GROUP 35C

TRACTION CONTROL SYSTEM (TCL)

CONTENTS

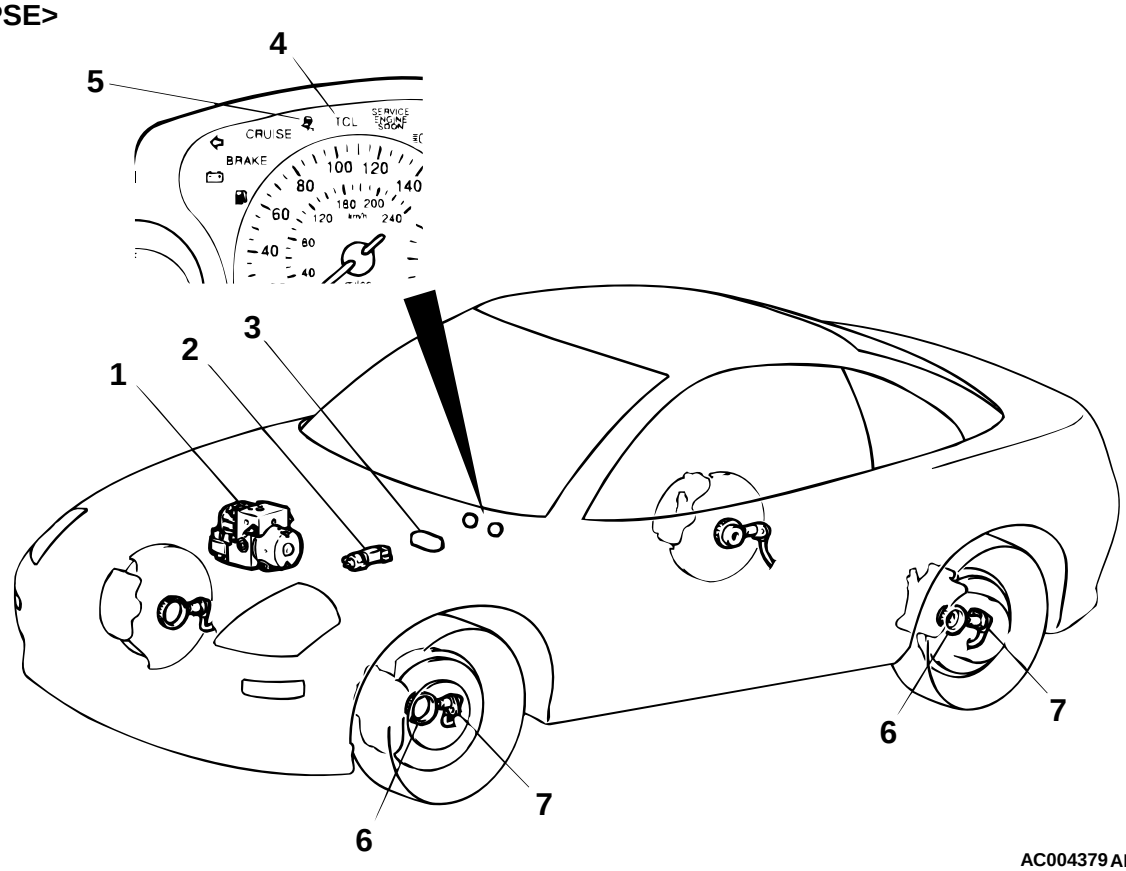
GENERAL DESCRIPTION

M1354000100041

If the throttle is opened excessively when a vehicle is started or accelerated, the driving wheels may slip due to excessive drive torque. This adversely affects startability, accelerating ability or controllability. To ensure startability, accelerating ability and controllability, this TCL system will prevent wheel slip by controlling (applying) brake fluid pressure to the drive wheels to adjust the driving torque according to road conditions. Each wheel-speed sensor detects wheel speed and converts it to an electric signal. The ABS-ECU determines which wheel begins to slip according to that signal. If the ABS-ECU determines wheel slip, it activates the solenoid valves and the pump inside the hydraulic unit to prevent the wheel slip by applying brake ensuring controllability. This TCL system is controlled by the ABS-ECU, and the TCL components are shared by the ABS system. If the ABS hydraulic unit is faulty, the ABS-ECU must be replaced.

CONSTRUCTION DIAGRAM

<ECLIPSE>



1. HYDRAULIC UNIT (INTEGRATED WITH ABS-ECU)
2. STOPLIGHT SWITCH
3. DATA LINK CONNECTOR
4. TCL INDICATOR LIGHT
5. TCL WARNING LIGHT
6. ABS ROTOR
7. WHEEL SPEED SENSOR

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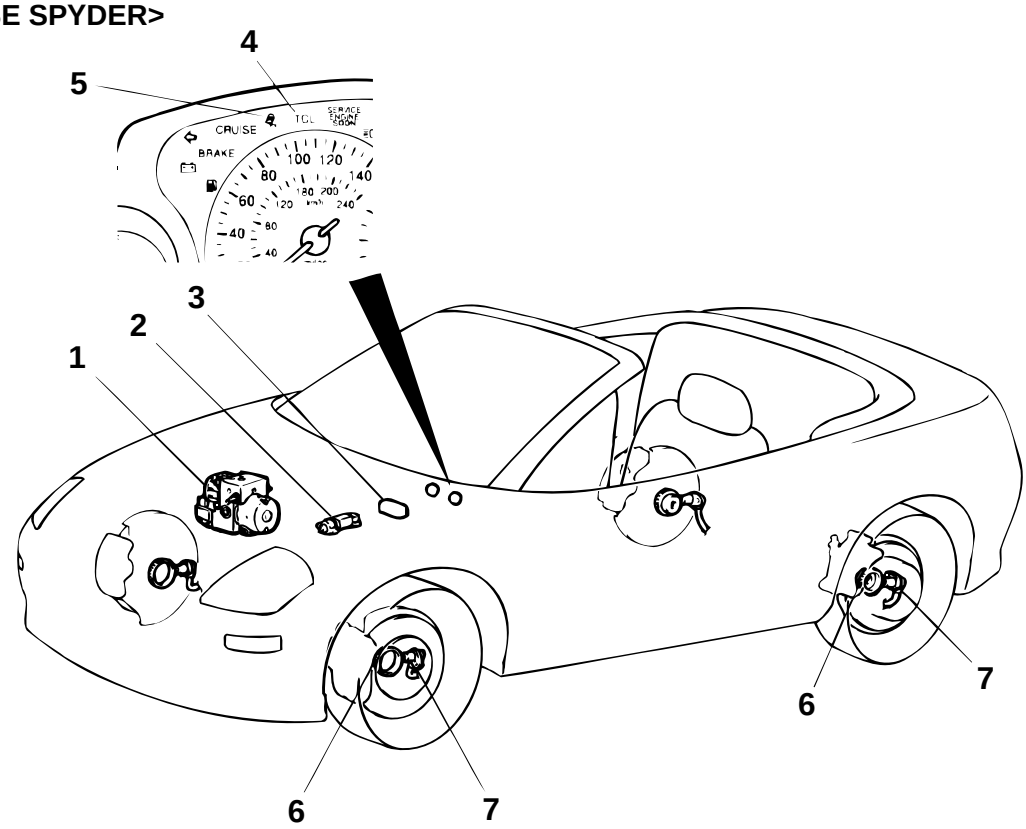

1. HYDRAULIC UNIT (INTEGRATED WITH ABS-ECU)
2. STOPLIGHT SWITCH
3. DATA LINK CONNECTOR
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5. TCL WARNING LIGHT
6. ABS ROTOR
7. WHEEL SPEED SENSOR

System Check Sound

When starting the engine and moving the vehicle for the first time after startup, a thudding sound can sometimes be heard coming from the engine compartment. This is a normal sound during the ABS and TCL unit self-check.

ABS Operation Sounds and Sensations

During normal operation, the ABS makes several sounds that may seem unusual at first:
A whining sound is caused by the ABS hydraulic unit motor.

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TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS

TCL DIAGNOSTIC TROUBLE CODE DETECTION CONDITIONS

M1354003500048

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.

TCL DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1354000400042

Refer to GROUP 35B, Diagnosis – ABS Diagnostic Troubleshooting Strategy P.35B-3.

TCL TROUBLE CODE DIAGNOSIS

M1354000500050

Retrieving TCL Diagnostic Trouble Codes

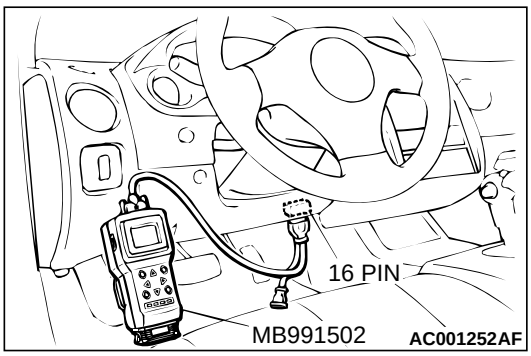
USING SCAN TOOL MB991502

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting the scan tool MB991502.



1. Connect scan tool MB991502 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Use scan tool MB991502 to check for TCL diagnostic trouble codes.
4. Turn the ignition switch to the "LOCK" (OFF) position.
5. Disconnect scan tool MB991502.

USING THE ABS WARNING LIGHT AND SPECIAL TOOL MB991529

NOTE: The TCL system is controlled by the ABS-ECU. TCL diagnostic trouble codes are also indicated by flashing of the ABS warning light.

Required Special Tool:

- MB991529: Diagnostic Trouble Code Check Harness

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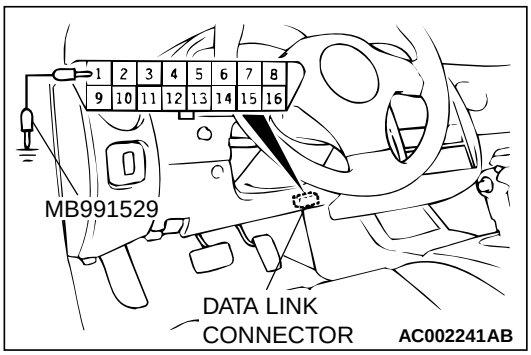
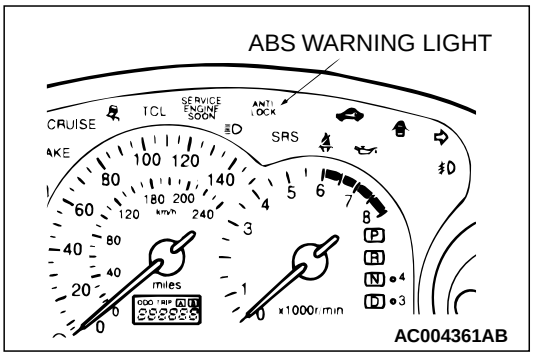


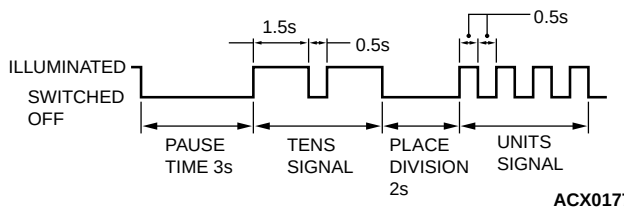
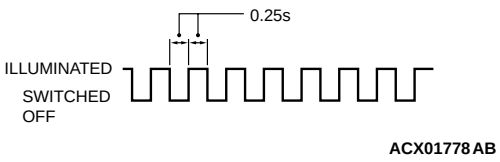
1. Use special tool MB991529 to ground number 1 terminal of the data link connector.

⚠ CAUTION

Do not depress the brake pedal after the ignition switch is turned "ON." If the brake pedal is depressed while the ABS is inoperative and the ignition switch is "ON," the ABS warning light will remain on. Because of this, diagnostic trouble codes will not be read out.

2. Turn the ignition switch to the "ON" position.
3. Read out a diagnostic trouble code by observing how the warning light flashes.



WHEN THE DIAGNOSTIC TROUBLE CODE NO. 24 IS OUTPUT	WHEN NO DIAGNOSTIC TROUBLE CODE IS OUTPUT
	

4. Disconnect special tool MB991529.

Erasing TCL Diagnostic Trouble Codes

USING SCAN TOOL MB991502

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

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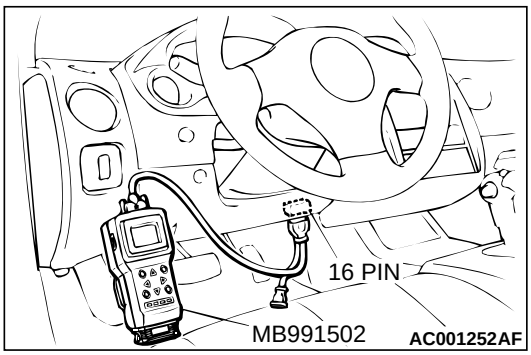


⚠ CAUTION

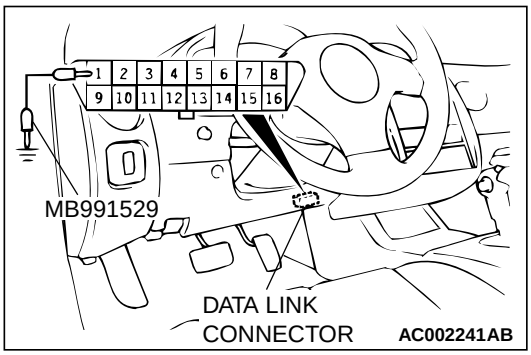
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting the scan tool MB991502.

1. Connect scan tool MB991502 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Use scan tool MB991502 to erase ABS diagnostic trouble codes.
4. Turn the ignition switch to the "LOCK" (OFF) position.
5. Disconnect scan tool MB991502.

BY SPECIAL OPERATION FOR BRAKE PEDAL

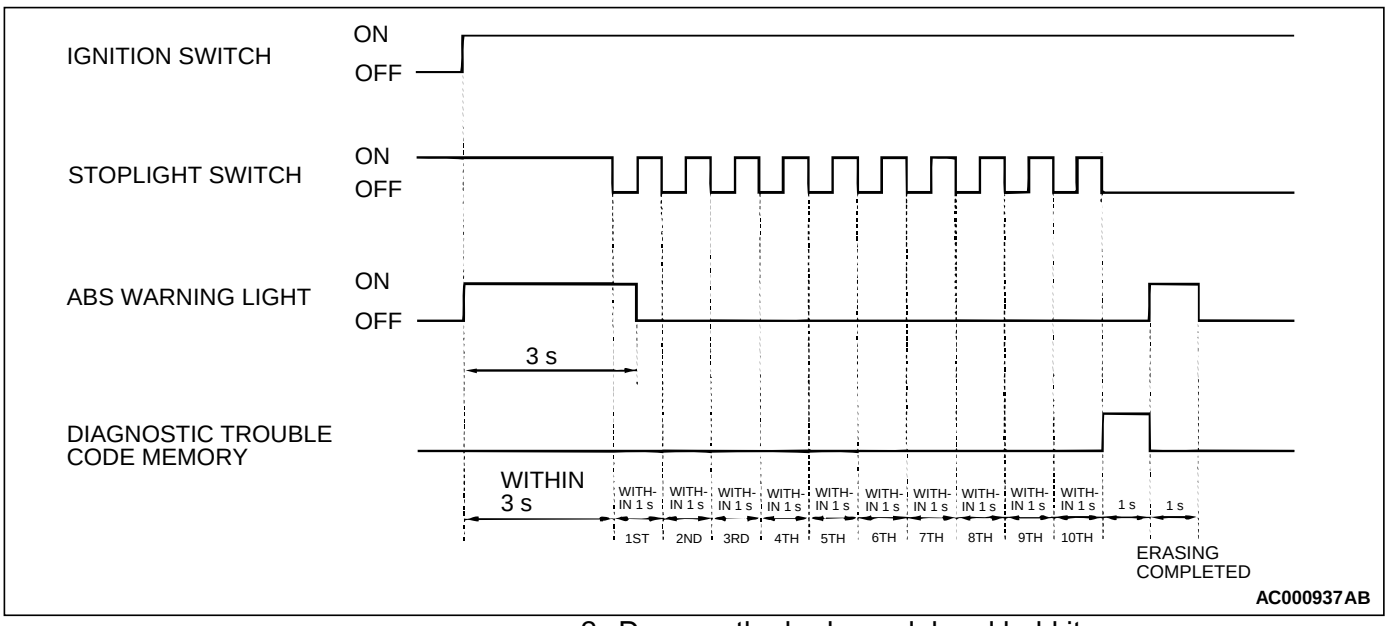
Required Special Tool:

- MB991529: Diagnostic Trouble Code Check Harness



1. Use special tool MB991529 to ground number 1 terminal of the data link connector.

   NOTE: If the ABS-ECU functions have stopped due to the fail-safe function, the diagnostic code cannot be erased.



2. Depress the brake pedal and hold it.
3. Turn the ignition switch to the "ON" position.
4. After turning the ignition switch to the "ON," release the pedal within three seconds. Repeat this process of pressing and releasing the brake pedal 10 continuous times.

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5. Turn the ignition switch to the "LOCK" (OFF) position.
6. Disconnect special tool MB991529.

DIAGNOSTIC TROUBLE CODE CHART

M1354000600046

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

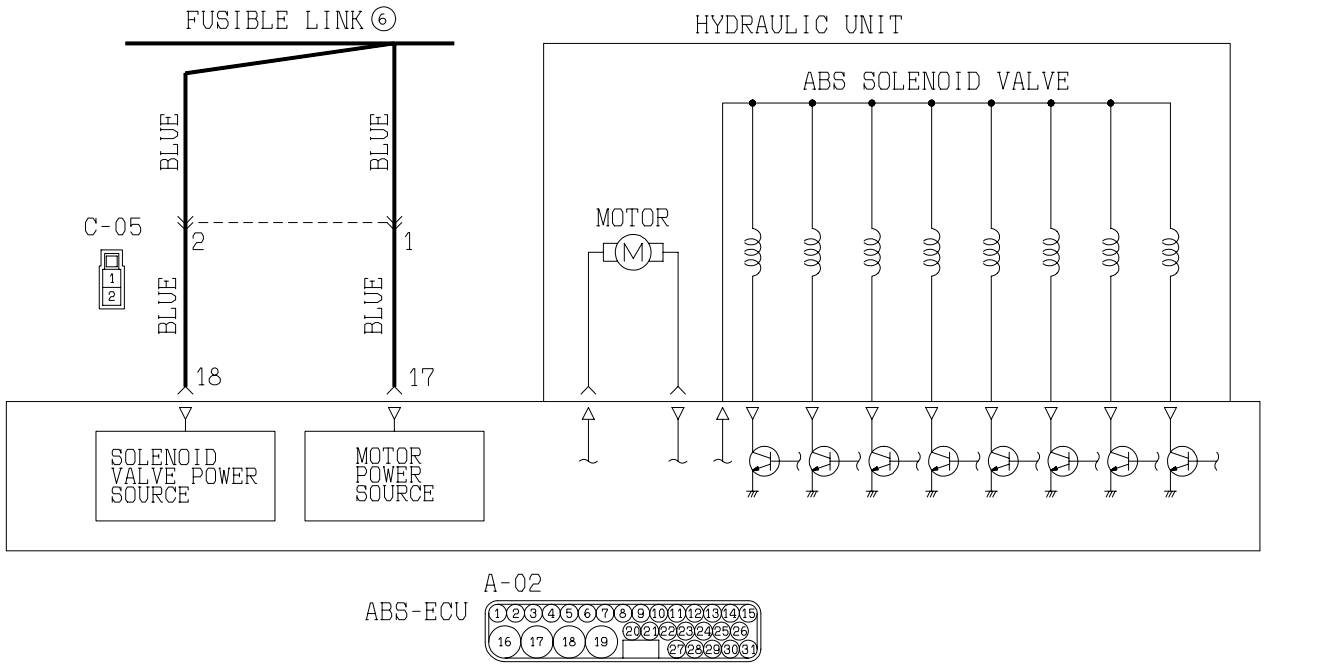
DIAGNOSTIC TROUBLE CODE NO.	INSPECTION ITEM	DIAGNOSTIC CONTENT	REFERENCE PAGE
11	Front right wheel speed sensor	Open circuit or short circuit	GROUP 35B, Diagnostic Trouble Code Procedures P.35B-8
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
15	Wheel speed sensor	Abnormal output signal	
16	Power supply system	ABS-ECU power supply voltage below or above the standard value. Not displayed if the voltage recovers.	Check the battery. (Refer to GROUP 54A, Battery – On-vehicle Service – Battery Check P.54A-5.)
21	Front right wheel speed sensor		GROUP 35B, Diagnostic Trouble Code Procedures P.35B-8
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
31	TCL front left solenoid valve (IN)		P.35C-8
32	TCL front left solenoid valve (OUT)		
33	TCL front right solenoid valve (IN)		
34	TCL front right solenoid valve (OUT)		
38	Stoplight switch system		GROUP 35B, Diagnostic Trouble Code Procedures P.35B-18

DIAGNOSTIC TROUBLE CODE NO.	INSPECTION ITEM	DIAGNOSTIC CONTENT	REFERENCE PAGE
41	ABS front right solenoid valve (IN)		P.35C-8
42	ABS front left solenoid valve (IN)		
43	ABS rear right solenoid valve (IN)		
44	ABS rear left solenoid valve (IN)		
45	ABS front right solenoid valve (OUT)		
46	ABS front left solenoid valve (OUT)		
47	ABS rear right solenoid valve (OUT)		
48	ABS rear left solenoid valve (OUT)		
51	Valve power supply		
53	Pump motor		
63	ABS-ECU		Replace the hydraulic unit (Integrated with ABS-ECU). (Refer to GROUP 35B, Hydraulic Unit P.35B-51.)

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC 31, 32, 33, 34: TCL Solenoid Valve inside Hydraulic Unit (Open Circuit or Short Circuit) /DTC 41, 42, 43, 44, 45, 46, 47, 48: ABS Solenoid Valve inside Hydraulic Unit (Open Circuit or Short Circuit) / DTC 51: Valve Power Supply /DTC 53: Pump Motor

Solenoid Valve and Motor Power Supply Circuit



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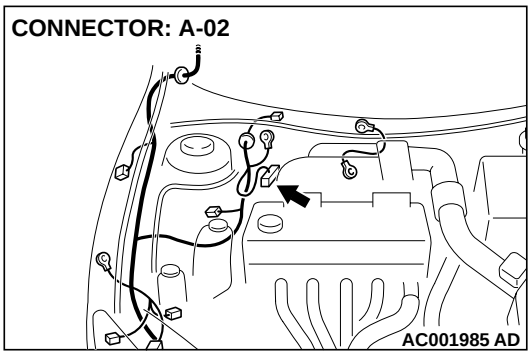
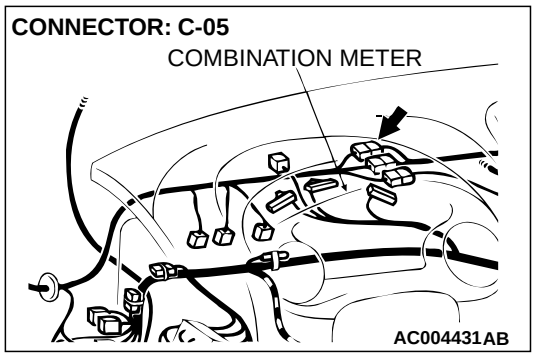
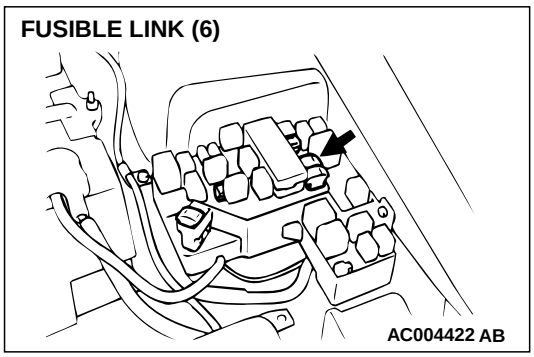






CIRCUIT OPERATION

Power is continuously supplied to the ABS-ECU through fusible link number 6 to operate the solenoid valves and motor. The ABS-ECU supplies power to the solenoids. If controls each solenoid by switching the ground circuit ON or OFF, depending on driving conditions.

TCL DTC SET CONDITIONS

These codes are displayed if the power supply circuit of solenoid valve or motor is open or short.

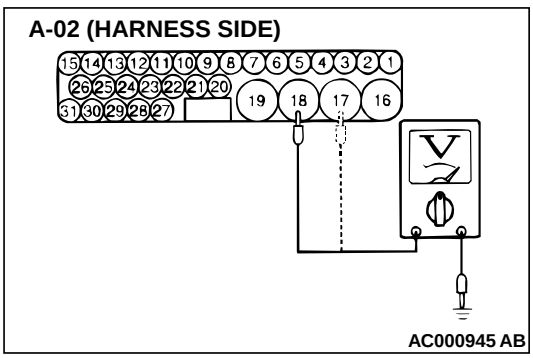
TROUBLESHOOTING HINTS (The most likely causes for these DTCs are to set are:)

- Damaged wiring harness or connector
- Malfunction of the hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB991502: Scan Tool (MUT-II)
- MB991529: Diagnostic Trouble Code Check Harness



STEP 1. Check the solenoid valve or motor power supply circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02 and measure at the harness side.

(2) Measure the voltages between terminal 18 and ground, and 17 and ground.

Q: Are the voltages approximately 12 volts (battery positive voltage)?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.). Then go to Step 3.

NO : Go to Step 2.

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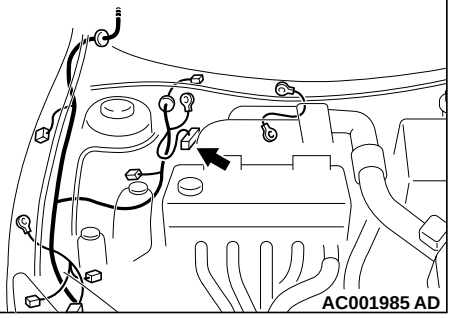
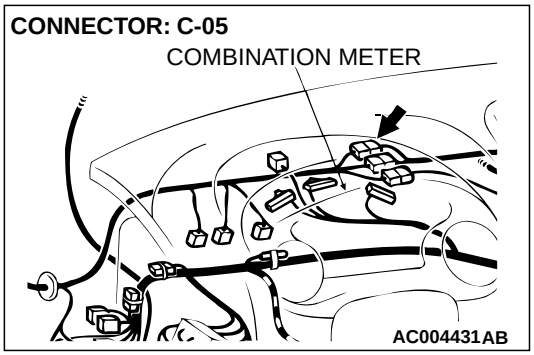
CONNECTOR: A-02



AC001985 AD

CONNECTOR: C-05



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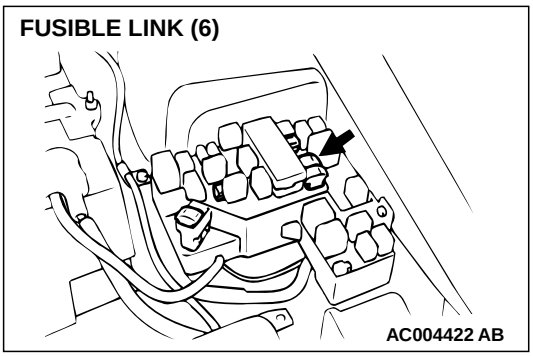
FUSIBLE LINK (6)



AC004422 AB

STEP 2. Check the harness wire between the fusible link number 6 and the ABS-ECU connector A-02.

NOTE: After inspecting the intermediate connector C-05, inspect the wires. If the intermediate connector C-05 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the connector has been repaired or replaced, go to Step 3.

Q: Is any of the harness wires between the fusible link number 6 and the ABS-ECU connector A-02 damaged?

YES : Repair it and then go to Step 3.
NO : Go to Step 3.

STEP 3. Check the diagnostic trouble codes.

Q: Does any of the diagnostic trouble codes 31, 32, 33, 34, 41, 42, 43, 44, 45, 46, 47, 48, 51, or 53 reset?

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

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SYMPTOM CHART

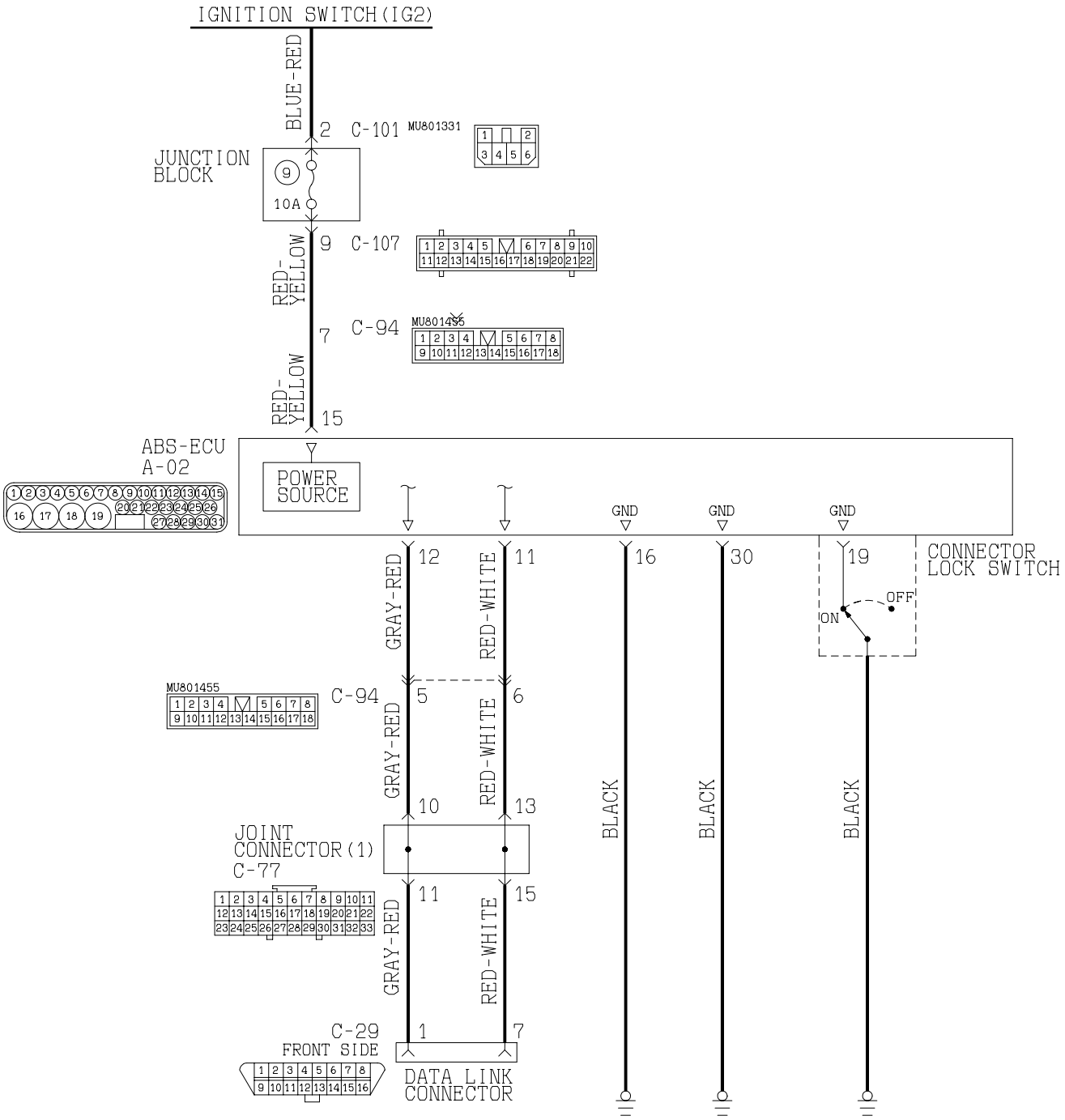
M1354000700043

SYMPTOMS	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication between the scan tool and all systems is not possible.	–	GROUP 13A, Diagnosis P.13A-339 or GROUP 13B, Diagnosis P.13B-411.
Communication between the scan tool and the ABS-ECU is not possible.	1	P.35C-12
When the ignition key is turned to "ON" (engine stopped), the TCL indicator light does not illuminate.	2	P.35C-17
When the ignition key is turned to "ON" (engine stopped), the TCL warning light does not illuminate.	3	P.35C-23
The TCL indicator light remains illuminated after the engine is started.	4	P.35C-29
The TCL warning light remains illuminated after the engine is started.	5	P.35C-32
The TCL system does not operate.	6	P.35C-35

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Communication between the Scan Tool and the ABS-ECU is not Possible.

Data Link Connector Circuit



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NOTE: CONNECTOR LOCK SWITCH
ON: The ABS-ECU connector A-02 is connected.
OFF: The ABS-ECU connector A-02 is disconnected.

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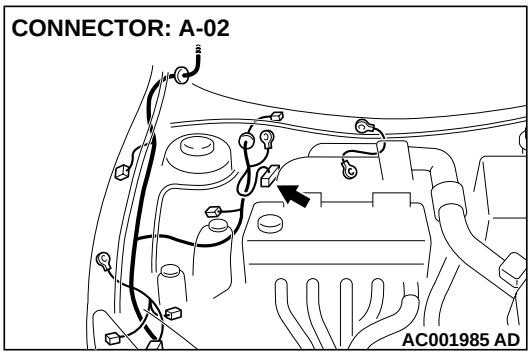

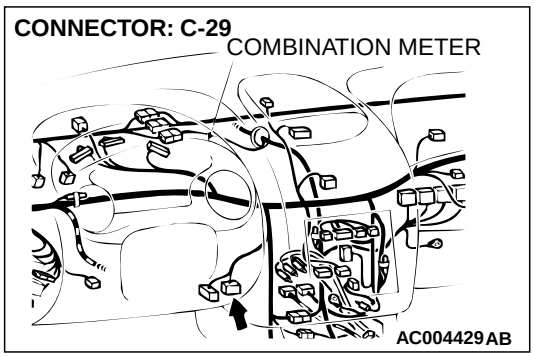

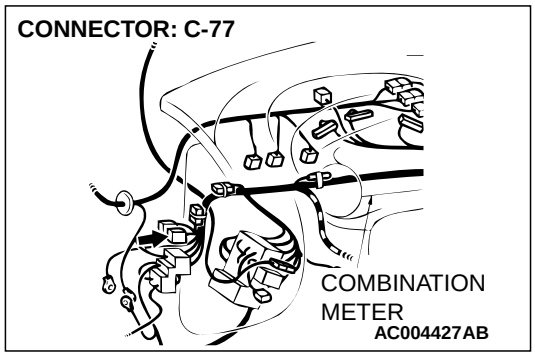

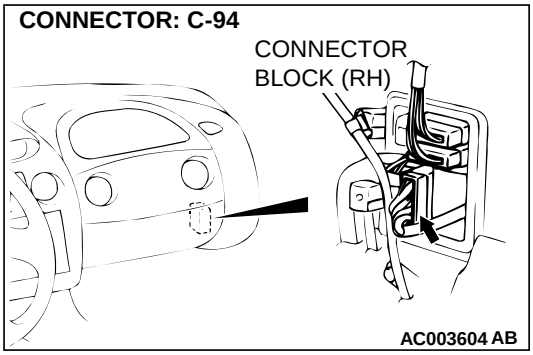

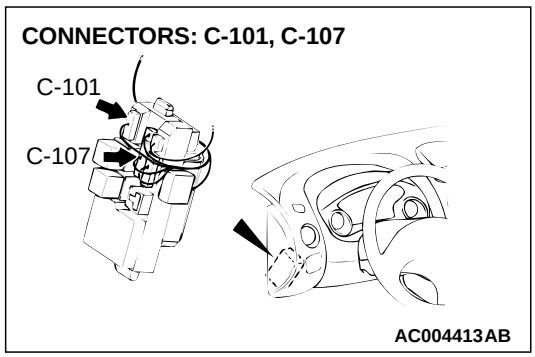

CIRCUIT OPERATION

- The diagnostic output is made from the ABS-ECU (terminal 11) to the diagnostic output terminal (terminal 7) of the data link connector.
- When the data link connector's diagnostic test mode control terminal (terminal 1) is grounded, the ABS-ECU (terminal 12) will switch to the diagnostic mode.

TECHNICAL DESCRIPTION (COMMENT)

When communication with the scan tool is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnostic output circuit.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Blown fuse
- Damaged wiring harness or connector
- Malfunction of the hydraulic unit (Integrated with ABS-ECU)

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

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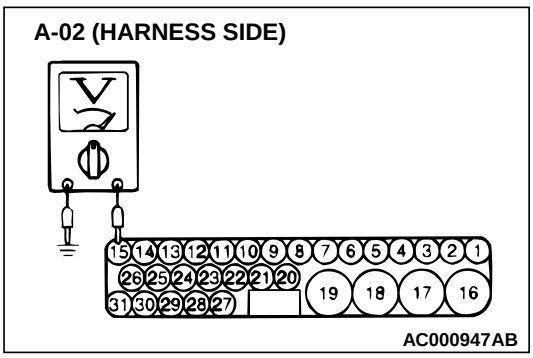
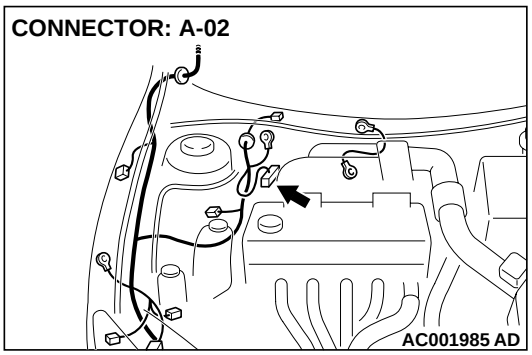


STEP 1. Check the power supply circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02 and measure at the harness side.
(2) Start the engine.
(3) Measure the voltage between terminal 15 and ground.

Q: Is the voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 3.
NO : Go to Step 2.

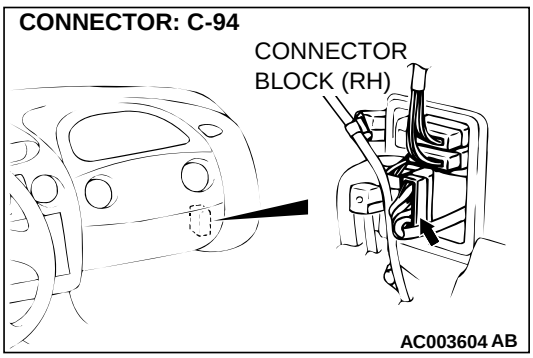


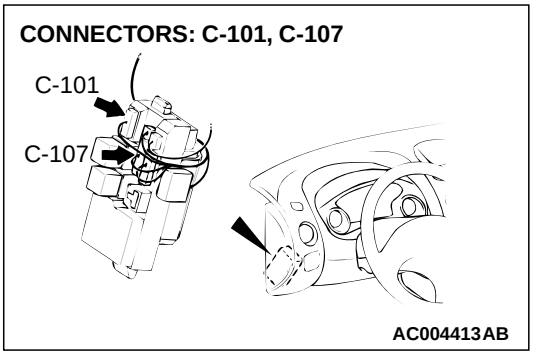
STEP 2. Check the harness wire between the ignition switch (IG2) and the ABS-ECU connector A-02.

NOTE: After inspecting the intermediate connector C-94, C-101, or C-107, inspect the wire. If the intermediate connector C-94, C-101, or C-107 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the connector has been repaired or replaced, go to Step 3.

Q: Is the harness wire between the ignition switch (IG2) and the ABS-ECU connector A-02 damaged?

YES : Repair it and go to Step 5.
NO : Go to Step 3.





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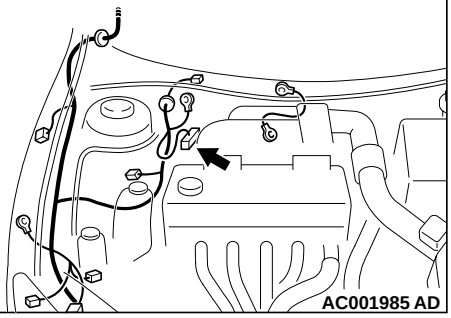
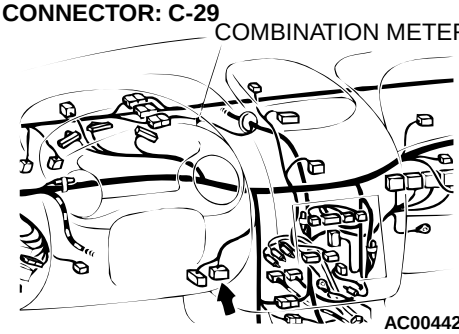
CONNECTOR: A-02



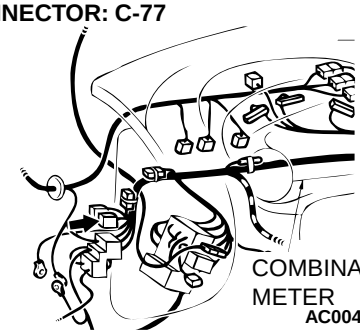
AC001985 AD

CONNECTOR: C-29



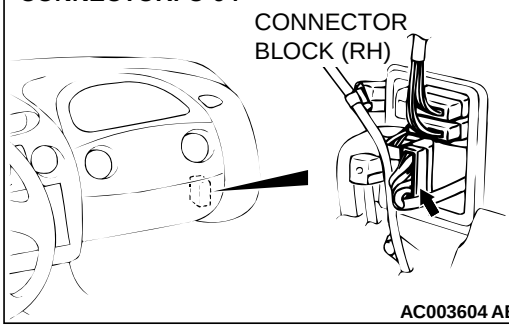
AC004429 AB

CONNECTOR: C-77



AC004427 AB

CONNECTOR: C-94



AC003604 AB

STEP 3. Check the harness wires between the ABS-ECU connector A-02 and the data link connector C-29.

NOTE: After inspecting the intermediate connector C-77 or C-94, inspect the wires. If the intermediate connector C-77 or C-94 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the connector has been repaired or replaced, go to Step 4.

Q: Is any of the harness wires between the ABS-ECU connector A-02 and the data link connector C-29 damaged?

YES : Repair it and go to Step 5.

NO : Go to Step 4.

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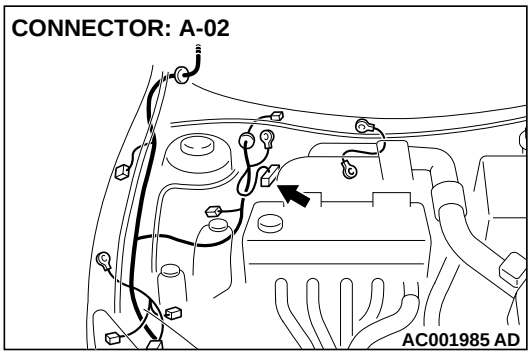


STEP 4. Check the harness wires between the ABS-ECU connector A-02 and ground.

Q: Is any of the harness wires between the ABS-ECU connector A-02 and ground damaged?

YES : Repair it and then go to Step 5.

NO : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 5.

STEP 5. Check symptoms.

Q: Does the scan tool communicate with the TCL system?

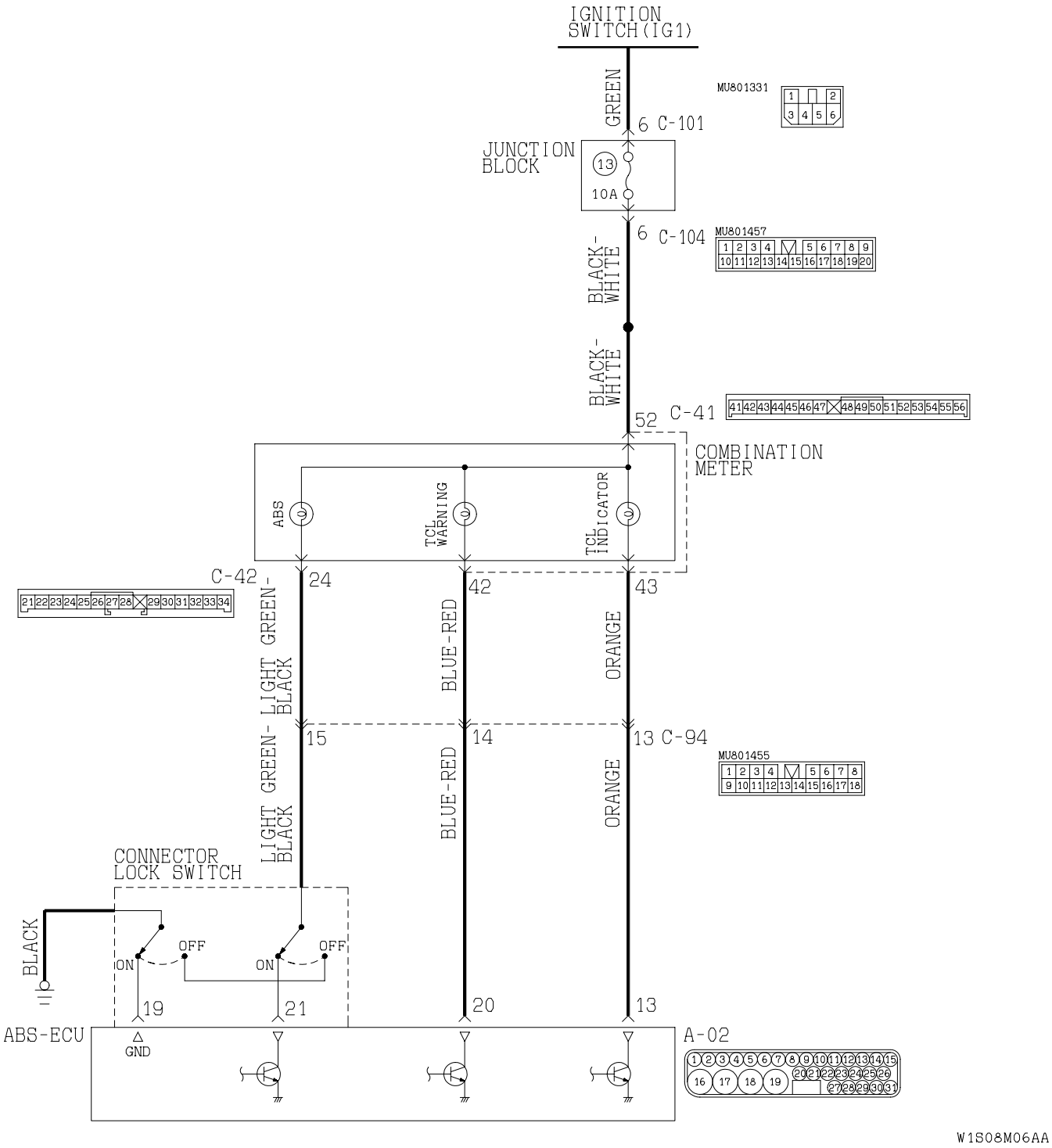
YES : This diagnosis is complete.

NO : Return to Step 1.

TSB Revision

INSPECTION PROCEDURE 2: When the Ignition Key is Turned to "ON" (Engine Stopped), the TCL Indicator Light does not Illuminate.

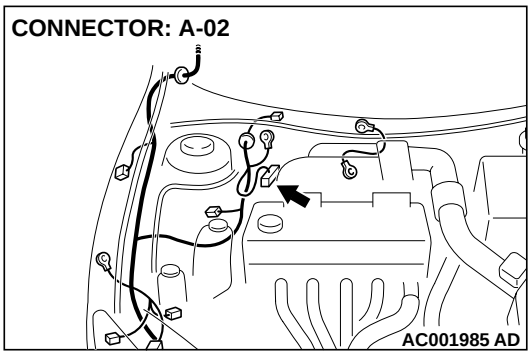
TCL Warning Light and TCL Indicator Light Circuit



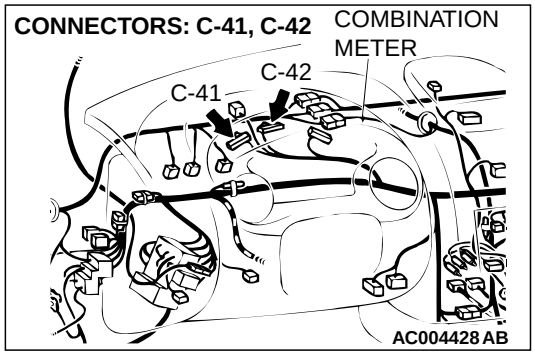
NOTE: CONNECTOR LOCK SWITCH
ON: The ABS-ECU connector A-02 is connected.
OFF: The ABS-ECU connector A-02 is disconnected.

TSB Revision

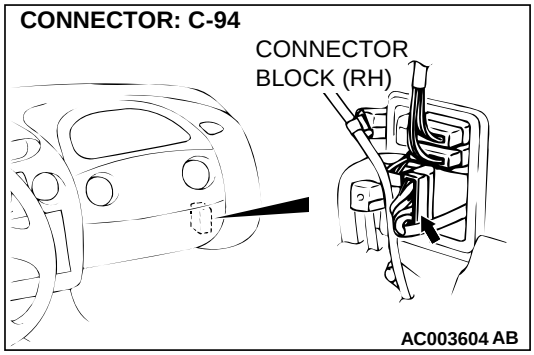
CONNECTOR: A-02



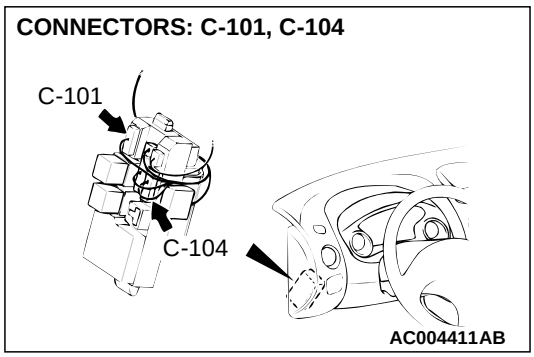
CONNECTORS: C-41, C-42



CONNECTOR: C-94



CONNECTORS: C-101, C-104



CIRCUIT OPERATION

- Power to the TCL indicator light is supplied from the ignition switch. The ABS-ECU grounds the circuit to turn the light ON.
- The ABS-ECU illuminates the TCL indicator light for three seconds on start-up <ignition key: "ON" (with engine stopped)>. When the ABS-ECU completes the self-check, it turns off the light.

TECHNICAL DESCRIPTION (COMMENT)

The cause may be: an open circuit in the TCL indicator light power supply circuit, a blown TCL indicator light bulb or ABS-ECU malfunction.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

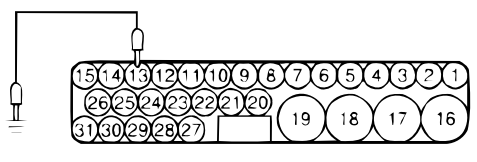
- Blown fuse
- Damaged wiring harness or connector
- Burnt out TCL indicator light bulb
- Malfunction of the ABS-ECU

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

A-02 (HARNESS SIDE)



STEP: 1. Check the TCL indicator light circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02 and measure at the harness side.
(2) Ground the terminal 13.
(3) Turn the ignition switch to the "ON" position.

Q: Does the TCL indicator light illuminate?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

NO : Go to Step 2.

TSB Revision

STEP: 2. Check the TCL indicator light bulb.

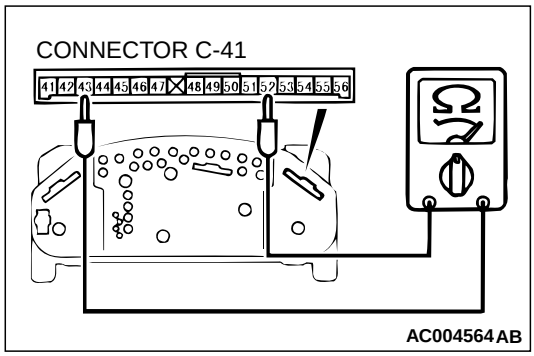
(1) Remove the combination meter (Refer to GROUP 54A, Combination Meter P.54A-66 and P.54A-68.).
(2) Check the TCL indicator light bulb.

Q: Is the TCL indicator light bulb burned out?

YES : Replace the bulb and then go to Step 9.
NO : Go to Step 3.

STEP: 3. Check the combination meter for the continuity.

(1) Remove the combination meter.(Refer to GROUP 54A, Combination Meter P.54A-66.)
(2) Remove the TCL indicator light bulb (Refer to GROUP 54A, Combination Meter P.54A-68.). Then measure the resistance between the bulb terminals.
(3) Install the TCL indicator light bulb to the combination meter, and then measure the resistance between the connector C-41 terminals 43 and 52. The resistance reading at this time should be much the same as the resistance measured at step (2).

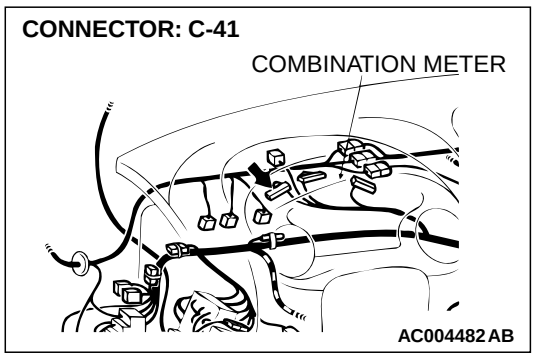


Q: Are the two resistance values extremely different each other?

YES : Replace the combination meter (printed circuit board) and then go to Step 9.
NO (much the same) : Go to Step 4.

STEP 4. Check the combination meter power supply circuit.

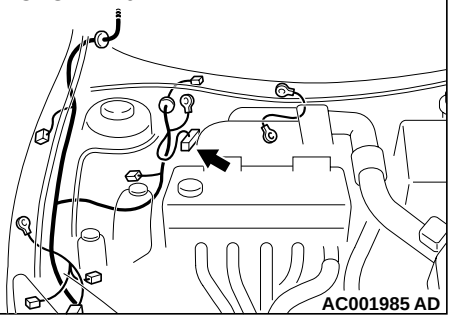
(1) Disconnect the combination meter connector C-41, and check at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between the terminal 52 and ground. It should be approximately 12 volts (battery positive voltage).



Q: Is the voltage approximately 12 volts (battery positive voltage)?

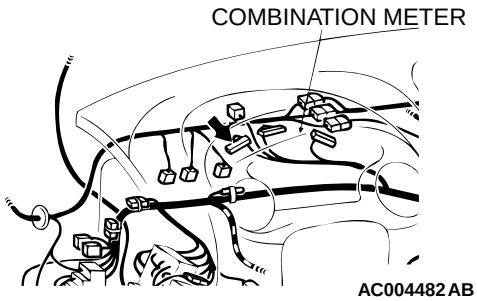
YES : Go to Step 5.
NO : Go to Step 7.

CONNECTOR: A-02



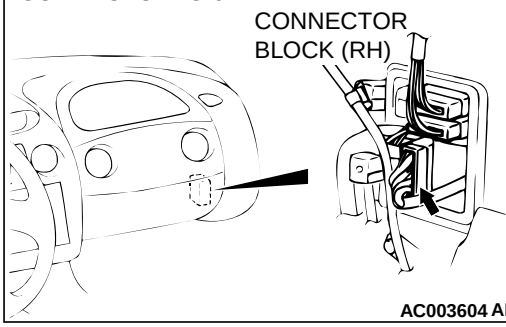
AC001985 AD

CONNECTOR: C-41



AC004482 AB

CONNECTOR: C-94



AC003604 AB

STEP 5. Check the connectors A-02, C-41, and C-94.

Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is any of the connectors damaged?

YES : Repair it and then go to Step 9.

NO : Go to Step 6.

TSB Revision

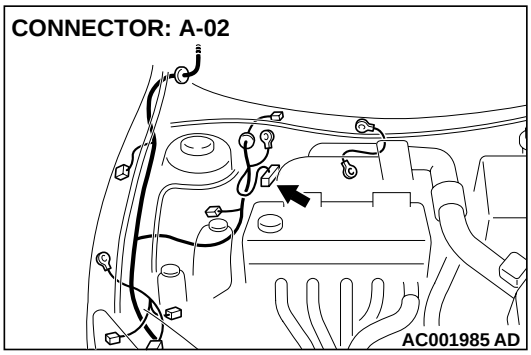
STEP 6. Check the continuity between the combination meter and the ABS-ECU.

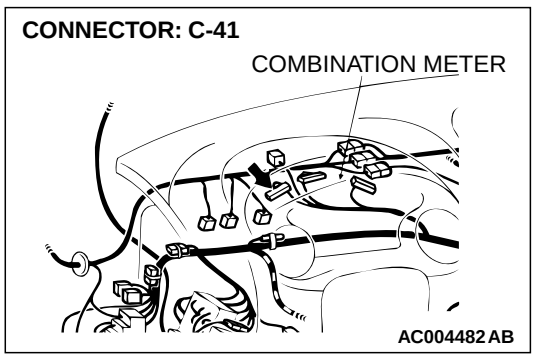
Check the continuity between the combination meter connector C-41 (terminal 43) and ABS-ECU connector A-02 (terminal 13).

Q: Is there the continuity between the combination meter connector C-41 (terminal 43) and the ABS-ECU connector A-02 (terminal 13)?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

NO : Repair the harness wire and then go to Step 9.





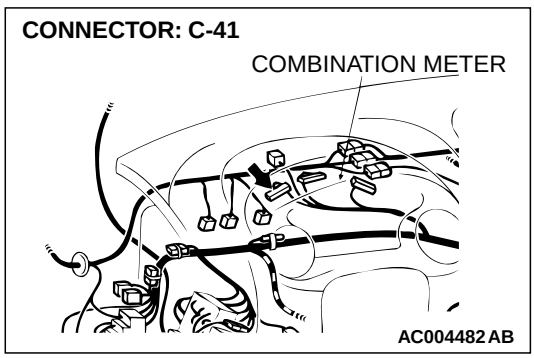
STEP 7. Check the connectors C-41, C-101, and C-104.

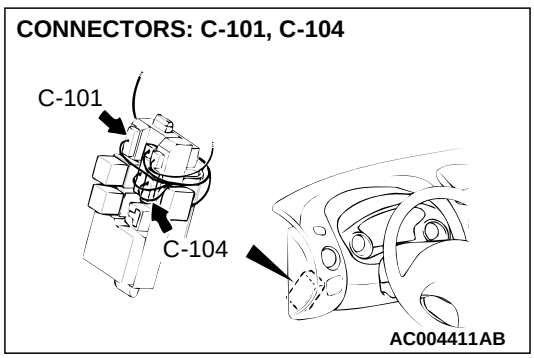
Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is any of the connectors damaged?

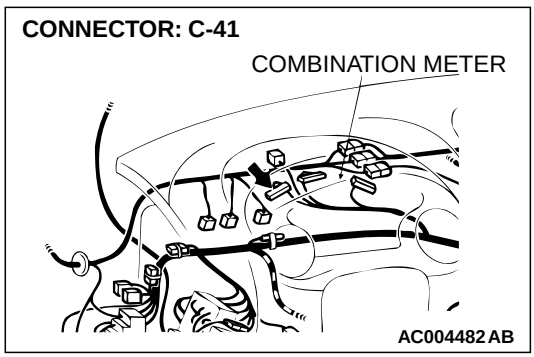
YES : Repair it and then go to Step 9.

NO : Go to Step 8.





TSB Revision



STEP 8. Check the continuity between the ignition switch (IG1) and the combination meter.

Check the continuity between the ignition switch (IG1) and the combination meter connector C-41 (terminal 52).

Q: Is there any continuity (less than 2 ohms) between the ignition switch (IG1) and combination meter connector C-41 (terminal 52)?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

NO : Repair the harness wire and then go to Step 9.

STEP 9. Check symptoms.

Q: Does the TCL indicator light illuminate 3 seconds when the ignition switch is turned to the "ON" position with engine stopped or upon start-up?

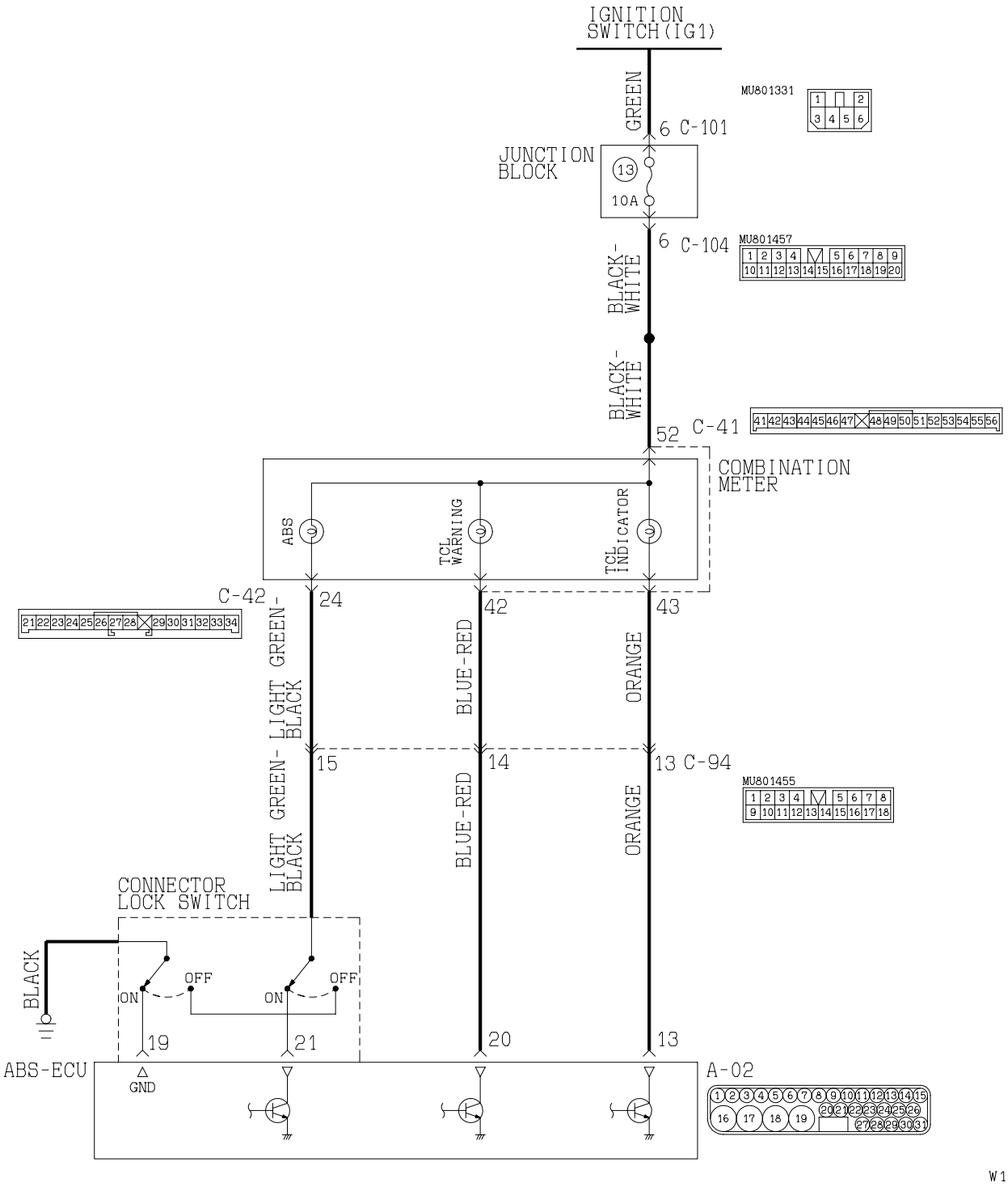
YES : This diagnosis is complete.

NO : Return to Step 1.

TSB Revision

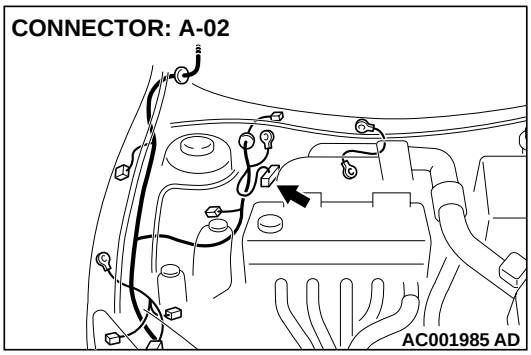
INSPECTION PROCEDURE 3: When the Ignition Key is Turned to "ON" (Engine Stopped), the TCL Warning Light does not Illuminate.

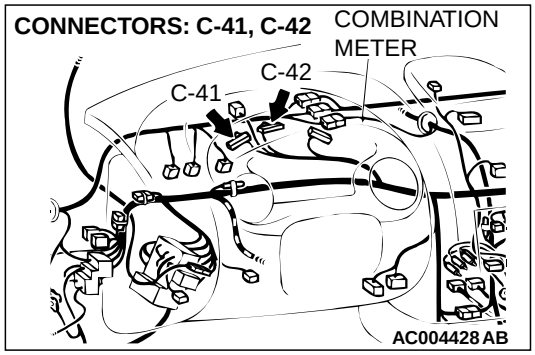
TCL Warning Light and TCL Indicator Light Circuit

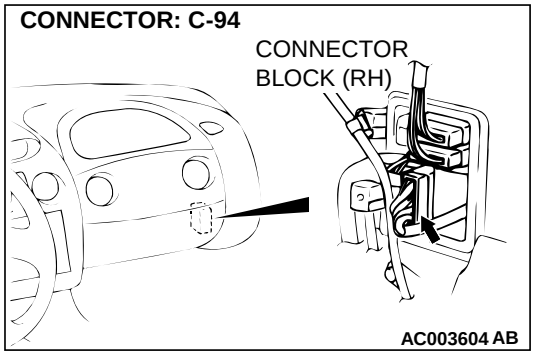


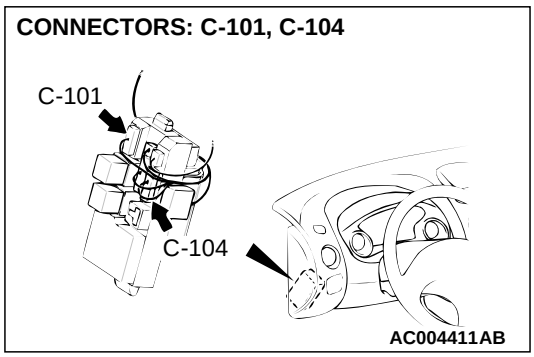
NOTE: CONNECTOR LOCK SWITCH
ON: The ABS-ECU connector A-02 is connected.
OFF: The ABS-ECU connector A-02 is disconnected.

TSB Revision









CIRCUIT OPERATION

- Power to the TCL warning light is supplied from the ignition switch. The ABS-ECU grounds the circuit to illuminate the light.
- The ABS-ECU illuminates the TCL warning light for three seconds on start-up <ignition key: "ON" (with engine stopped)>. When the ABS-ECU completes the self-check, it turns off the light.

TECHNICAL DESCRIPTION (COMMENT)

The cause may be: an open circuit in the TCL warning light power supply circuit, a blown TCL warning light bulb or ABS-ECU malfunction.

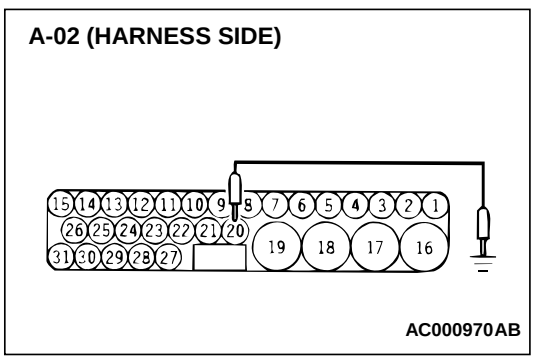
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Blown fuse
- Damaged wiring harness or connector
- Burnt out TCL warning light bulb
- Malfunction of the ABS-ECU

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set



STEP 1. Check the TCL warning light circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02 and measure at the harness side.
(2) Ground the terminal 20.
(3) Turn the ignition switch to the "ON" position.

Q: Does the TCL warning light illuminate?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

NO : Go to Step 2.

TSB Revision

STEP 2. Check the TCL warning light bulb.

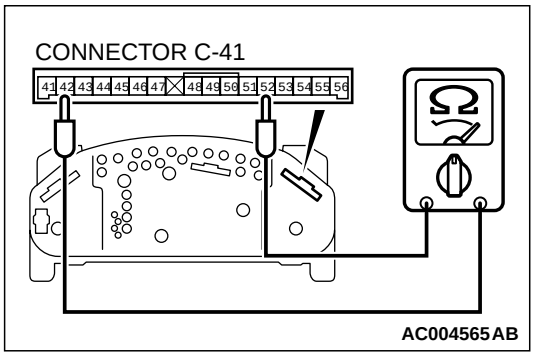
(1) Remove the combination meter (Refer to GROUP 54A, Combination Meter P.54A-66 and P.54A-68.).
(2) Check the TCL warning light bulb.

Q: Is the TCL warning light bulb burned out?

YES : Replace the bulb and then go to Step 9.
NO : Go to Step 3.

STEP 3. Check the combination meter for the continuity.

(1) Remove the combination meter.
(2) Remove the TCL warning light bulb. Then measure the resistance between the bulb terminals.
(3) Install the TCL warning light bulb to the combination meter, and then measure the resistance between the connector C-41 terminals 52 and 42. The resistance reading at this time should be much the same as the resistance measured at step (2).

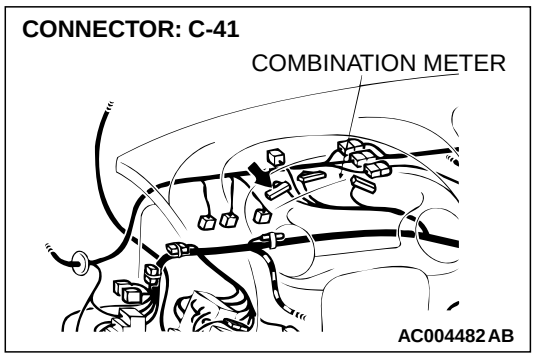


Q: Are the two resistance values extremely different each other?

YES : Replace the combination meter (printed circuit board) and then go to Step 9.
NO (much the same) : Go to Step 4.

STEP 4. Check the power supply circuit at the combination meter.

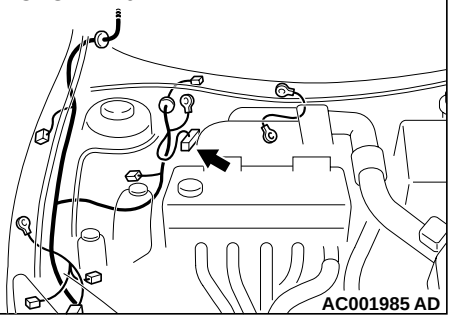
(1) Disconnect the combination meter connector C-41, and check at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between the terminal 52 and ground. It should be approximately 12 volts (battery positive voltage.).



Q: Is the voltage approximately 12 volts (battery positive voltage)?

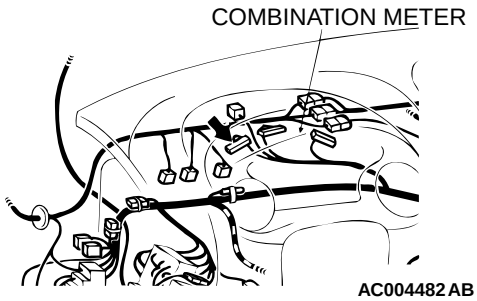
YES : Go to Step 5.
NO : Go to Step 7.

CONNECTOR: A-02



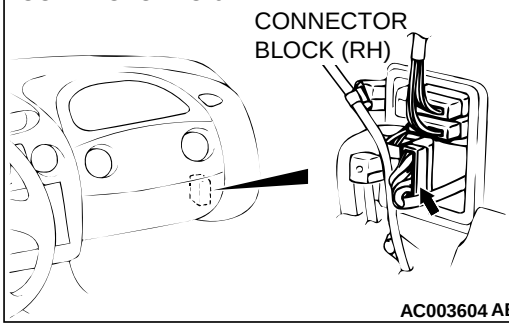
AC001985 AD

CONNECTOR: C-41



AC004482 AB

CONNECTOR: C-94



AC003604 AB

STEP 5. Check the connectors A-02, C-41, and C-94.

Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is any of the connectors damaged?

YES : Repair it and then go to Step 9.

NO : Go to Step 6.

TSB Revision

STEP 6. Check the continuity between the combination meter and the ABS-ECU.

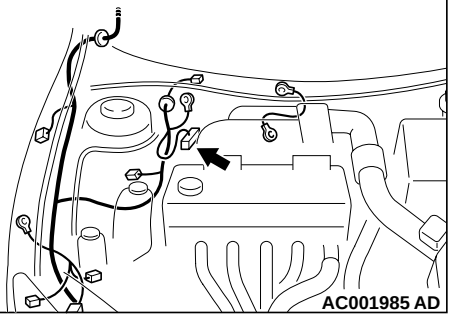
Check the continuity between the combination meter connector C-41 (terminal 42) and ABS-ECU connector A-02 (terminal 20).

Q: Is there the continuity between the combination meter connector C-41 (terminal 42) and the ABS-ECU connector A-02 (terminal 20)?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

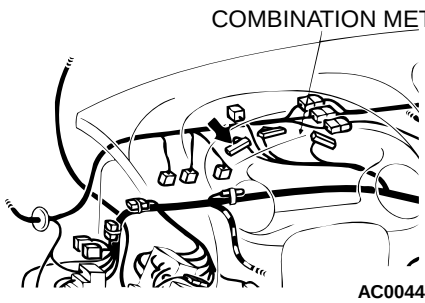
NO : Repair the harness wire and then go to Step 9.

CONNECTOR: A-02



AC001985 AD

CONNECTOR: C-41



AC004482 AB

STEP 7. Check connectors C-41, C-101, and C-104.

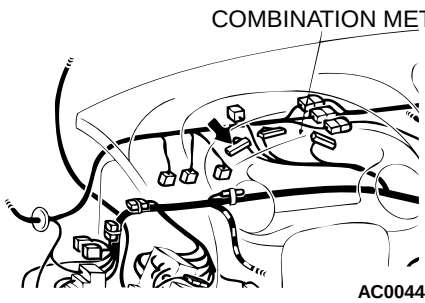
Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is any of the connectors damaged?

YES : Repair it and then go to Step 9.

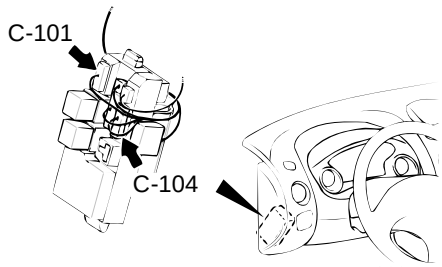
NO : Go to Step 8.

CONNECTOR: C-41



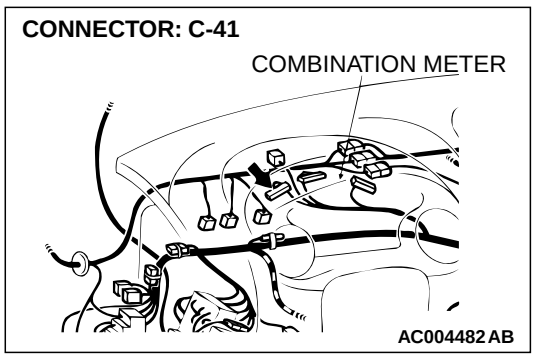
AC004482 AB

CONNECTORS: C-101, C-104



AC004411AB

TSB Revision



STEP 8. Check the continuity between the ignition switch (IG1) and the combination meter.

Check the continuity between the ignition switch (IG1) and the combination meter connector C-41 (terminal 52).

Q: Is there any continuity (less than 2 ohm) between the ignition switch (IG1) and the combination meter connector C-41 (terminal 52)?

YES : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 9.

NO : Repair the harness wire and then go to Step 9.

STEP 9. Check symptoms.

Q: Does the TCL warning light illuminate for 3 seconds when the ignition switch is turned to the "ON" position with engine stopped or upon startup?

YES : This diagnosis is complete.

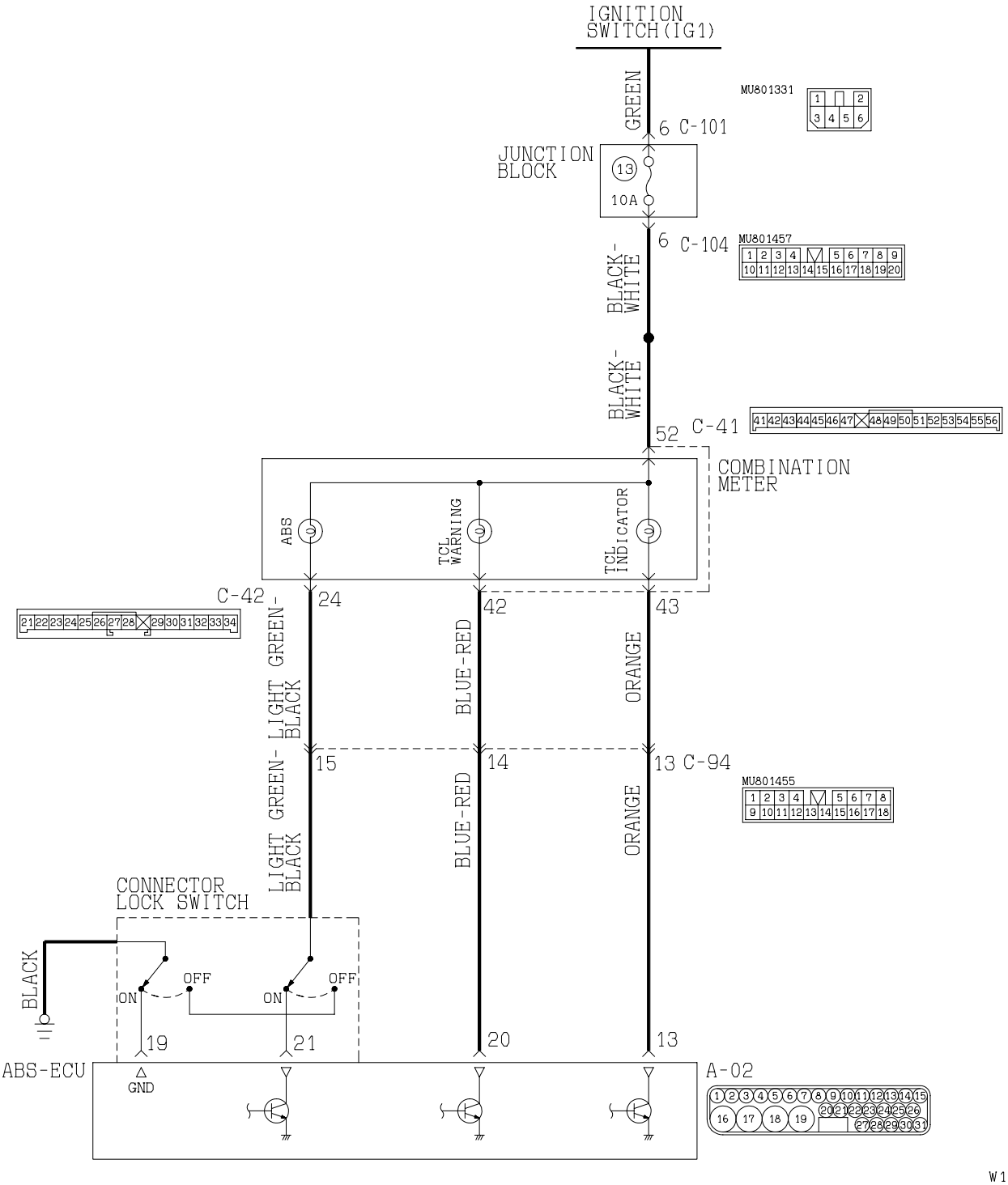
NO : Return to Step 1.

TSB Revision

INSPECTION PROCEDURE 4: The TCL Indicator Light Remains Illuminated after the Engine is Started.

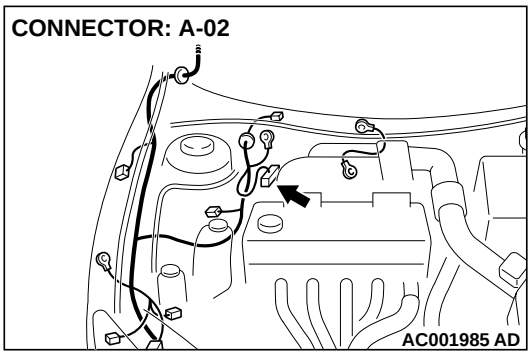
NOTE: This diagnosis procedure is limited to cases where communication with the scan tool is possible (ABS-ECU power supply is normal) and no diagnostic trouble code outputs.

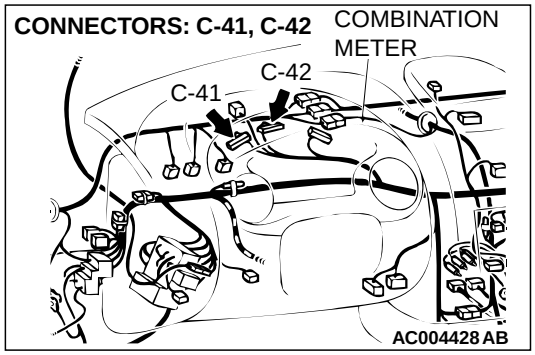
TCL Warning Light and TCL Indicator Light Circuit

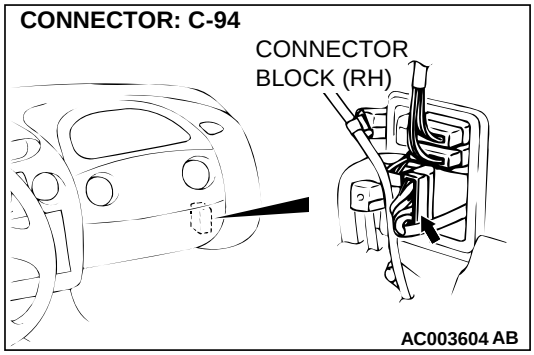


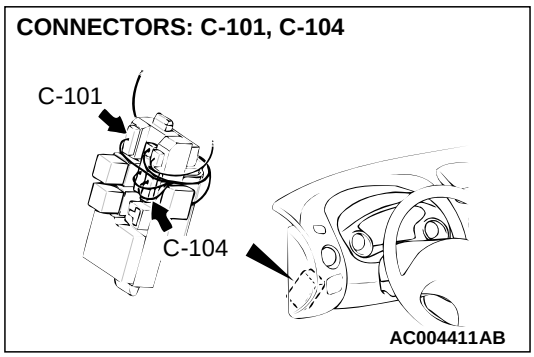
NOTE: CONNECTOR LOCK SWITCH
ON: The ABS-ECU connector A-02 is connected.
OFF: The ABS-ECU connector A-02 is disconnected.

TSB Revision









CIRCUIT OPERATION

- The ABS-ECU controls the illumination of the TCL indicator light by turning it "ON" and "OFF."
- The ABS-ECU illuminates the TCL indicator light for three seconds on start-up <ignition key: "ON" (with engine stopped)>. When the ABS-ECU completes the self-check, it turns off the light.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably the hydraulic unit (integrated with ABS-ECU) malfunction.

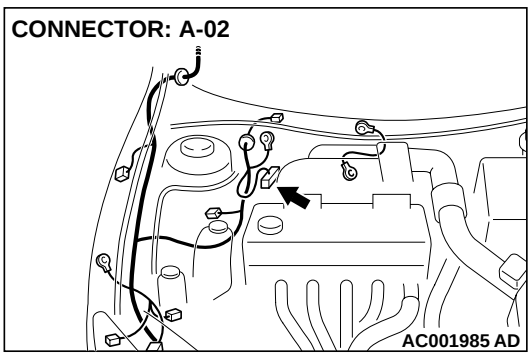
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Damaged wiring harness or connector
- Malfunction of the hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set



STEP 1. Check the TCL indicator light circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02.
(2) Turn the ignition switch to the "ON" position.

Q: Does the TCL indicator light illuminate?

YES : Go to Step 2.
NO : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 3.

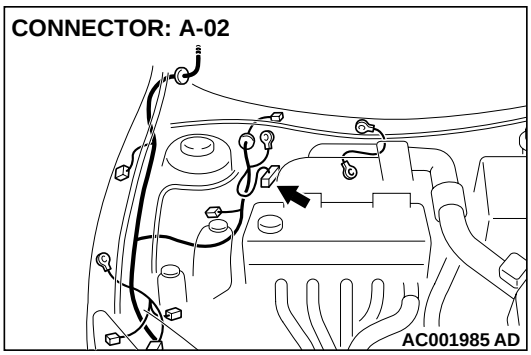
TSB Revision

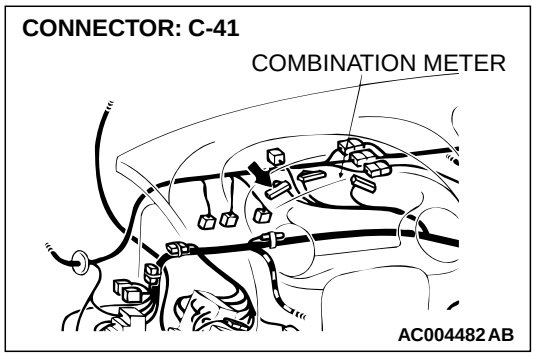
STEP 2. Check the harness wire between the ABS-ECU connector A-02 and the combination meter connector C-41.

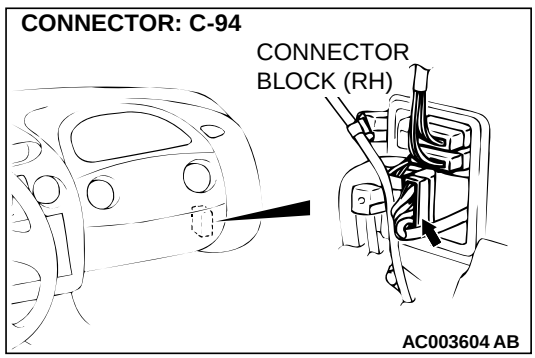
NOTE: After inspecting the intermediate connector C-94, inspect the wire. If the intermediate connector C-94 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the connector has been repaired or replaced, go to Step 3 .

Q: Is the harness wire between the ABS-ECU connector A-02 and the combination meter connector C-41 damaged?

YES : Repair it and then go to Step 3.
NO : Go to Step 3.







STEP 3. Check symptom.

Q: Does the TCL indicator light turn off 3 seconds after start-up?

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

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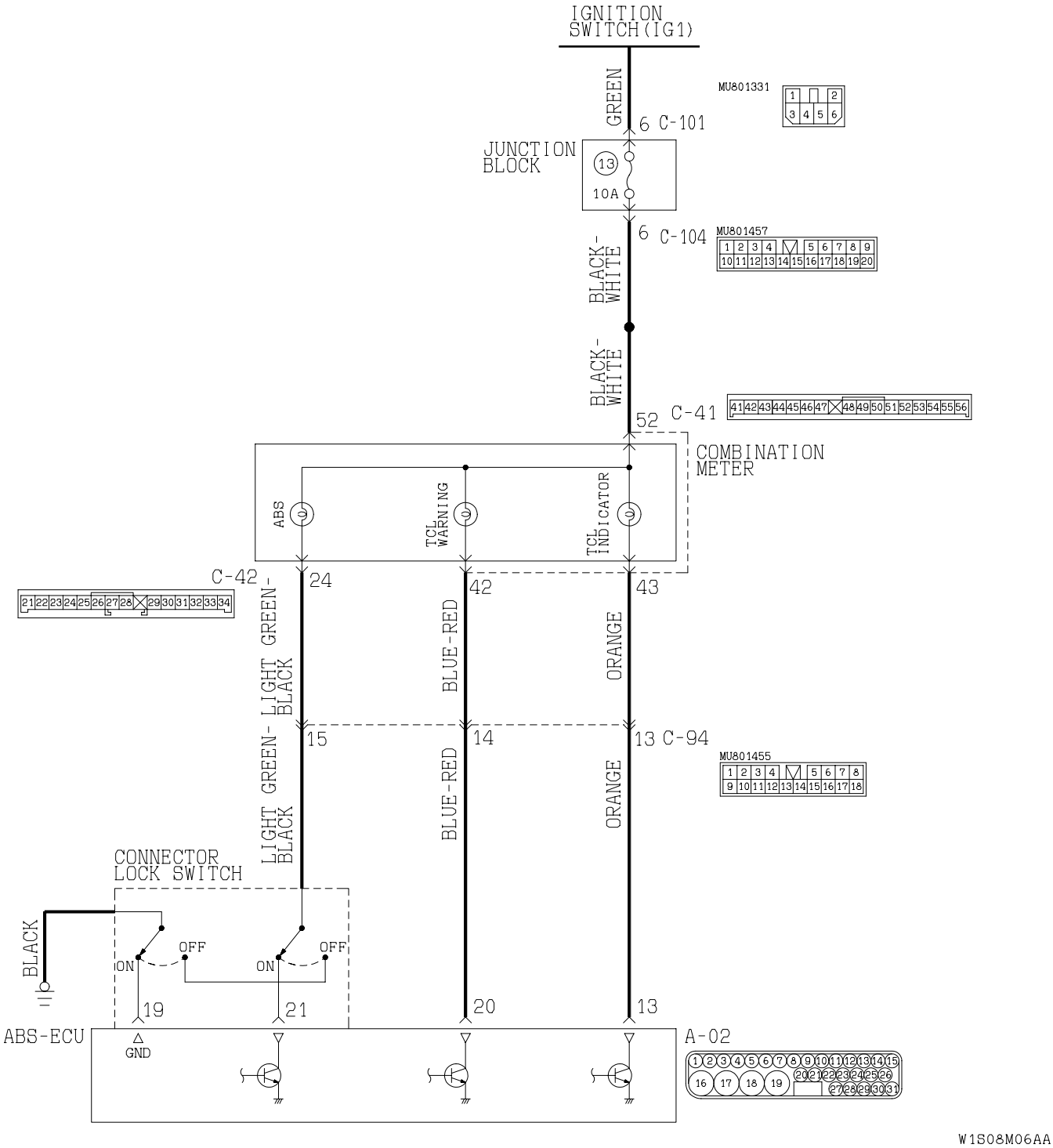
INSPECTION PROCEDURE 5: The TCL Warning Light Remains Illuminated after the Engine is Started.

NOTE: This diagnosis procedure is limited to cases where communication with the scan tool is possible (ABS-ECU power supply is normal) and no diagnostic trouble code outputs.

TCL Warning Light and TCL Indicator Light Circuit



NOTE: CONNECTOR LOCK SWITCH
ON: The ABS-ECU connector A-02 is connected.
OFF: The ABS-ECU connector A-02 is disconnected.

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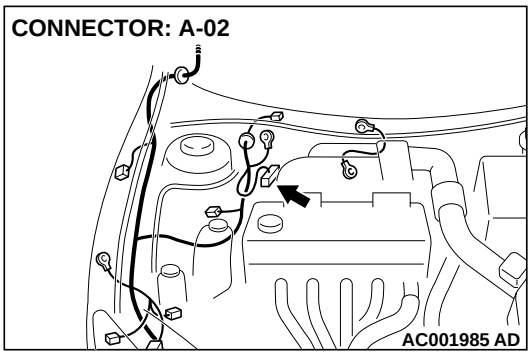
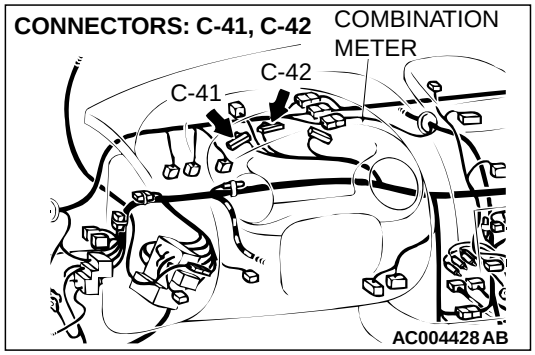
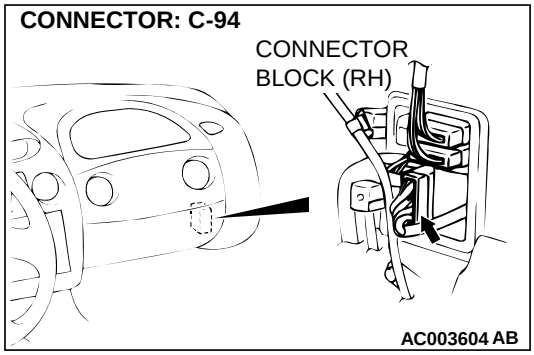
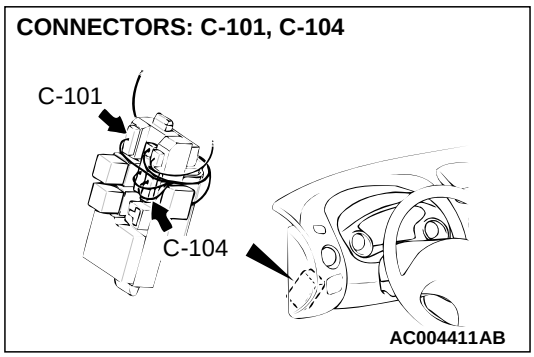








CIRCUIT OPERATION

- The ABS-ECU controls the illumination of the TCL warning light by turning it "ON" and "OFF."
- The ABS-ECU illuminates the TCL warning light for three seconds on start-up <ignition key: "ON" (with engine stopped)>. When the ABS-ECU completes the self-check, it turns off the light.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably hydraulic unit (integrated with ABS-ECU) malfunction.

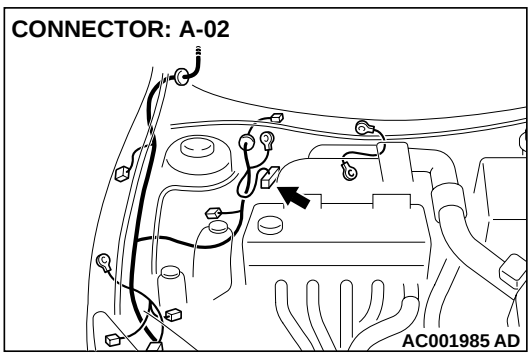
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Damaged wiring harness or connector
- Malfunction of the hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set



STEP 1. Check the TCL warning light circuit at the ABS-ECU connector A-02.

(1) Disconnect the ABS-ECU connector A-02.
(2) Turn the ignition switch to the "ON" position.

Q: Does the TCL warning light illuminate?

YES : Go to Step 2.
NO : Replace the hydraulic unit (integrated with ABS-ECU) (Refer to GROUP 35B, Hydraulic Unit P.35B-51.) and then go to Step 3.

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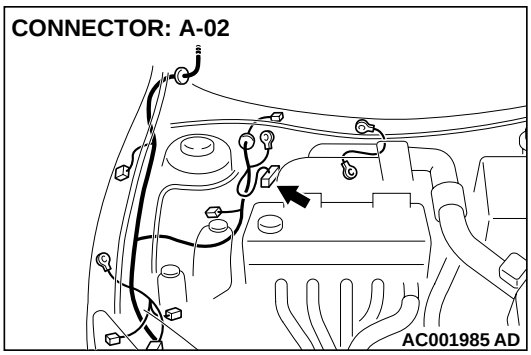
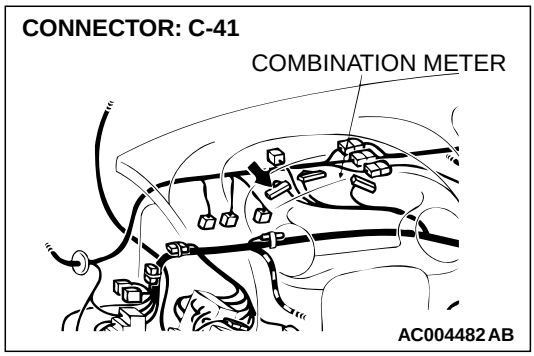
STEP 2. Check the harness wire between the ABS-ECU connector A-02 and the combination meter connector C-41.

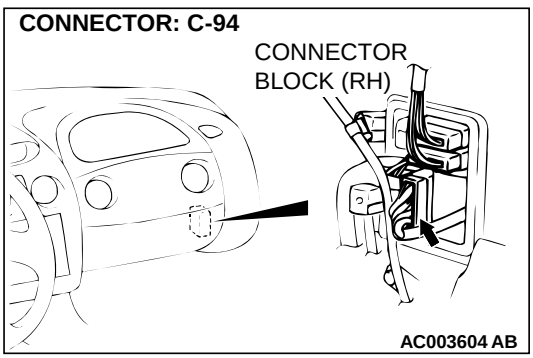
NOTE: After inspecting the intermediate connector C-94, inspect the wire. If the intermediate connector C-94 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the connector has been repaired or replaced, go to Step 3.

Q: Is the harness wire between the ABS-ECU connector A-02 and the combination meter connector C-41 damaged?

YES : Repair it and then go to Step 3.
NO : Go to Step 3.







STEP 3. Check symptoms.

Q: Does the TCL warning light turn off 3 seconds after start-up?

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

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INSPECTION PROCEDURE 6: The TCL System does not Operate.

TECHNICAL DESCRIPTION (COMMENT)
The cause depends on driving and road surface conditions, so diagnosis may be difficult. However, if no diagnostic trouble code is displayed, carry out the following inspection.

TROUBLESHOOTING HINTS (The most likely cause for this case:)
Malfunction of the hydraulic unit

DIAGNOSIS
Check the hydraulic unit (Refer to P.35C-39.). If the hydraulic unit (integrated with ABS-ECU) is malfunctioning, replace it. Then check that the malfunction symptom is eliminated.

DATA LIST REFERENCE TABLE

M1354003000043

The following items can be read by the scan tool from the ABS-ECU input data.

MUT-II SCAN TOOL DISPLAY	ITEM NO.	CHECK ITEM	CHECKING REQUIREMENTS	NORMAL VALUE
BATT. VOLTAGE	16	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	9 – 16 V
FL SNSR	12	Front-left wheel speed sensor	Drive the vehicle	Vehicle speeds displayed on the speedometer and scan tool are identical.
FR SNSR	11	Front-right wheel speed sensor		
RL SNSR	14	Rear-left wheel speed sensor		
RR SNSR	13	Rear-right wheel speed sensor		
STOPLIGHT SW	36	Stoplight switch	Depress the brake pedal.	ON
			Release the brake pedal.	OFF

ACTUATOR TEST REFERENCE TABLE

M1354003100040

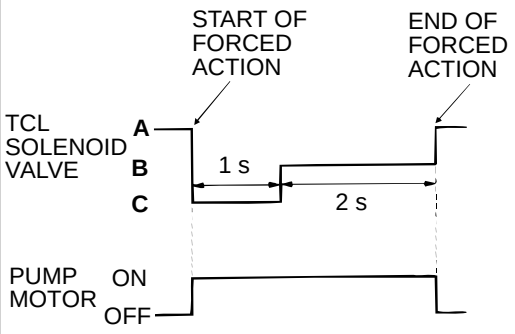
The scan tool activates the following actuators for testing.

NOTE: If the ABS-ECU is inoperative, actuator testing cannot be carried out.

NOTE: Actuator testing is only possible when the vehicle is stationary. If the vehicle speed during actuator testing exceeds 10 km/h (6 mph), forced actuation will be canceled.

ACTUATOR TEST SPECIFICATIONS

ACTIVATION PATTERN (NO.06,07)



NOTE
A: HYDRAULIC PRESSURE DECREASES
B: HYDRAULIC PRESSURE HOLDS
C: HYDRAULIC PRESSURE INCREASES

AC000971AB

NO.	ITEM	PARTS TO BE ACTIVATED
01	ABS solenoid valve for front-left wheel	Solenoid valves and pump motor in the hydraulic unit (simple inspection mode)
02	ABS solenoid valve for front-right wheel	
03	ABS solenoid valve for rear-left wheel	
04	ABS solenoid valve for rear-right wheel	
06	TCL solenoid valve for front-right wheel	TCL valves and pump motor in the hydraulic unit (simple inspection mode)
07	TCL solenoid valve for front-left wheel	
12	Pump motor	Activate the pump motor for two seconds.

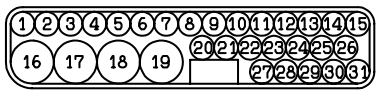
CHECK AT ABS-ECU

M1354003200047

TERMINAL VOLTAGE CHECK CHART

1. Measure the voltages between terminals (16), (19) and (30) (ground terminals) and each respective terminal.
2. The terminal layouts are shown in the illustration below.

NOTE: Do not measure terminal voltage for approximately three seconds after the ignition switch is turned to "ON." The ABS-ECU performs the initial check during that period.



AC002089 AB

CONNECTOR TERMINAL NO.	SIGNAL	CHECKING REQUIREMENT	NORMAL CONDITION
14	Input from stoplight switch	Stoplight switch: ON	System voltage
		Stoplight switch: OFF	Approximately 0 V
15	ABS-ECU power supply	Ignition switch: "ON"	System voltage
17	Motor power supply	Always	System voltage
18	Solenoid valve power supply	Always	System voltage

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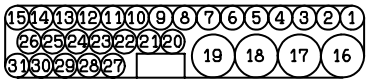
RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

1. Turn the ignition switch to the "LOCK" (OFF) position and disconnect the ABS-ECU connectors before checking resistance and continuity.
2. Check between the terminals indicated in the table below.
3. The terminal layouts are shown in the illustration below.

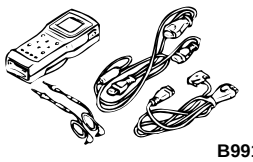
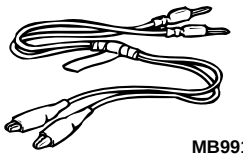
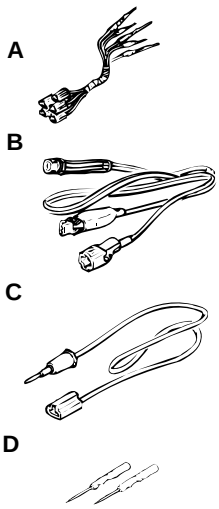


AC002090 AB

CONNECTOR TERMINAL NO.	SIGNAL	NORMAL CONDITION
6 – 7	Front-left wheel speed sensor	1.28 – 1.92 kΩ
1 – 3	Rear-right wheel speed sensor	1.28 – 1.92 kΩ
4 – 5	Front-right wheel speed sensor	1.28 – 1.92 kΩ
8 – 9	Rear-left wheel speed sensor	1.28 – 1.92 kΩ
16 – body ground	Solenoid valve ground	Less than 2 Ω
19 – body ground	Motor ground	Less than 2 Ω
30 – body ground	TCL solenoid valve ground	Less than 2 Ω

SPECIAL TOOLS

M1354000200037

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool (MUT-II)	MB991496-OD	For checking of TCL (Diagnostic trouble code display when using the scan tool)
 MB991529	MB991529 Diagnostic trouble code check harness	Tool not necessary if scan tool (MUT-II) is available.	For checking of TCL (Diagnostic trouble code display when using the TCL warning light)
A B C D  MB991223AB	MB991223 Harness set A:MB991219 Inspection harness B:MB991220 LED harness C:MB991221 LED harness adaptor D:MB991222 Probe	MB991223 MB991709-01	Making voltage and resistance measurement during troubleshooting A: Connector pin contact B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection

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ON-VEHICLE SERVICE

BLEEDING

M1354003600034

⚠ CAUTION

Use the specified brake fluid. Don't use a mixture of the specified brake fluid and another non-specified fluid.

Specified brake fluid: Conforming to DOT 3 or DOT 4

MASTER CYLINDER BLEEDING

Refer to GROUP 35A, On-vehicle Service – Bleeding P.35A-22.

BRAKE LINE BLEEDING

⚠ CAUTION

Be sure to filter/strain the brake fluid being added to the master cylinder reservoir tank. Debris may damage the hydraulic unit.

Refer to GROUP 35A, On-vehicle Service – Bleeding P.35A-22.

WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT

M1354003700031

Refer to GROUP 35B, On-vehicle Service – Wheel Speed Sensor Output Voltage Measurement P.35B-45.

HYDRAULIC UNIT CHECK

M1354003400041

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

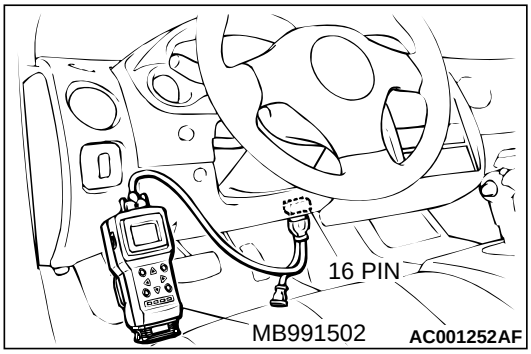
⚠ CAUTION

- **The roller of the braking force tester and the tire should be dry during testing.**
- **When testing the front brakes, apply the parking brake. When testing the rear brakes, stop the front wheels with chocks.**

1. Jack up the vehicle. Then support the vehicle with rigid racks at the specified jack-up points or place the front or rear wheels on the rollers of the braking force tester.
2. Release the parking brake, and feel the drag force (drag torque) on each road wheel.

   When using the braking force tester, take a reading of the brake drag force.

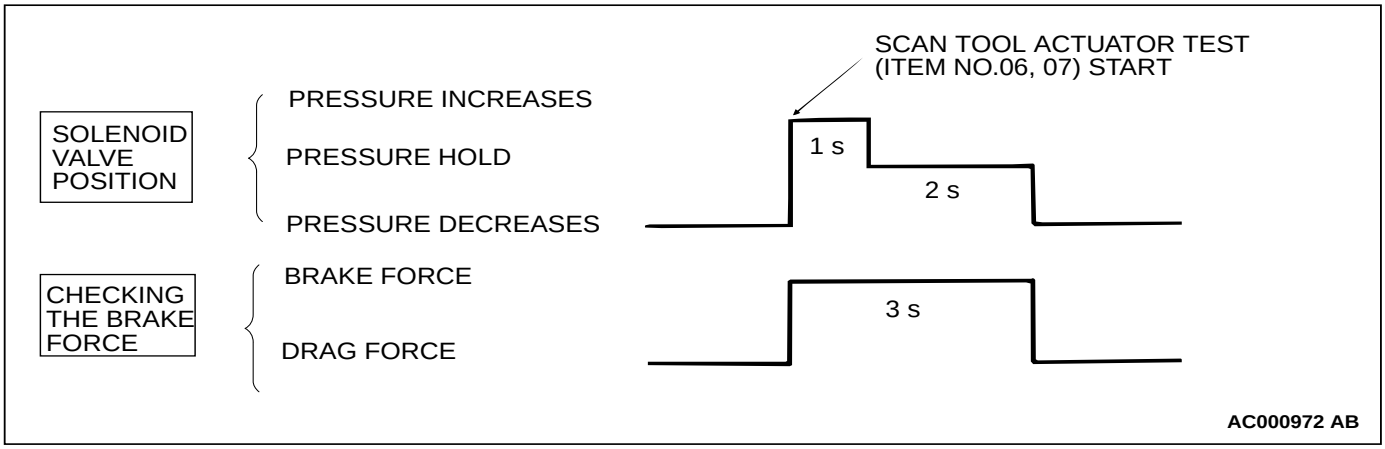
   To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.



3. Turn the ignition switch to the "LOCK" (OFF) position and set scan tool MB991502 as shown in the illustration.
4. After checking that the selector lever <A/T> or the shift lever <M/T> is in neutral, start the engine.
5. Use scan tool MB991502 to force-drive the actuator.

   NOTE: The TCL system will switch to the scan tool mode and the ABS warning light will illuminate.

   NOTE: When the TCL has been interrupted by the fail-safe function, scan tool MB991502 actuator testing cannot be used.



6. Turn the wheel by hand and check the change in braking force. Use a braking force tester. The braking force reading value should change when the actuator test is carried out. The result should be as shown in the diagram above.
7. If the result of inspection is abnormal, replace the hydraulic unit (Refer to GROUP 35B, Hydraulic Unit P.35B-51.).

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