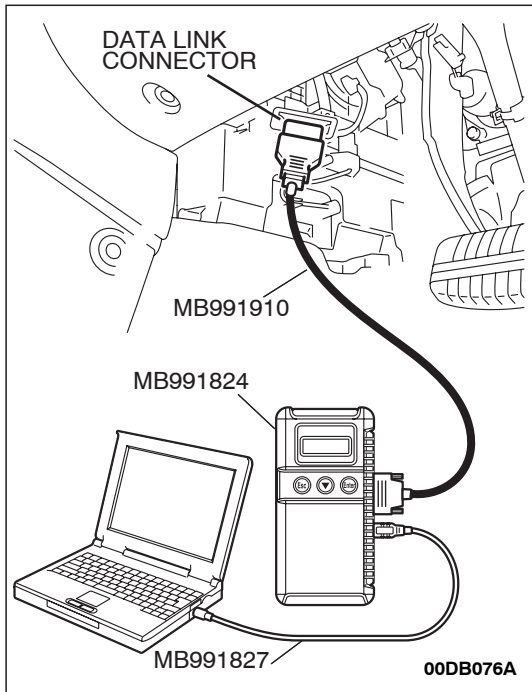
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1100 set?

YES : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit P.35B-93). Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-14).



STEP 6. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1100 set?

YES : Return to Step 1.

NO : The procedure is complete.

U1101 CAN Communications System Time Out Error A/T Related Data

⚠ CAUTION

- If DTC U1101 is set in the ABS/TCL-ECU, always diagnose the CAN main bus line. If there is any fault in the CAN bus lines, an incorrect DTC may be set.
- Whenever the ABS/TCL-ECU is replaced, ensure that the communication circuit is normal.

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

DTC SET CONDITION

The ABS/TCL-ECU receives A/T system-related signals from the A/T-ECU via CAN bus lines.

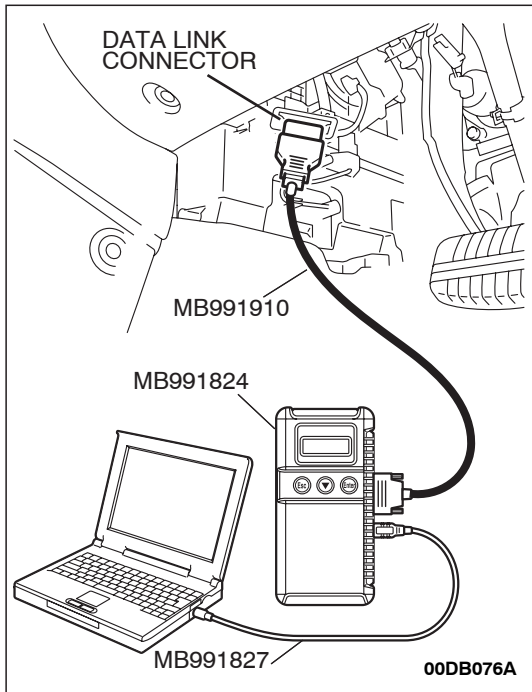
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THESE DTCS ARE TO SET ARE:)

- Damaged harness or connector.
- Malfunction of the A/T-ECU.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



STEP 1. Using diagnostic tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

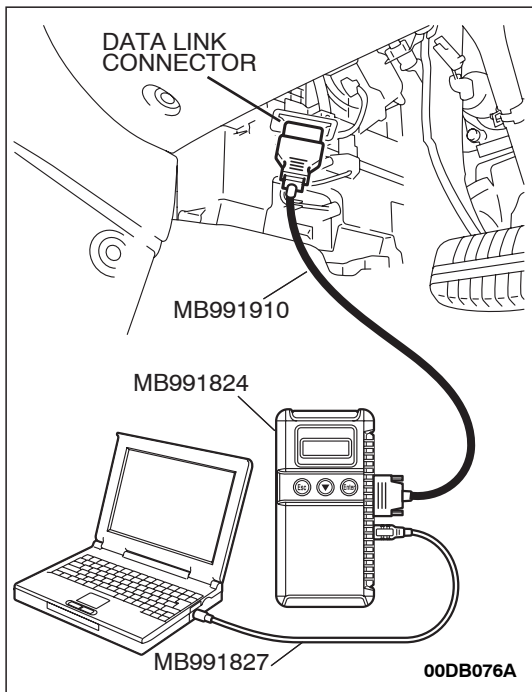
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose the CAN bus line. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.

NO : Repair the CAN bus lines. (Refer to GROUP 54C, Diagnosis – Can Bus Diagnostic Chart P.54C-15). Then go to Step 6.



STEP 2. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

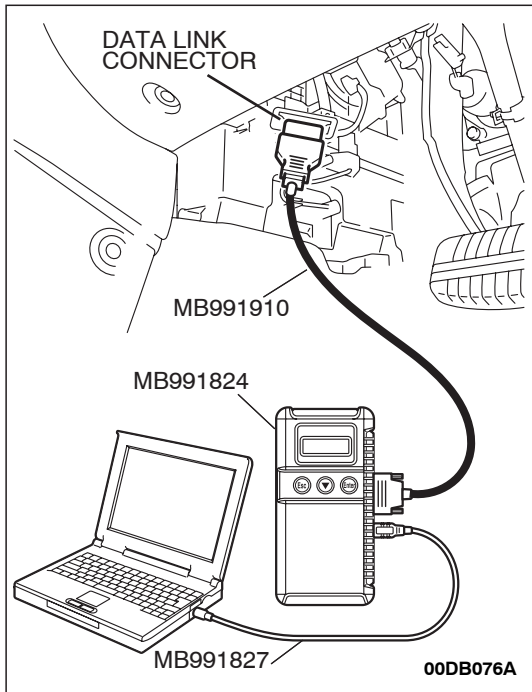
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Check for A/T system diagnostic trouble code. (Refer to GROUP 23A, A/T Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code P.23A-13).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is any DTC set?

YES : Repair the automatic transaxle control system. (Refer to GROUP 23A, A/T Diagnosis – Diagnostic Trouble Code Chart P.23A-34). Then go to Step 6.

NO : Go to Step 3.



STEP 3. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

(1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).

(2) Turn the ignition switch to the "ON" position.

(3) Check if a DTC, which relates to CAN communication-linked systems below, is set.

ETACS-ECU

- DTC (U1101): A/T-ECU time-out (related to A/T). (Refer to GROUP 54B, SWS Diagnosis – General Description – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code P.54B-10).

Combination meter

- DTC (U1101): A/T-ECU time-out (related to A/T). (Refer to GROUP 54A, Combination Meter Assembly Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code P.54A-46).

Multi-center display

- DTC (U1101): A/T-ECU time-out (related to A/T). (Refer to GROUP 54A, Multi-center Display – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code P.54A-251).

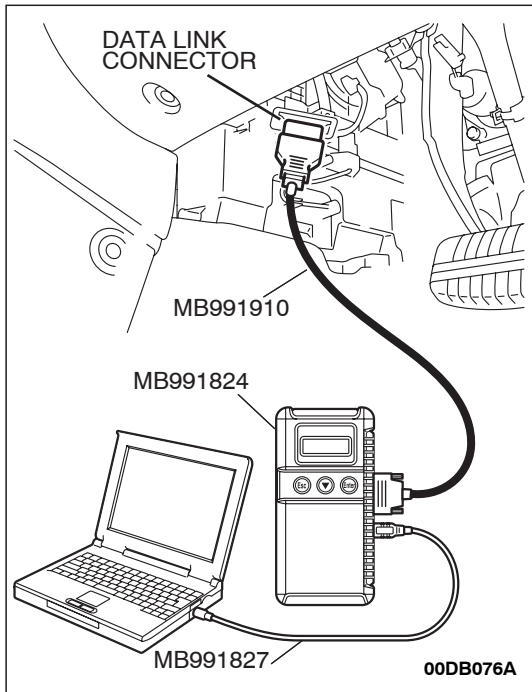
(4) Turn the ignition switch to the "LOCK" (OFF) position.

(5) Disconnect diagnostic tool MB991958.

Q: Is DTC (U1101) set?

YES : Go to Step 4.

NO : Go to Step 5.



STEP 4. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

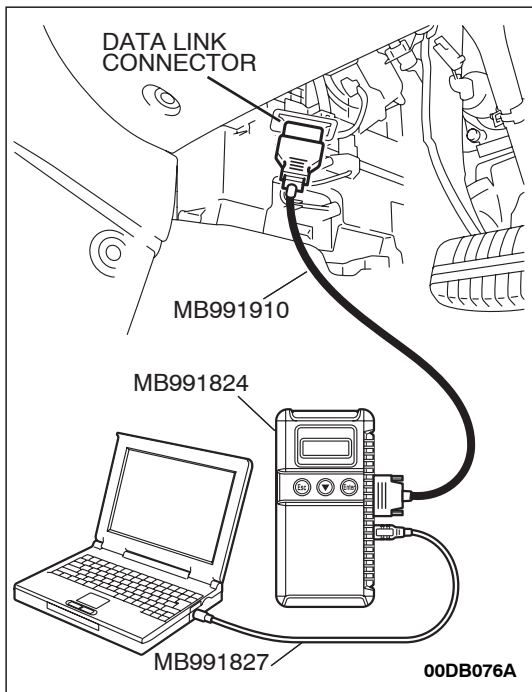
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1101 set?

YES : Replace the Engine-ECU. [Refer to GROUP 13A, Engine-ECU P.13A-675]. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-14).



STEP 5. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

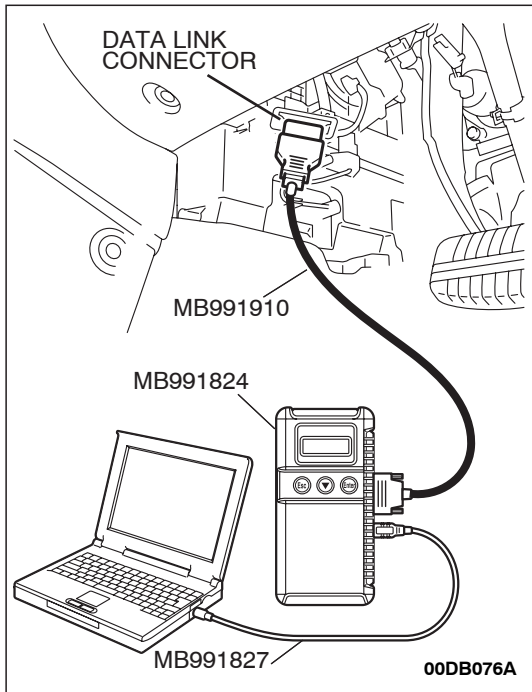
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1101 set?

YES : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit P.35B-93). Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-14).



STEP 6. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1101 set?

YES : Return to Step 1.

NO : The procedure is complete.

U1120 CAN Communications System TCL Uncontrollable by Engine Malfunction

⚠ CAUTION

- If DTC U1120 is set in the ABS/TCL-ECU, always diagnose the CAN main bus line. If there is any fault in the CAN bus lines, an incorrect DTC may be set.
- Whenever the ABS/TCL-ECU is replaced, ensure that the communication circuit is normal.
- The engine control system-related DTC may be set when DTC U1120 is set. (For details refer to GROUP 00, Intersystem Affiliated DTC Reference Table P.00-17). Diagnose the engine control system first when the engine control system-related DTC is set.

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

DTC SET CONDITION

The ABS/TCL-ECU receives engine system-related signals from the Engine-ECU via CAN bus lines. If a fail-safe related data is contained in the signal from the Engine-ECU, DTC U1120 will be stored.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THESE DTCS ARE TO SET ARE:)

- Damaged harness or connector.
- Malfunction of the Engine-ECU.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

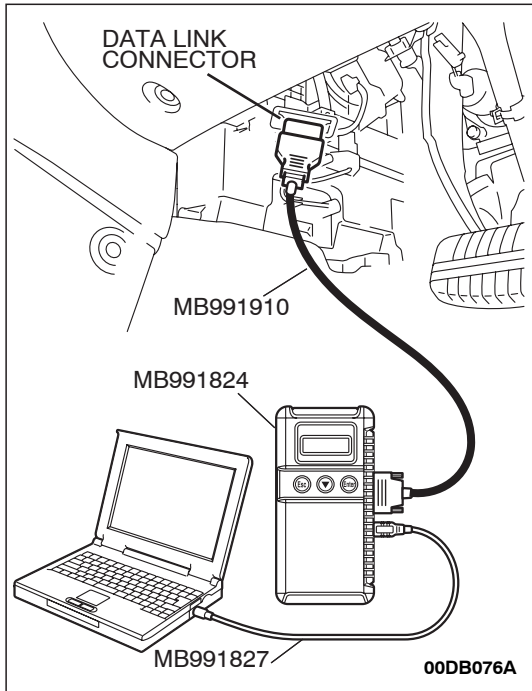
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

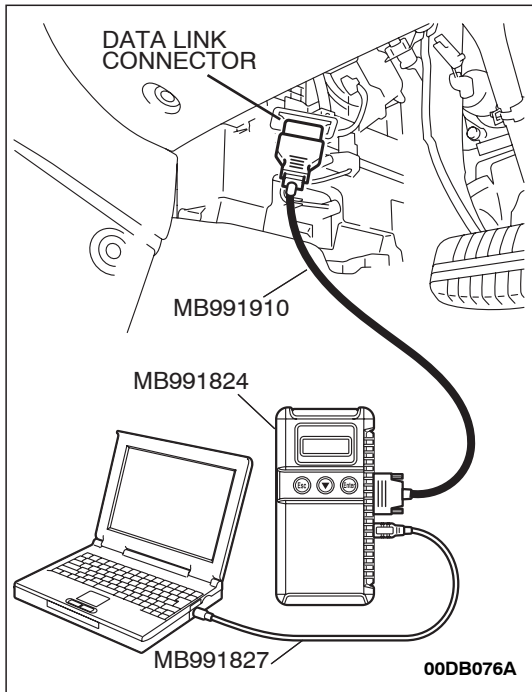
- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Check for MPI system diagnostic trouble code. (Refer to GROUP 13A, MPI Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.13A-6](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is any DTC set?

YES : Repair the MPI control system. (Refer to GROUP 13A, MPI Diagnosis – Diagnostic Trouble Code Chart [P.13A-17](#)). Then go to Step 6.

NO : Go to Step 2.





STEP 2. Using diagnostic tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

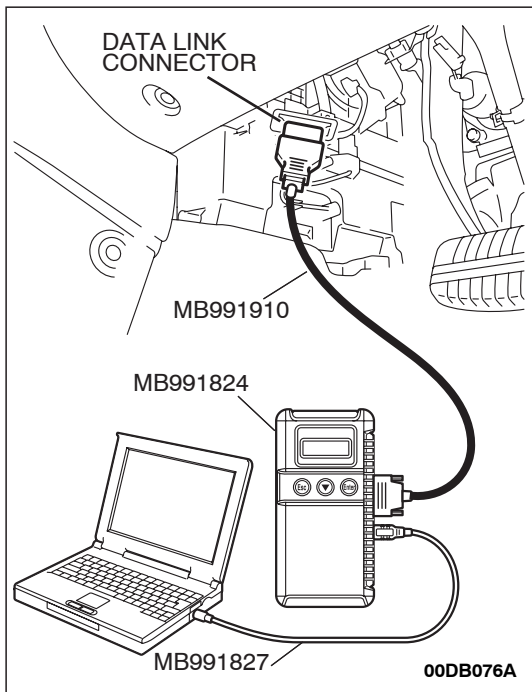
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose the CAN bus line. (Refer to [P.13C-3](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.

NO : Repair the CAN bus lines. (Refer to GROUP 54C, Diagnosis – Can Bus Diagnostic Chart [P.54C-15](#)). Then go to Step 6.



STEP 3. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

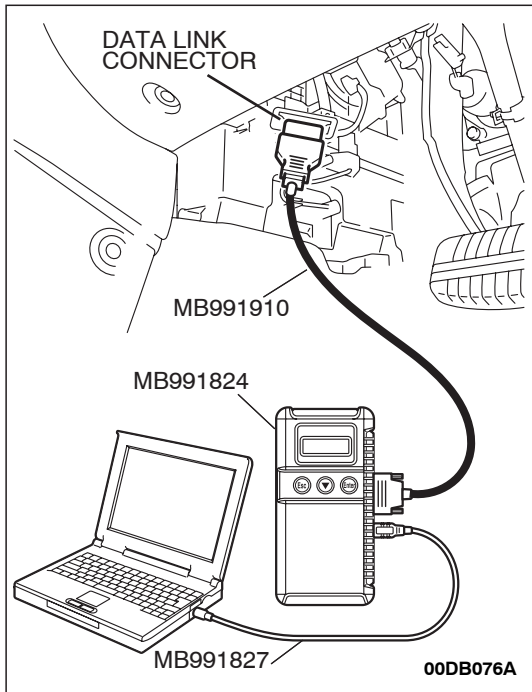
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Check if a DTC, which relates to CAN communication-linked systems below, is set.
A/C-ECU
 - DTC U1120: Failure Information on Engine-ECU (related to engine). (Refer to GROUP 55, Auto A/C Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.55-6](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1120 set?

YES : Go to Step 4.

NO : Go to Step 5.



STEP 4. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

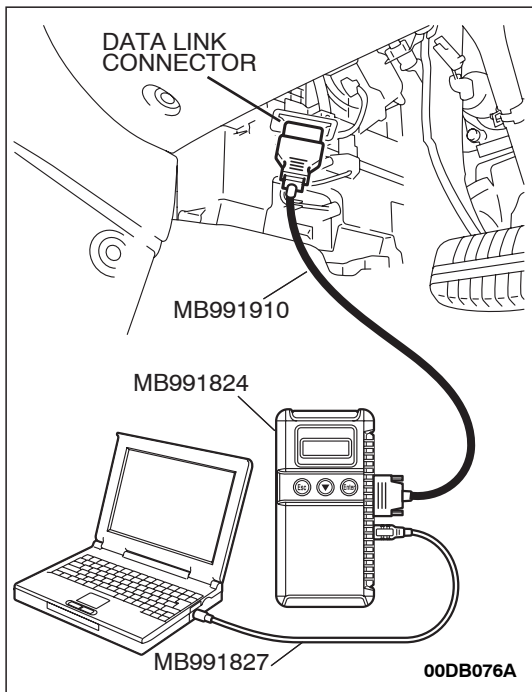
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to [P.13C-3](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1120 set?

YES : Replace the Engine-ECU. [Refer to GROUP 13A, Engine-ECU [P.13A-675](#)]. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#)).



STEP 5. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

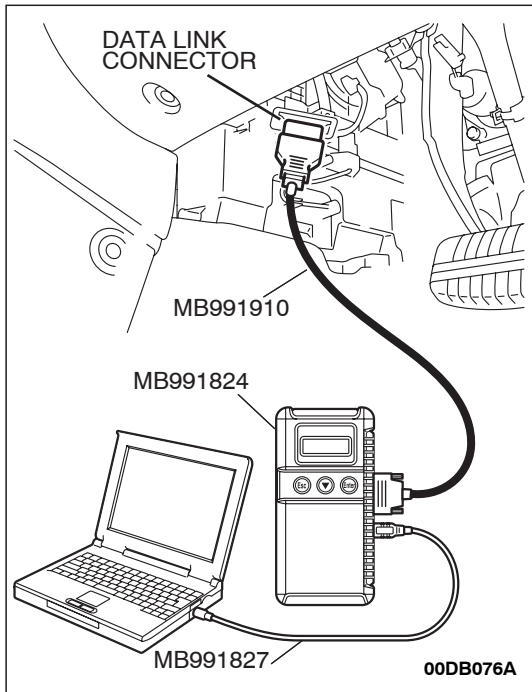
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to [P.13C-3](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1120 set?

YES : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit [P.35B-93](#)). Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#)).



STEP 6. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to [P.13C-3](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1120 set?

YES : Return to Step 1.

NO : The procedure is complete.

U1400 Dynamic range error APS1

DTC SET CONDITION

This code is set when the MPI system sets either of DTCs P2138, P2122 or P2123.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THESE DTCS ARE TO SET ARE:)

- Malfunction of the MPI system

DIAGNOSIS

Check whether the MPI system sets either of diagnostic trouble codes P2138, P2122 or P2123, and repair if necessary. (Refer to GROUP 13A, MPI Diagnosis – Diagnostic Function – How to Read and Erase Diagnostic Trouble Code [P.13A-6](#)).

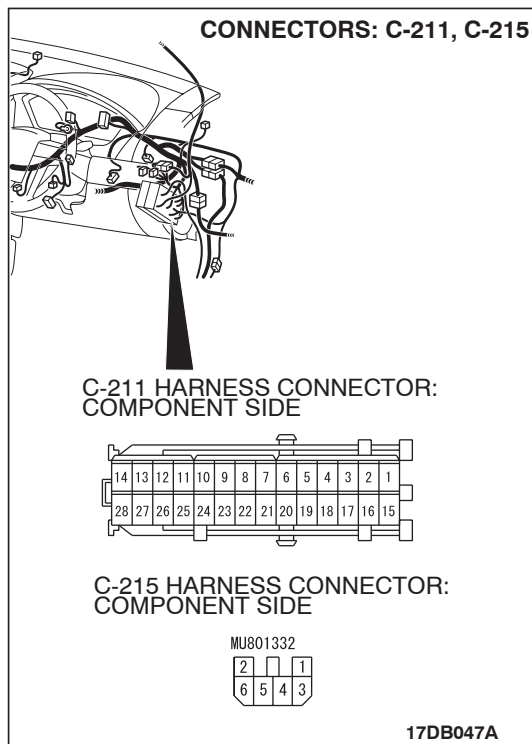
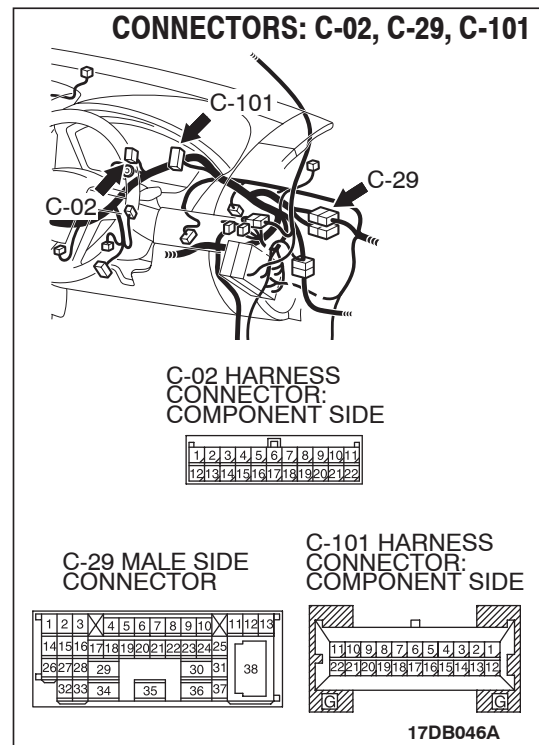
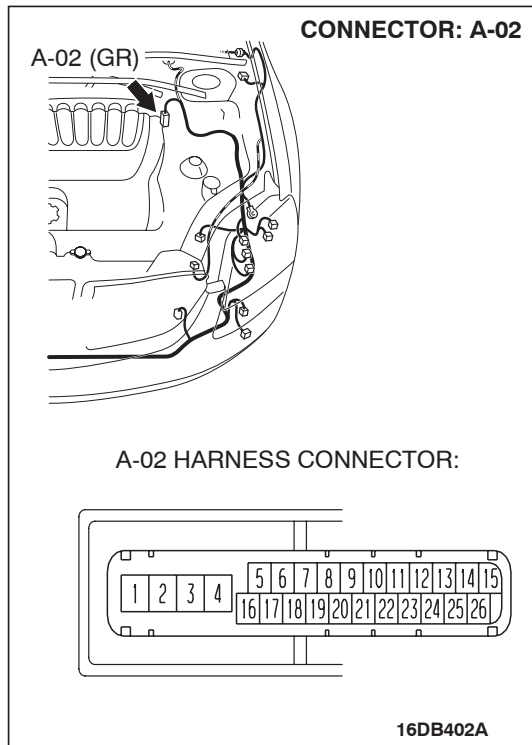
SYMPTOM CHART

M1136003400029

SYMPTOM		INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication with diagnostic tool is not possible	Communication with all systems is impossible	-	Group 13A, MPI Diagnosis – Symptom Procedures – Inspection Procedure 1 P.13A-539.
	Communication with the ABS/TCL-ECU only is impossible	-	Group 35B, ABS Diagnosis – Symptom Procedures – Inspection Procedure 1 P.35B-72.
When the ignition switch is turned to the "ON" position (engine stopped), the "TCL OFF" indicator light dose not illuminate.		1	P.13C-23
When the ignition switch is turned to the "ON" position (engine stopped), the TCL work indicator light does not illuminate.		2	
The "TCL OFF" indicator light remains illuminated after the engine is started.		3	
The TCL work indicator light remains illuminated after the engine is started.		4	
When the TCL switch is push on, TCL does not be cancelled.		5	P.13C-28
TCL dose not operate.		6	P.13C-34

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: When the Ignition Switch is Turned to the "ON" Position (Engine Stopped), the "TCL OFF" Indicator Light does not Illuminate. INSPECTION PROCEDURE 2: When the Ignition Switch is Turned to the "ON" Position (Engine Stopped), the TCL Work Indicator Light dose not Illuminate. INSPECTION PROCEDURE 3: The "TCL OFF" Indicator Light Remains Illuminated After the Engine is Started. INSPECTION PROCEDURE 4: The TCL Work Indicator Light Remains Illuminated After the Engine is Started.



CIRCUIT OPERATION

- The TCL automatically goes to ON, when the ignition is turned to the "ON" position. To deactivate the TCL, press the TCL switch. To reactivate the TCL, press the TCL switch again.

- ABS/TCL-ECU send the illumination signal of "TCL OFF" indicator light and TCL work indicator light to the combination meter via the CAN communication.
- ABS/TCL-ECU operates the "TCL OFF" indicator light and the TCL work indicator light for three seconds after the ignition switch is turned "ON" position for bulb check.

NOTE: If you press the TCL switch to deactivate the TCL and then keep the TCL switch pressed for about 10 seconds, an error prevention function will automatically reactivate the TCL. If you then still wish to deactivate the TCL, press the TCL switch again to deactivate it.

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

COMMENT

This may be caused by faults in the CAN bus line, the combination meter or the ABS/TCL-ECU.

TROUBLESHOOTING HINTS

- Malfunction of the combination meter.
- Damaged harness or connector.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using diagnostic tool MB991958, diagnose the CAN bus line.

CAUTION

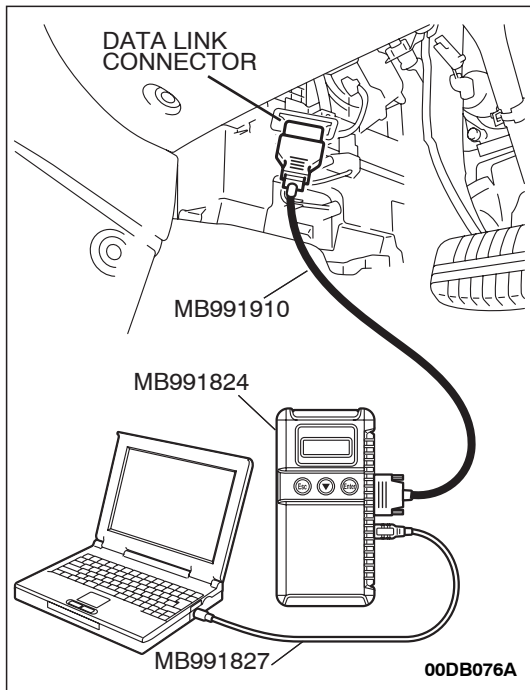
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

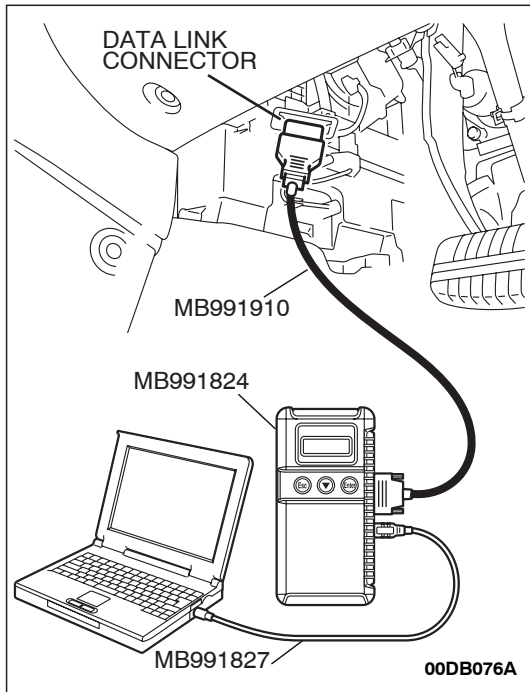
- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to [P.13C-3](#)).
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose the CAN bus line. (Refer to [P.13C-3](#)).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is the check result satisfactory?

YES : Go to Step 2

NO : Repair the CAN bus lines. (Refer to GROUP 54C, Diagnosis – Can Bus Diagnostic Chart [P.54C-15](#)). Then go to Step 4.





STEP 2. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

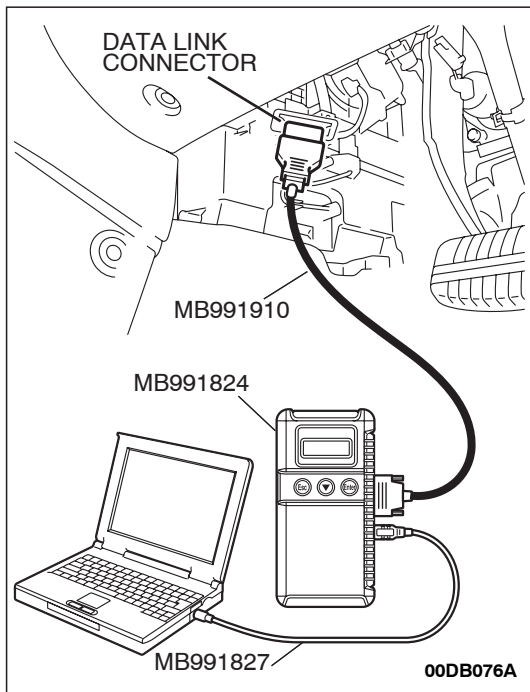
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is any DTC set?

YES : Refer to P.13C-8, Diagnostic Trouble Code Chart.
Then go to Step 4.

NO : Go to Step 3.



STEP 3. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.17-11).
- (2) Turn the ignition switch to the "ON" position.
- (3) Check for Combination meter system diagnostic trouble code. (Refer to GROUP 54A, Combination Meter Assembly Diagnosis – Diagnosis Function – How to Read and Erase Diagnostic Trouble Code P.54A-46).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is DTC U1102 set?

YES : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit P.35B-93). Then go to Step 4.

NO : Replace the combination meter assembly. (Refer to GROUP 54A – Combination Meter Assembly P.54A-142). Then go to Step 4.

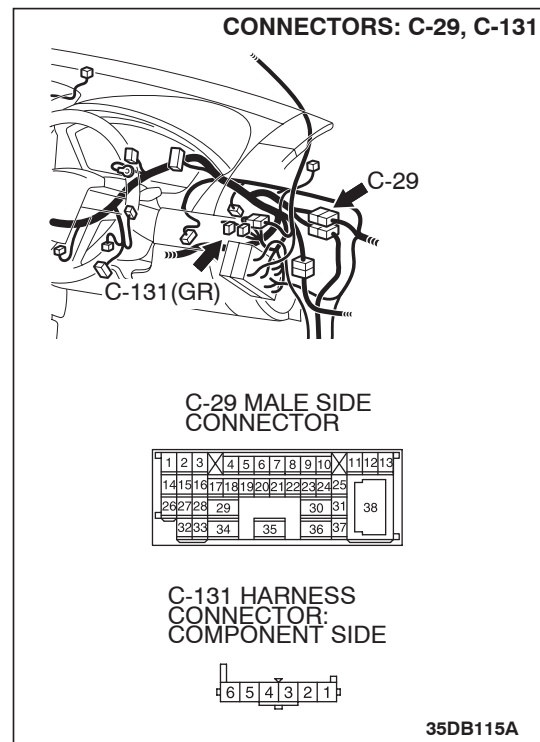
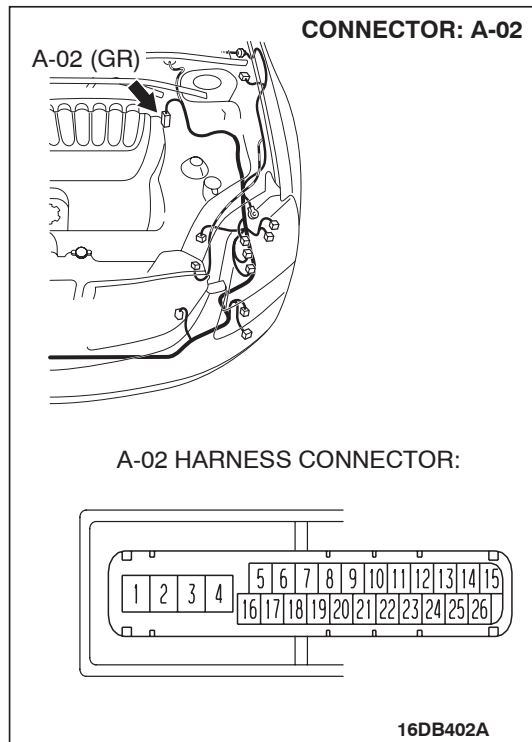
STEP 4. Retest the system

Q: Turn the ignition switch to the "ON" position. Do the "TCL OFF" indicator light and the TCL work indicator light illuminate for three seconds, and then go out after the engine starts?

YES : The procedure is complete.

NO : . Return to Step 1.

INSPECTION PROCEDURE 5: When the TCL Switch is Pushed On, TCL does not Cancel.



NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

CIRCUIT OPERATION

ABS/TCL-ECU terminal 21 is grounded every time the TCL switch is pressed. ABS/TCL-ECU monitors this operation state and turns the TCL ON or OFF.

COMMENT

The cause is probably an open-circuit in the TCL switch circuit.

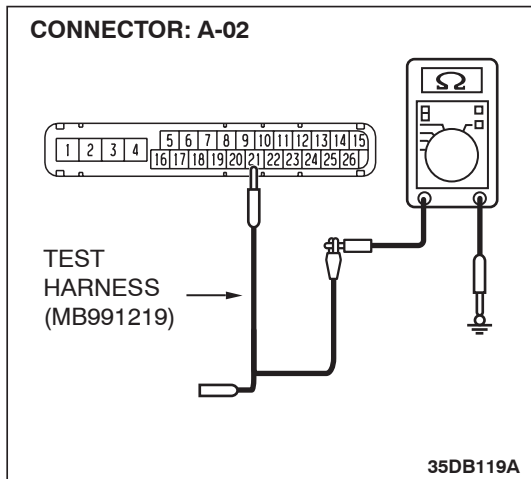
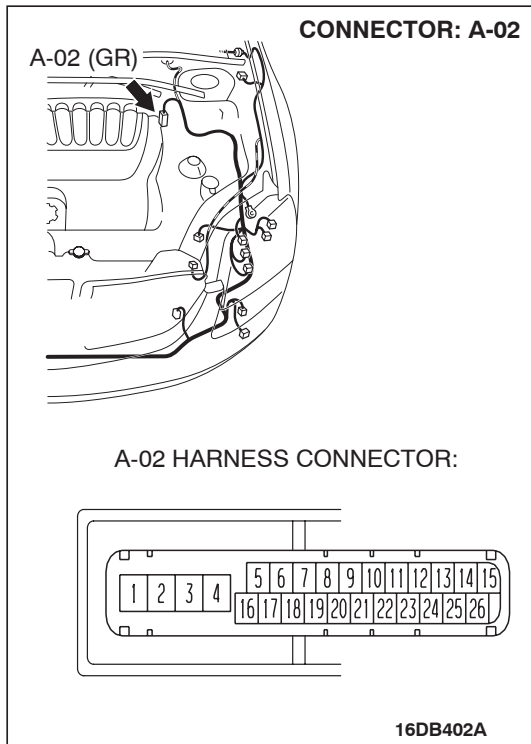
TROUBLESHOOTING HINTS

- Malfunction of the TCL switch.
- Damaged harness or connector.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB991219: Inspection Test Harness



STEP 1. Measure the resistance at ABS/TCL-ECU connector A-02.

(1) Disconnect the ABS/TCL-ECU connector A-02.

(2) Measure the resistance at the ABS/TCL-ECU wiring harness-side connector A-02 using the Inspection test harness MB991219 (by inserting probe) and body ground.

NOTE: The special tool (Inspection test harness) MB991219 for connector pin contact pressure should be used. The test probe should never be forcibly inserted, as it may cause a defective contact.

(3) Turn the ignition switch to the "OFF" position.

(4) Measure the resistance by probing ABS/TCL-ECU connector A-02 terminal 21 (using inspection test harness MB991219) and ground.

NOTE: The special tool (Inspection test harness) MB991219 for connector pin contact pressure should be used. The test probe should never be forcibly inserted, as it may cause a defective contact.

- When the TCL switch is not pressed, the resistance should indicate an open circuit (more than 2 ohms).
- When the TCL switch is pressed, the resistance should measure 2 ohms or less.

(5) Turn the ignition switch to the "LOCK" (OFF) position.

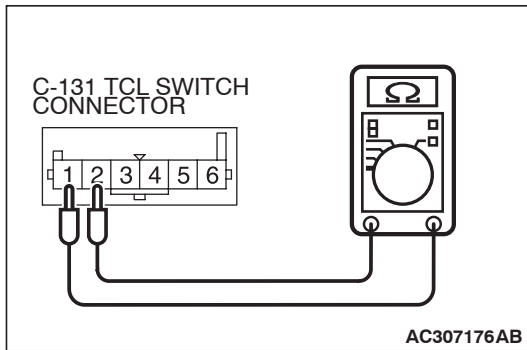
(6) Disconnect inspection test harness MB991219.

(7) Connect the ABS/TCL-ECU connector A-02.

Q: Is the resistance value more than 2 ohms when the TCL switch is not pressed, and is the resistance value less than 2 ohms when the TCL switch is pressed?

YES : Go to Step 6.

NO : Go to Step 2.



STEP 2. Check the TCL switch.

- (1) Remove the TCL switch. (Refer to [P.13C-49](#)).
- (2) Connect an ohmmeter to the TCL switch between terminals 1 and 2.
- (3) Check for continuity between terminals 1 and 2 when the TCL switch is operated.
 - There is no continuity between terminals 1 and 2 when the TCL switch is not pressed.
 - There is continuity between terminals 1 and 2 when the TCL switch is pressed.

Q: Is there no continuity between terminals 1 and 2 when the TCL switch is not pressed, and is there continuity when the TCL switch is pressed?

YES : Install the TCL switch. (Refer to [P.13C-49](#)). Then go to Step 3.

NO : Replace the TCL switch. (Refer to [P.13C-49](#)). Then go to Step 7.

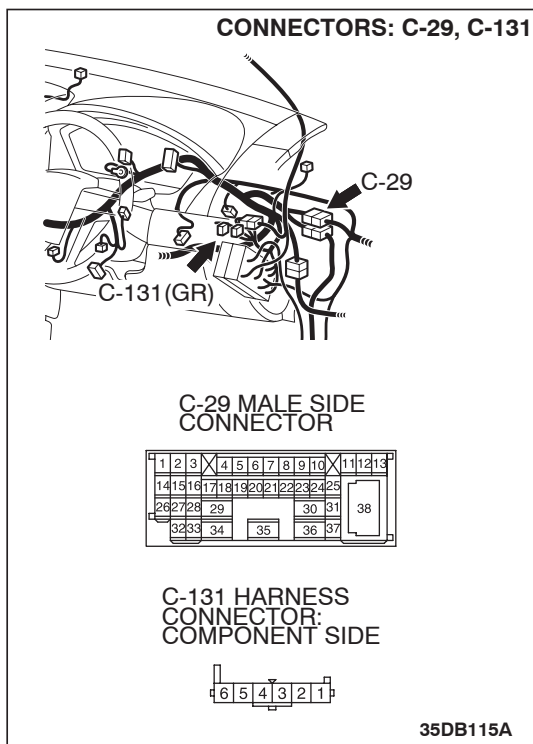
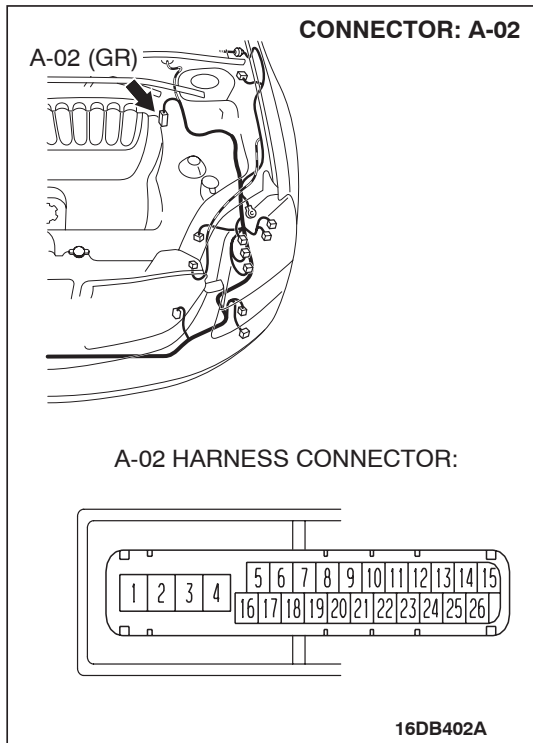
STEP 3. Check ABS/TCL-ECU connector A-02, intermediate connector C-29 and TCL switch connectors C-131 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are there connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the faulty connector. (Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#)). Then go to Step 7.

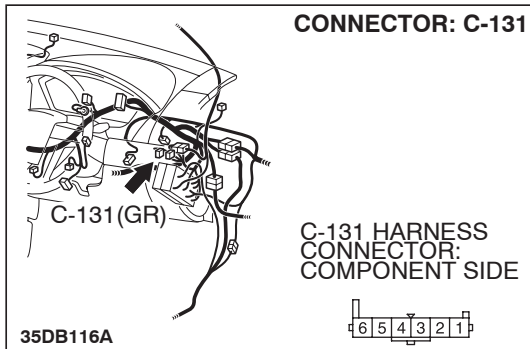
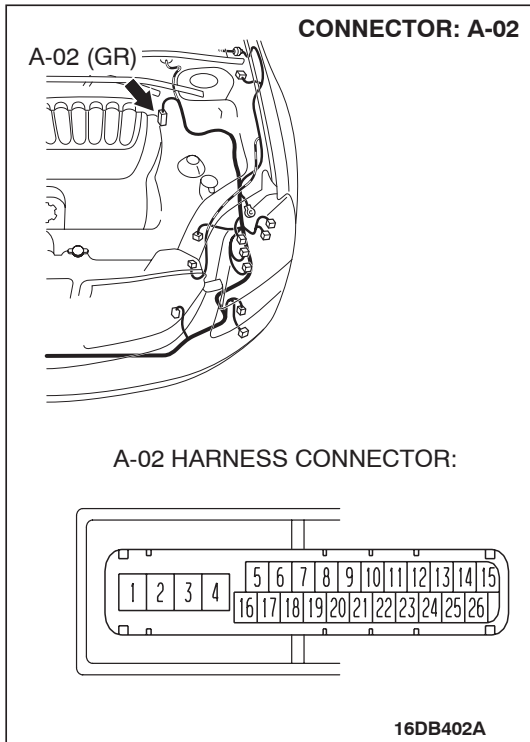


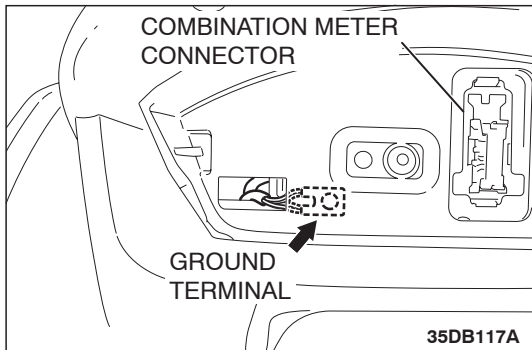
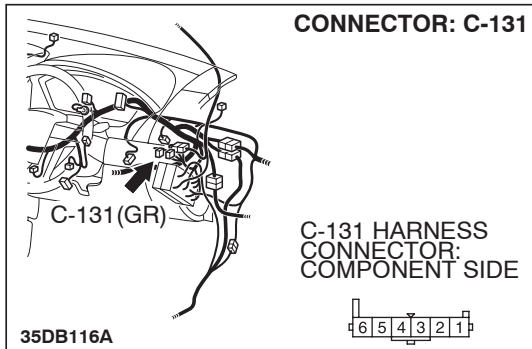
STEP 4. Check the harness wire between ABS/TCL-ECU connector A-02 terminal 21 and TCL switch connector C-131 terminal 1 for damage.

Q: Are there harness wires in good condition?

YES : Go to Step 5.

NO : Repair the damaged harness wire. Then go to Step 7.





STEP 5. Check the harness wire between TCL switch connector C-131 terminal 2 and ground for damage.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair the damaged harness wire. Then go to Step 7.

STEP 6. Retest the system

Q: Does TCL system cancel, when the TCL switch is pushed on?

YES : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#)).

NO : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit [P.35B-93](#)). Then go to Step 7.

STEP 7. Retest the system

Q: Does TCL system cancel, when the TCL switch is pushed on?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 6: TCL does not Operate.

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

COMMENT

The fail-safe function is probably cancelling TCL. In this case, diagnostic tool MB991958 can be used to retest each system by checking the diagnostic trouble codes.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CASE:)

- Malfunction of the CAN bus line.
- Malfunction of the MPI system.
- Malfunction of the A/T system.
- Malfunction of the ABS/TCL-ECU.

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using diagnostic tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

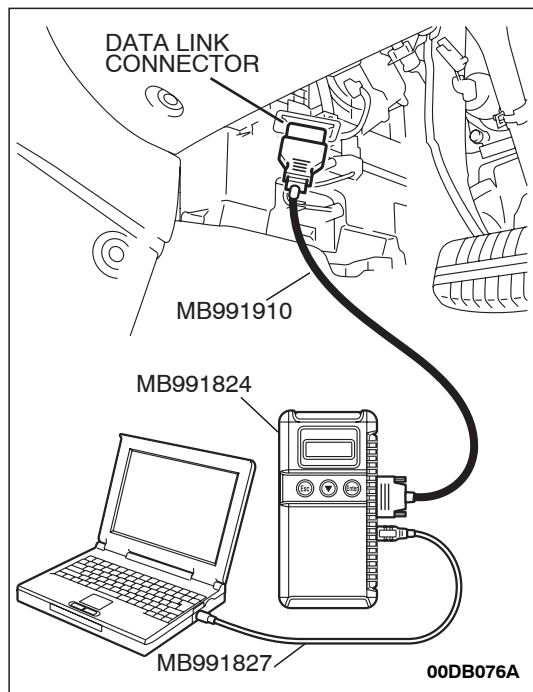
To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

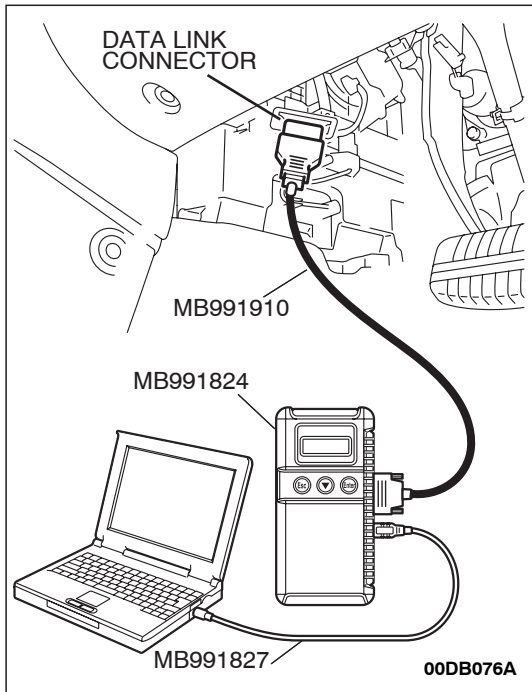
- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.
- (3) Use diagnostic tool MB991958 to read the TCL diagnostic trouble codes. (Refer to P.13C-3).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Is any DTC set?

YES : Repair the TCL. (Refer to P.13C-8, Diagnostic Trouble Code Chart). Then go to Step 4.

NO : Go to Step 2.





STEP 2. Using diagnostic tool MB991958, check TCL actuator test item09: Engine TCL Drive.

⚠ CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

- (1) Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
- (2) Turn the ignition switch to the "ON" position.

⚠ CAUTION

The engine speed increases after the actuator test because the actuator test continues for only three seconds. Therefore, release the accelerator pedal immediately.

- (3) Use diagnostic tool MB991958 to check the actuator test. (Refer to P.13C-3).
 - Item 09: Engine TCL Drive.
 - When the accelerator pedal is depressed at the same time that the button for actuator test item 09 displayed on diagnostic tool MB991958 is pressed, the system prevents the engine speed from rising for three seconds.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.
- (5) Disconnect diagnostic tool MB991958.

Q: Are the check results for actuator test item 09 satisfactory?

YES : Go to Step 3.

NO : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit P.35B-93). Then go to Step 4.

STEP 3. Retest the system

Q: Does the TCL work normally?

YES : It can be assumed that this malfunction is intermittent. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-14).

NO : Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B – Hydraulic Unit P.35B-93). Then go to Step 4.

STEP 4. Retest the system

Q: Does the TCL work normally?

YES : The procedure is complete.

NO : Return to Step 1.

DATA LIST REFERENCE TABLE

M1136003500071

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

The following items can be read by the diagnostic tool from the ABS/TCL-ECU input data. (Refer to P.13C-3).

MUT-III DIAGNOSTIC TOOL DISPLAY	ITEM NO.	CHECK ITEM	CHECKING REQUIREMENTS	NORMAL VALUE
FL wheel speed sensor	01	Front left wheel speed sensor	Drive the vehicle	Vehicle speeds displayed on the speedometer and diagnostic tool are identical.
FR wheel speed sensor	02	Front right wheel speed sensor		
RL wheel speed sensor	03	Rear left wheel speed sensor		
RR wheel speed sensor	04	Rear right left wheel speed sensor		
Power supply voltage	05	ABS/TCL-ECU power supply voltage	Ignition switch power supply voltage	Battery positive voltage
Stoplamp switch (input)*	06	Stoplamp switch	Depress the brake pedal.	ON
			Release the brake pedal.	OFF
Stoplamp switch*	13	Stoplamp switch	Depress the brake pedal.	ON
			Release the brake pedal.	OFF
Pump motor	21	Pump motor	When the ABS outputs the operation permission signal during driving	ON
			When the ABS outputs the operation permission signal during driving	OFF
Valve relay	30	Valve relay	When the ABS outputs the operation permission signal during driving	ON
			When the ABS outputs the operation permission signal during driving	OFF
TCL mode	35	TCL operation	When the TCL outputs the operation permission signal during driving	ON
			When the TCL outputs the operation inhibition signal during driving	OFF

NOTE: Since the TCL is controlled with the same ABS/TCL-ECU used to control the ABS, the stoplight switch check item (No.6) used only for the ABS also appear.

ACTUATOR TEST REFERENCE TABLE

M1136003600067

NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/ short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

The diagnostic tool activates the following actuators for testing. (Refer to [P.13C-3](#)).

MUT-III DIAGNOSTIC TOOL DISPLAY	ITEM NO.	CHECK ITEM	PARTS TO BE ACTIVATED
FL wheel ABS Drive*	01	Solenoid valve for front left wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
FR wheel ABS Drive*	02	Solenoid valve for front right wheel	
RL wheel ABS Drive*	03	Solenoid valve for rear left wheel	
RR wheel ABS Drive*	04	Solenoid valve for rear right wheel	
Engine TCL Drive	09	TCL operation check	Outputs the engine torque control signal (engine torque = 0) to PCM for three seconds.

NOTE: Since the TCL is controlled with the same ABS/TCL-ECU used to control the ABS, the FL, FR, RL or RR Wheel ABS Drive testing items (No.01 to 04) used only for the ABS also appear.

CHECK AT ABS/TCL-ECU CONNECTOR: A-02 RESISTANCE AND TERMINAL VOLTAGE

M1136003800072

RESISTANCE AND TERMINAL VOLTAGE CHECK CHART

Required Special Tools:

MB991219: Inspection Test Harness

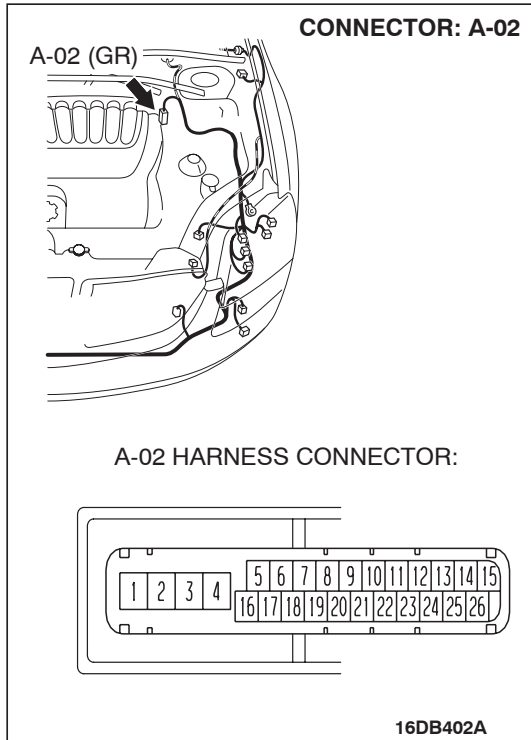
MB991223: Harness Set

1. Disconnect the ABS/TCL-ECU connector A-02.

2. Measure the resistance and terminal voltage at the ABS/TCL-ECU wiring harness-side connector A-02 using the Inspection test harness MB991219 (by inserting probe) between terminals shown in the table below and body ground.

NOTE: The special tool (Inspection test harness) MB991219 for connector pin contact pressure should be used. The test probe should never be forcibly inserted, as it may cause a defective contact.

3. The terminal layouts are shown in the illustrations below.



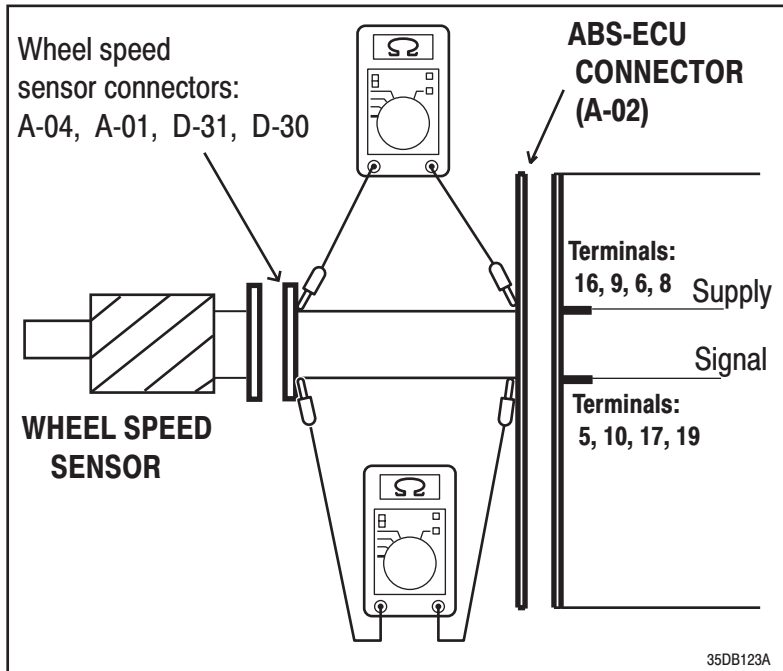
CONNECTOR TERMINAL NO	SIGNAL	CHECKING REQUIREMENT		NORMAL CONDITION
21	TCL switch	Ignition switch: "ON"	When the TCL switch is not pressed.	More than 2 ohms (open circuit)
			When the TCL switch is pressed.	Less than 2 ohms
18	ABS/TCL-ECU power supply	Ignition switch: "ON"		Battery positive voltage
		Ignition switch: "START"		1 V or less

RESISTANCE AND CONTINUITY BETWEEN ABS-ECU AND WHEEL SPEED SENSOR HARNESS-SIDE CONNECTOR TERMINALS

Required Special Tools:

MB991219: Inspection Test Harness

MB991223: Harness Set



1. Disconnect the ABS/TCL-ECU connector A-02 and the related wheel speed sensor connector, then turn the ignition switch to the "LOCK" (OFF) position.
2. Measure the resistance and continuity between the ABS/TCL-ECU wiring harness-side connector A-02 and the Wheel Speed Sensor connectors using the Inspection test harness MB991219 (by inserting probe) and an ohmmeter between terminals shown in the table below.

NOTE: The special tool (Inspection test harness) MB991219 for connector pin contact pressure should be used. The test probe should never be forcibly inserted, as it may cause a defective contact.

3. The terminal layout is shown in the table below.

SIGNAL	TERMINAL NO.		NORMAL CONDITION
	ABS (A-02)	SENSOR	
FR wheel speed sensor (A-01)	9	2	Less than 2 ohms
	10	1	Less than 2 ohms
RR wheel speed sensor (D-30)	8	1	Less than 2 ohms
	19	2	Less than 2 ohms
FL wheel speed sensor (A-04)	16	2	Less than 2 ohms
	5	1	Less than 2 ohms
RL wheel speed sensor (D-31)	6	1	Less than 2 ohms
	17	2	Less than 2 ohms

VOLTAGE AND SIGNAL CHECK AT ABS-ECU (A-02) USING OSCILLOSCOPE

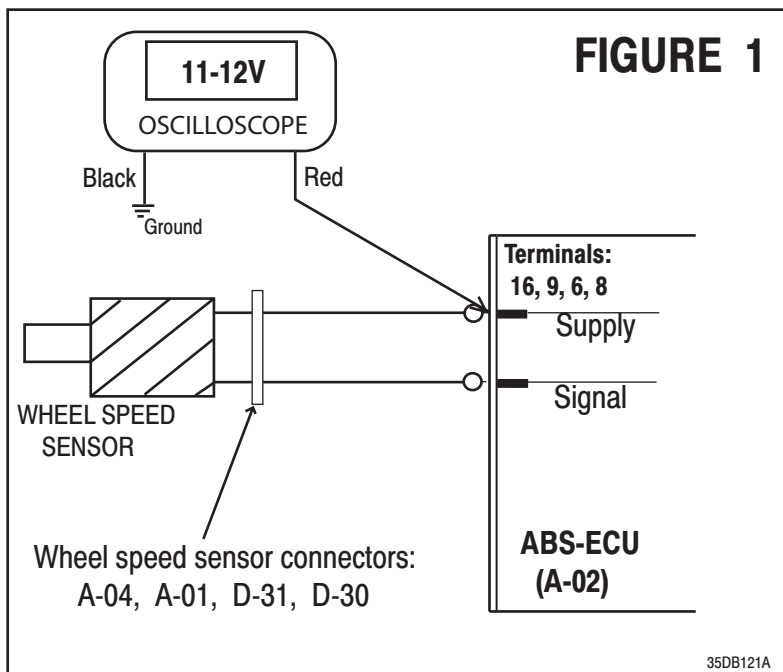
NOTE: If the ABS-8 ECU or the active wheel speed sensor are disconnected, or if the wiring is an open/short circuit, the ABS 8 ECU will shut off power supply to the respective wheel speed sensor. All other wheel speed sensors will operate normally. To restore the power supply, the ignition switch must be turned to the "OFF" position then to the "ON" position again.

WHEEL SPEED SENSOR AIR GAP:

- Sensor air gap: (0.2mm - 0.85mm).

Measure supply voltage for wheel speed sensor using an oscilloscope.

- (1) ABS-ECU must remain connected.
- (2) Wheel speed sensors must remain connected
- (3) Remove ABS connector protection cap to access terminal location from the rear of connector for back-probing.
- (4) Using probe (MB991222) , backprobe the wheel speed sensor voltage supply circuit terminals (16, 9, 6 and 8) at the ABS-ECU connector (A-02) individually.
- (5) Connect oscilloscope (as per figure 1) shows, to the appropriate terminal positions and check supply voltage individually with scope.



- Connect oscilloscope to FL sensor signal terminal (16) at ABS-ECU (A-02)
 - Connect oscilloscope to FR sensor signal terminal (9) at ABS-ECU (A-02)
 - Connect oscilloscope to RL sensor signal terminal (6) at ABS-ECU (A-02)
 - Connect oscilloscope to RR sensor signal terminal (8) at ABS-ECU (A-02)
- (6) Turn the ignition switch to the "ON" position.

(7) The recommended Supply Voltage at terminals 16, 9, 6, and 8 are:

- Set value: 10.0Volts - 14.5Volts

Q: Is the supply voltage within the set value?

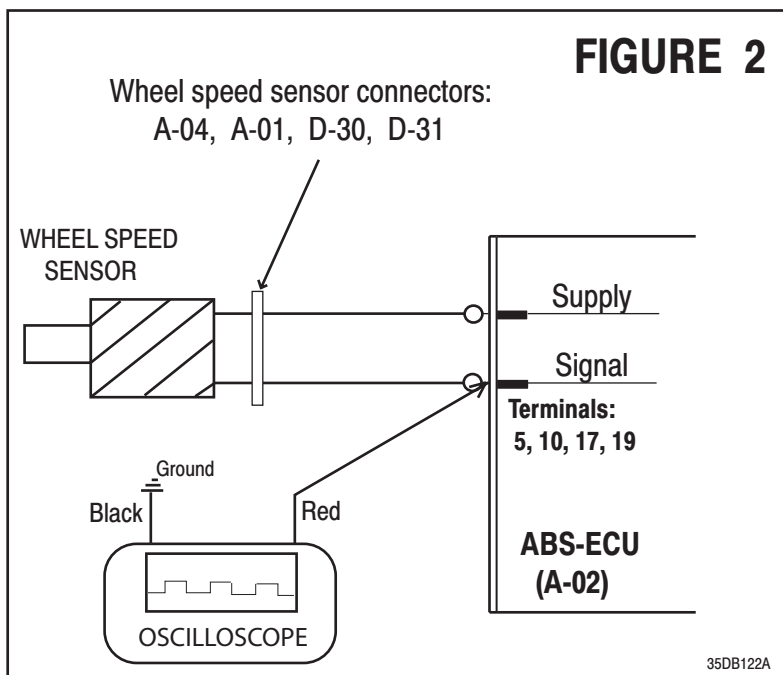
YES : Check wheel speed sensor signal at ABS-ECU using an oscilloscope

- NO** :
- Refer to Power supply system [P.35B-63](#)
 - Refer to Motor supply system [P.35B-48](#)
 - Refer to Valve relay system [P.35B-56](#)

Measure wheel speed sensor signals using an oscilloscope.

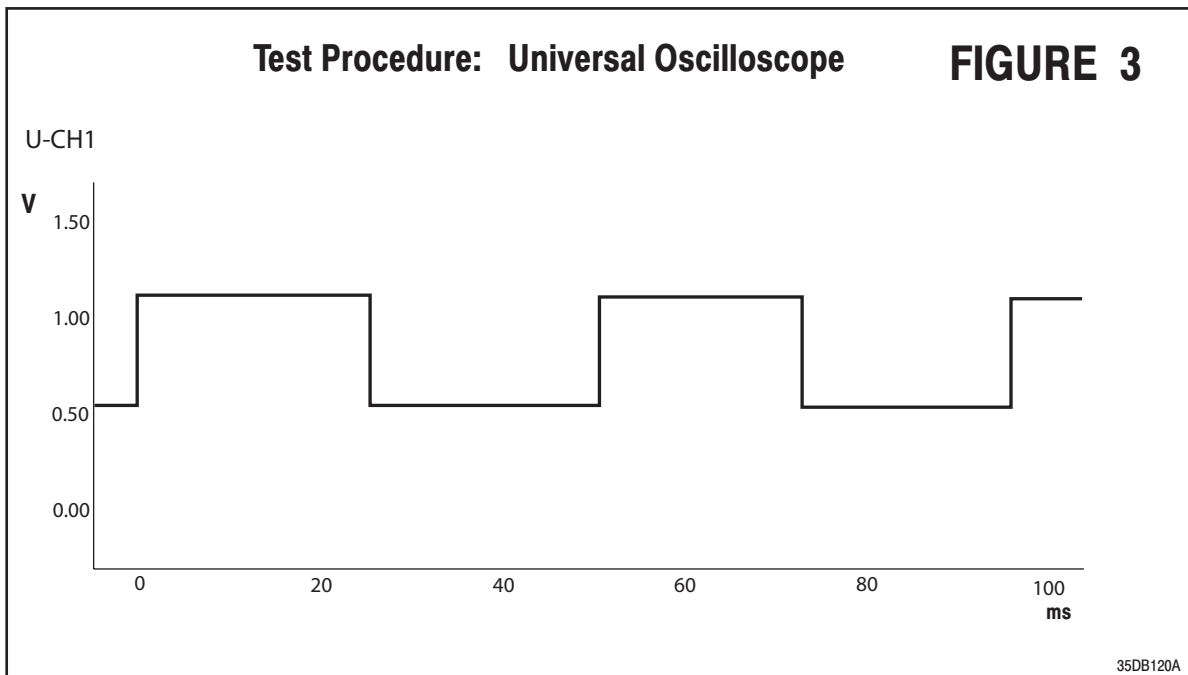
NOTE: To check connections of the wheel speed sensors, remove the rear seat to access the rear wheel speed sensor connectors, and remove inner front guard (splash shield) to access the front wheel speed sensors.

- (1) Wheel speed sensor must remain connected to measure active sensor.
- (2) ABS-ECU must remain connected.
- (3) Remove ABS connector protection cap to access terminal location from the rear of connector for back-probing.
- (4) Using probe (MB991222), backprobe the wheel speed sensor signal circuit terminals (5, 10, 17, 19), and check individually at the ABS-ECU connector A-02
- (5) The wheel to be tested must be free to turn by hand or be driven by brake dynamometer
- (6) Connect oscilloscope (as per figure 2) shows, to the appropriate terminal positions and check sensor operation individually with scope.



- Connect oscilloscope to FL sensor signal terminal (5) at ABS-ECU (A-02)
 - Connect oscilloscope to FR sensor signal terminal (10) at ABS-ECU (A-02)
 - Connect oscilloscope to RL sensor signal terminal (17) at ABS-ECU (A-02)
 - Connect oscilloscope to RR sensor signal terminal (19) at ABS-ECU (A-02)
- (7) Recommended Oscilloscope setting:
- Y-axis: 2Volts
 - X-axis: 100ms
- (8) Turn the ignition switch to the "ON" position.
- (9) Turn wheel by hand at approximately 1 revolution per second (r/sec) or drive on brake dynamometer at 5km/h.

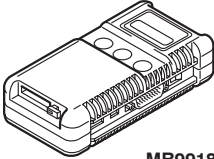
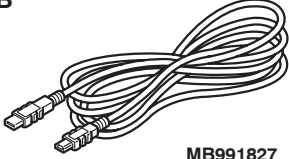
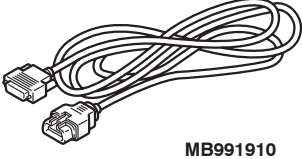
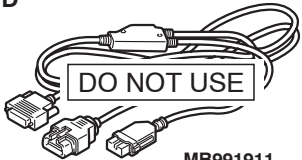
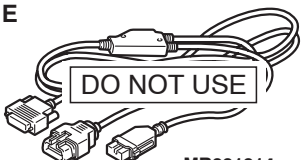
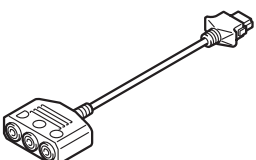
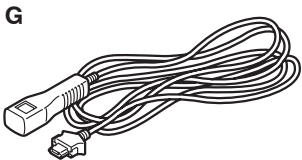
The measurement reading of the active wheel speed sensors on the oscilloscope should correspond to figure 3 below.


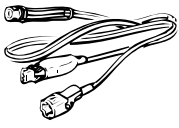
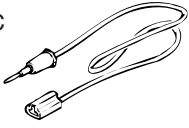



NOTE: If the oscilloscope signal shape is correct and wheel sensor air gap is within specification, but the voltage values are either higher or lower as shown in the table below, the wheel speed sensor must be changed.

SPECIAL TOOLS

M1136000600024

TOOL	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991914</p> <p>F</p>  <p>MB991825</p> <p>G</p>  <p>MB991826 MB991958</p>	<p>MB991958</p> <p>A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991914 F: MB991825 G: MB991826</p> <p>MUT-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.) B: MUT-III USB cable C: MUT-III main harness A (Vehicles with CAN communication system) D: MUT-III main harness B (Vehicles without CAN communication system) E: MUT-III main harness C (for Daimler Chrysler models only) F: MUT-III measurement adapter G: MUT-III trigger harness</p>	<p>MB991824-KIT</p> <p><i>NOTE: G: MB991826 MUT-III trigger harness is not necessary when pushing V.C.I. ENTER key.</i></p>	<p>Checking diagnostic trouble codes</p> <p>CAUTION</p> <p>For vehicles with CAN communication, use MUT-III main harness A to send simulated vehicle speed. If you connect MUT-III main harness B instead, the CAN communication does not function correctly.</p>

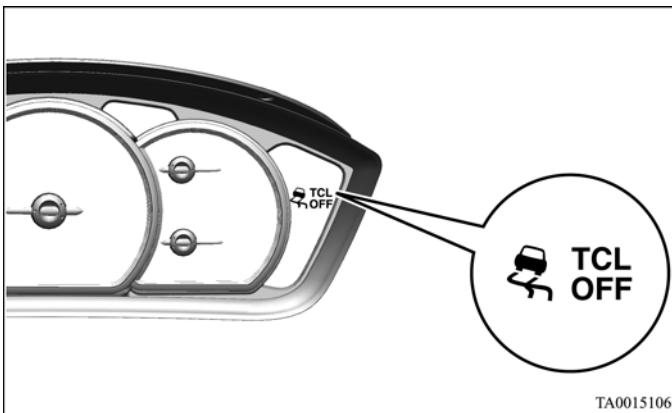
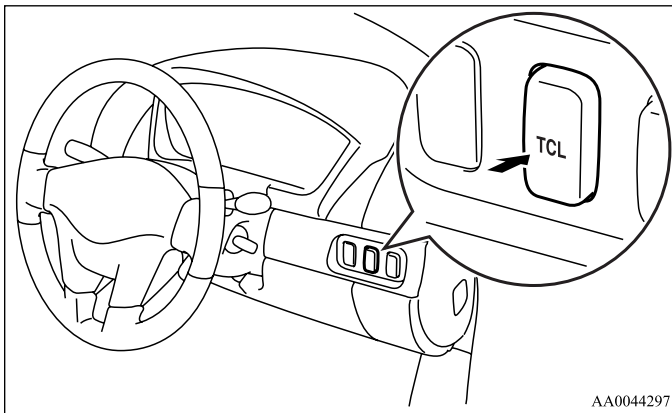
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>MB991223AD</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p> <p>Harness set</p> <p>A: Inspection harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>General service tools</p>	<p>Checking the continuity and measuring the voltage at the harness connector</p>

ON-VEHICLE SERVICE

TCL INDICATOR LIGHT CHECK

M1136000900058

1. Check that the "TCL OFF" indicator light and the TCL work indicator light illuminate for three seconds when the ignition switch is turned to the "ON" position.
2. Check that the "TCL OFF" indicator light illuminates and goes off in cycles each time the TCL switch is pushed after starting the engine.
3. Check that the "TCL OFF" indicator light and the TCL work indicator light do not illuminate, when driving at 30km/h (37.5 mph) for more than 2 seconds.
4. If defective, repair it. (Refer to [P.13C-23](#), TCL diagnosis – Symptom Procedures – Inspection Procedure 1, 2, 3 and 4).

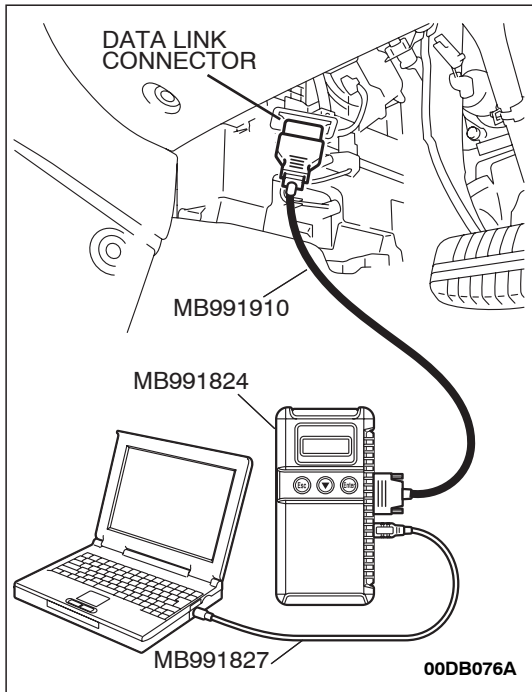


TCL OPERATION CHECK

M1136001100055

Required Special Tools:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



CAUTION

To prevent damage to diagnostic tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool MB991958.

1. Connect diagnostic tool MB991958 to the data link connector. (Refer to P.13C-3).
2. Turn the ignition switch to the "ON" position.

CAUTION

The engine speed increases after the actuator test because the actuator test continues for only three seconds. Therefore, release the accelerator pedal immediately.

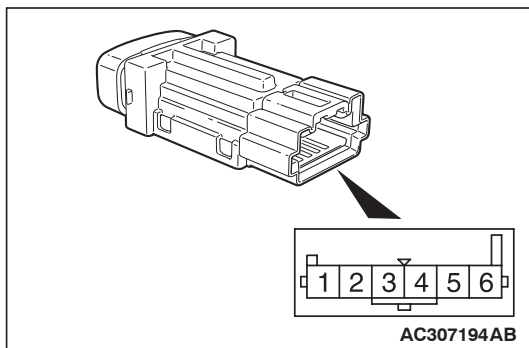
3. Use diagnostic tool MB991958 to check the actuator test. (Refer to P.13C-3).
 - Item 09: Engine TCL Drive.
 - When the accelerator pedal is depressed at the same time that the button for actuator test item 09 displayed on diagnostic tool MB991958 is pressed, the system prevents the engine speed from rising for three seconds.
4. Turn the ignition switch to the "LOCK" (OFF) position.
5. Disconnect diagnostic tool MB991958.
6. If defective, repair it. (Refer to P.13C-34, TCL diagnosis – Symptom Procedures – Inspection Procedure 6).

TCL SWITCH CHECK

M1136001700024

1. Remove the TCL switch. (Refer to P.13C-49).
2. Measure the resistance between terminal 1 and terminal 2 when the TCL switch is pressed or released. If the values measured at the time correspond to those in the table below, the resistance values are correct.

SWITCH POSITION	TESTER CONNECTION	SPECIFIED CONDITION
Pressed	1-2	Less than 2 ohms
Released	1-2	Open circuit



WHEEL SPEED SENSOR CHECK

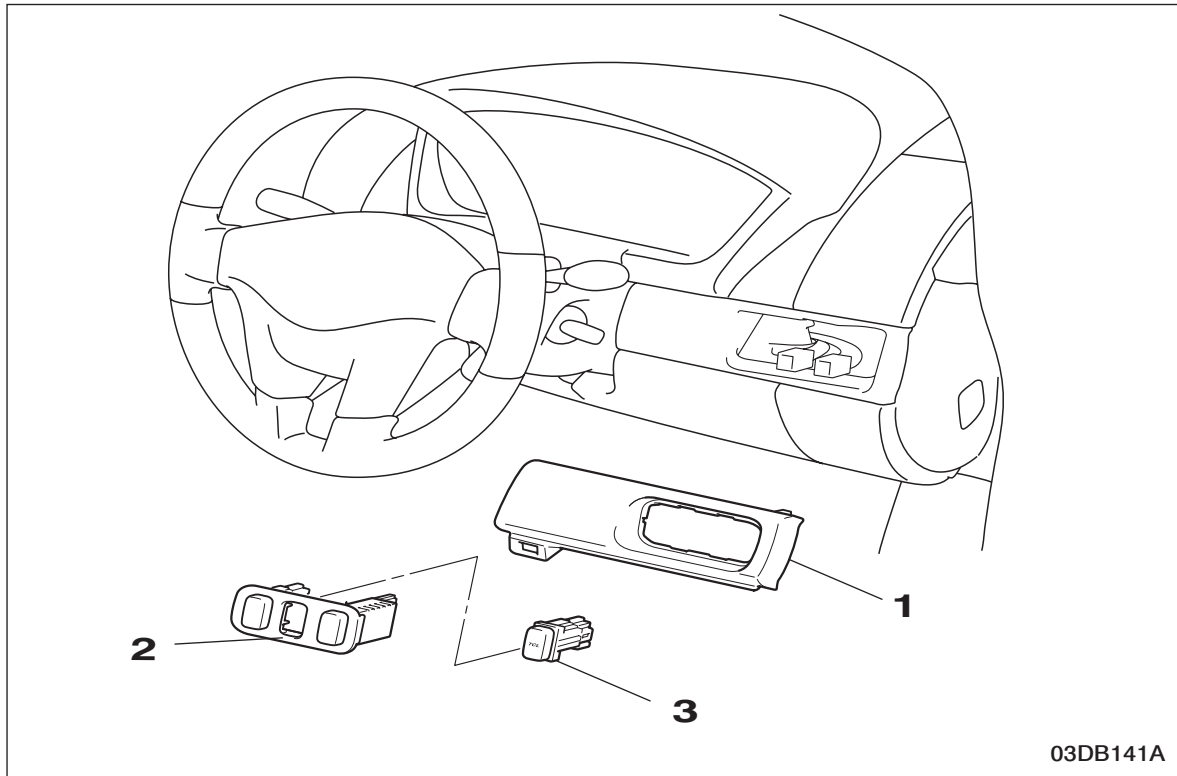
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Refer to GROUP 35B, On-vehicle Service P.35B-88.

TCL SWITCH

REMOVAL AND INSTALLATION

M1136001600027



REMOVAL STEPS

- HOOD LOCK RELEASE HANDLE (REFER TO GROUP 42, HOOD [P.42-8.](#))
- INSTRUMENT LOWER PANEL (REFER TO GROUP 52A, INSTRUMENT PANEL ASSEMBLY [P.52A-4.](#))

REMOVAL STEPS (Continued)

- INSTRUMENT PANEL GARNISH (REFER TO GROUP 52A, INSTRUMENT PANEL ASSEMBLY [P.52A-4.](#))
1. SWITCH BEZEL ASSEMBLY
 2. SWITCH PANEL ASSEMBLY
 3. TCL SWITCH

WHEEL SPEED SENSOR

REMOVAL AND INSTALLATION

Refer to GROUP 35B, Wheel Speed Sensor [P.35B-95.](#)

M1136002500023

ABS/TCL-ECU

REMOVAL AND INSTALLATION

Replace the hydraulic unit (integrated with ABS/TCL-ECU). (Refer to GROUP 35B, Hydraulic Unit [P.35B-93.](#))

M1136005300017

