GROUP 35C

TRACTION CONTROL SYSTEM (TCL)

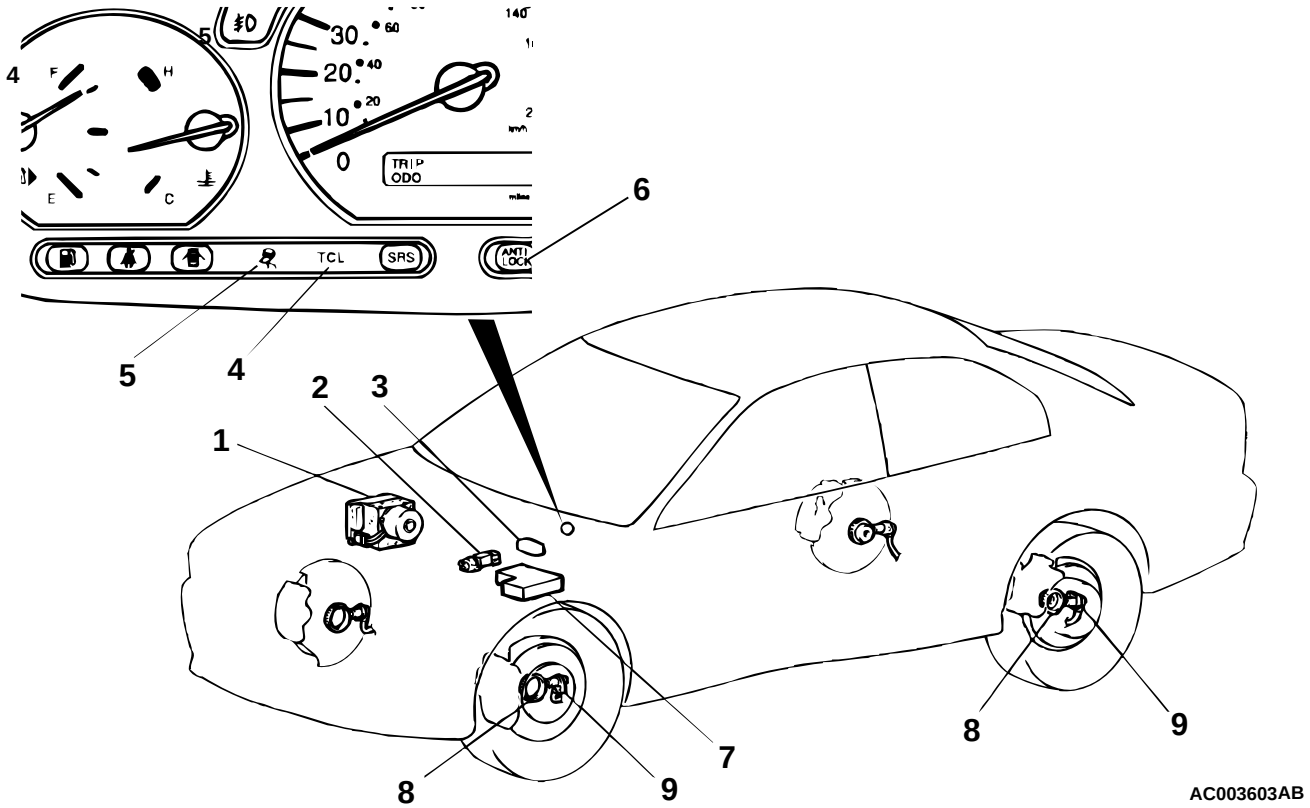
CONTENTS

GENERAL INFORMATION

M1354000100029

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



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

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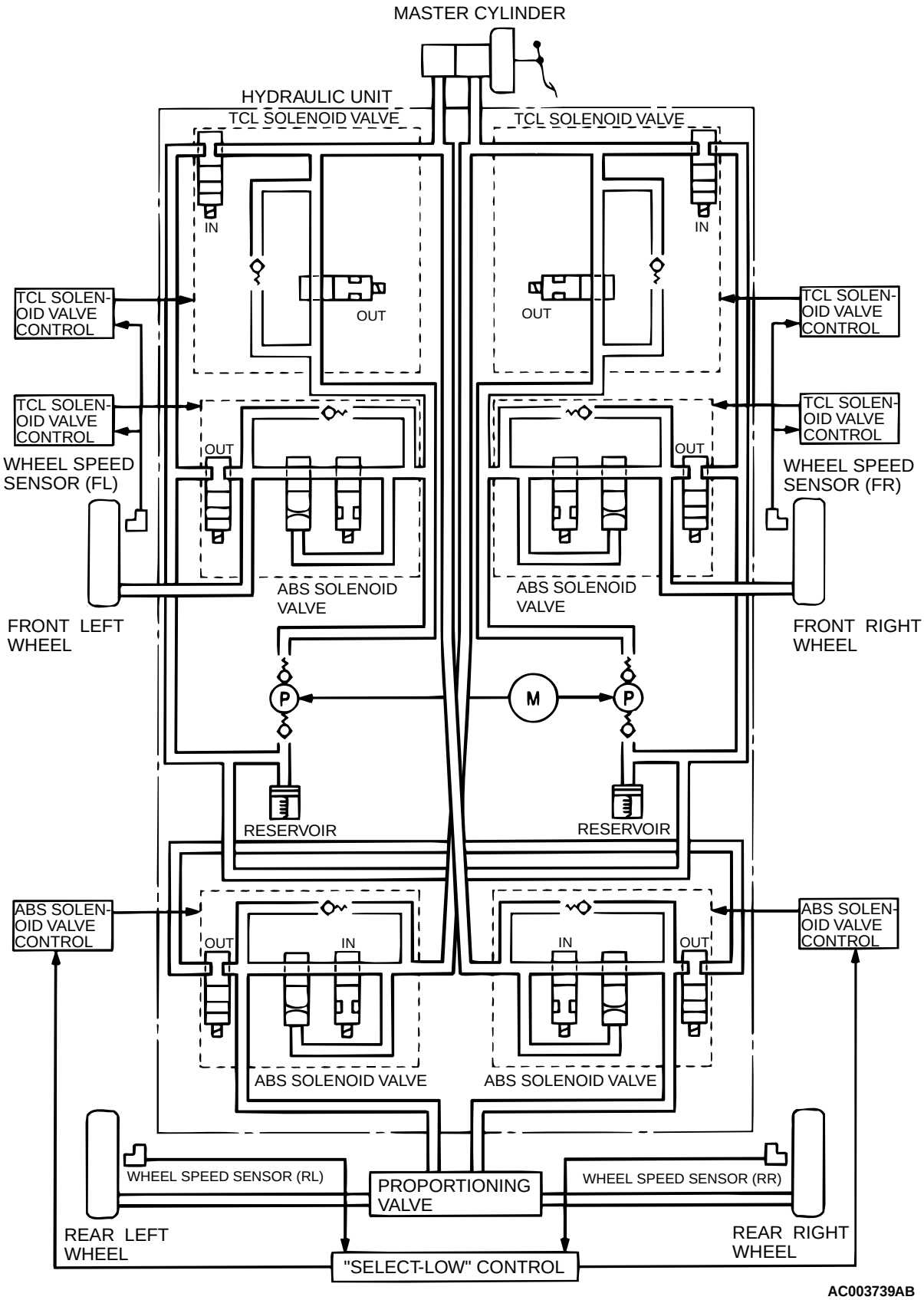
FLUID PRESSURE DIAGRAM



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OPERATION OF SYSTEM

The hydraulic unit incorporates eight ABS solenoid valves, two (IN, OUT) for each front wheel (driving wheel).

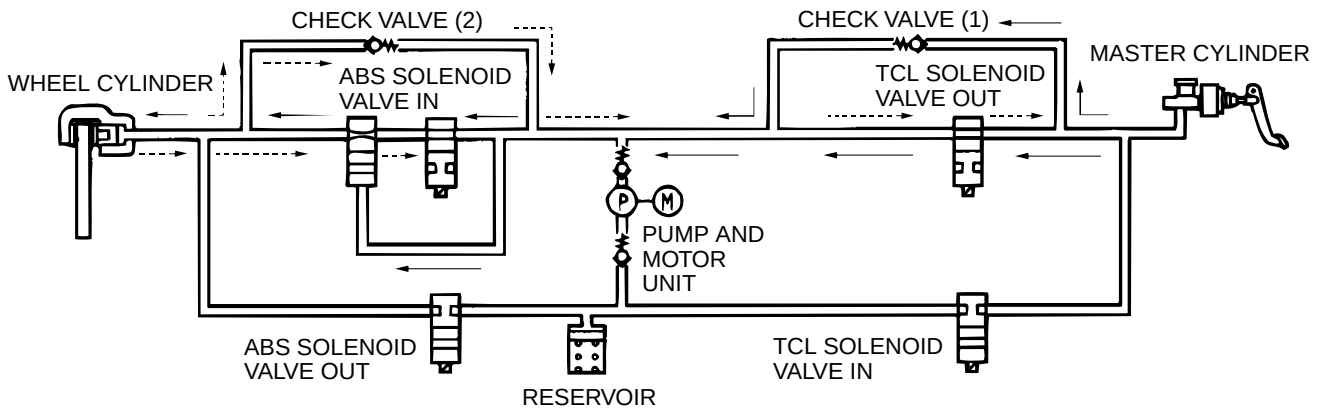
1.When the TCL is inactive

The TCL solenoid valve (OUT) and ABS solenoid valve (IN) are open while the TCL solenoid valve IN and ABS solenoid valve (OUT) are closed. If the brake pedal is depressed, the fluid pressure in the master cylinder flows through the TCL solenoid valve (OUT), check valve (1) and ABS solenoid valve (IN) to the wheel cylinder, operating the brake.

Described below is the functioning of these components when one of the front wheels is about to slip.

If the brake pedal is released, the fluid pressure in the master cylinder falls, and the fluid returns through the ABS solenoid valve (IN), check valve (2) and TCL solenoid valve (OUT) to the master cylinder, releasing the brake.

COMPONENT		CURRENT SUPPLY	VALVE POSITION	COMPONENT		CURRENT SUPPLY	VALVE POSITION
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Closed
	OUT	OFF	Closed		OUT	OFF	Open



←·····WHEN BRAKE PEDAL IS DEPRESSED

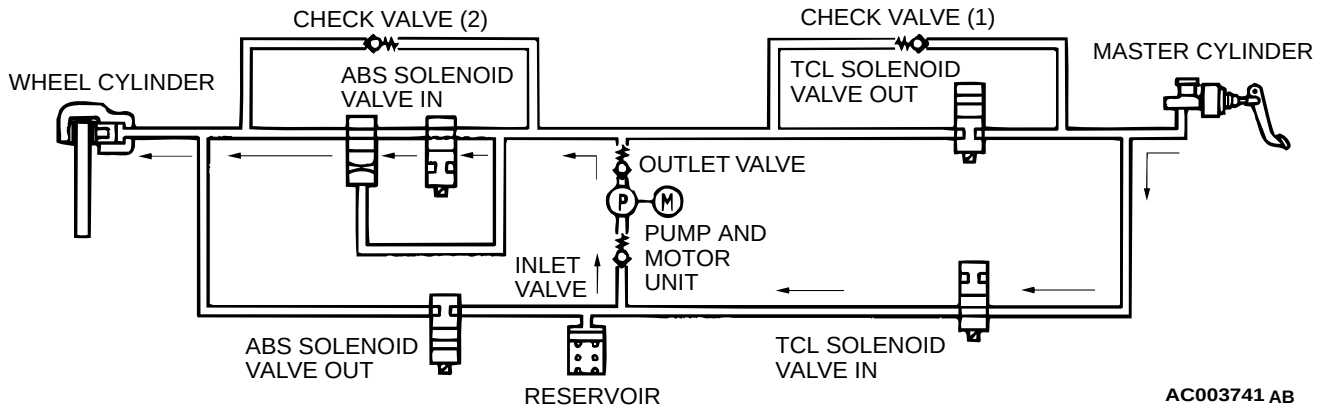
←——WHEN BRAKE PEDAL IS RELEASED

2.When the TCL is active

(1) Pressure increasing mode

If the ABS-ECU determines that either of the front wheels is slipping due to abrupt acceleration, etc, it commands the TCL solenoid valve (OUT) to close and the TCL solenoid valve to open. Furthermore, it energizes the motor to drive the pump. The pump then sucks out the fluid in the master cylinder through the TCL solenoid valve (IN) and the inlet valve, then sends it through the outlet valve (IN) to the wheel cylinder, increasing the fluid pressure in that cylinder.

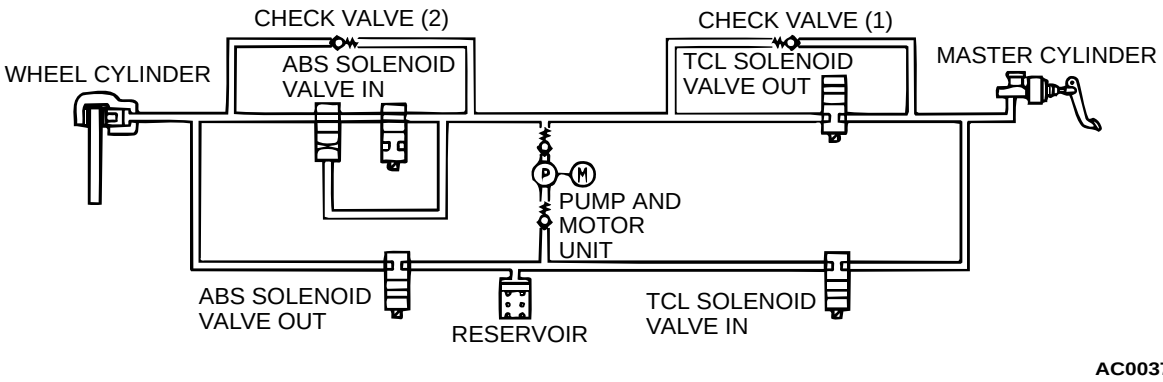
COMPONENT		CURRENT SUPPLY	VALVE POSITION	COMPONENT		CURRENT SUPPLY	VALVE POSITION
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	ON	Open
	OUT	OFF	Closed		OUT	ON	Closed



(2) Pressure holding mode

If the ABS-ECU determines that the fluid pressure has been increased to the optimum level, it stops supplying power to the motor and the TCL solenoid valve (IN). This causes the pump to stop its operation and the TCL solenoid valve (IN) to close. As a result, the fluid pressure in the wheel cylinder is retained.

COMPONENT		CURRENT SUPPLY	VALVE POSITION	COMPONENT		CURRENT SUPPLY	VALVE POSITION
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Closed
	OUT	OFF	Closed		OUT	ON	Closed



(3) Pressure reducing mode

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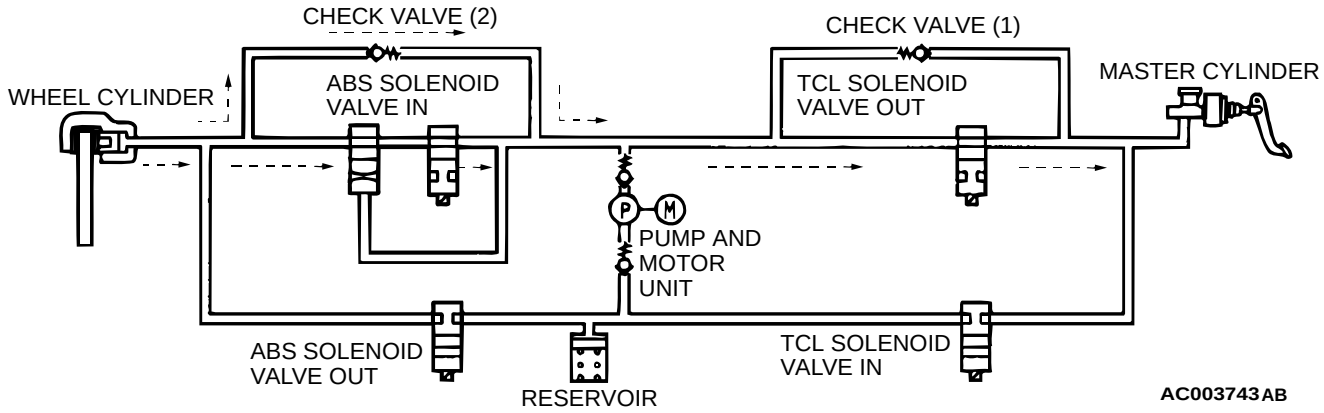
If the ABS-ECU determines that wheel slipping has been prevented, it commands the TCL solenoid valve (OUT) to open. This causes the fluid in the wheel cylinder to flow through the ABS solenoid valve (IN), check valve (2) and TCL solenoid valve (OUT) back to the master cylinder, reducing the fluid pressure in the brake circuit.

COMPONENT		CURRENT SUPPLY	VALVE POSITION	COMPONENT		CURRENT SUPPLY	VALVE POSITION
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Closed
	OUT	OFF	Closed		OUT	OFF	Open



TRACTION CONTROL SYSTEM (TCL) DIAGNOSIS

TCL Diagnostic Trouble Code Detection Conditions

M1354003500026

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

M1354000400020

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

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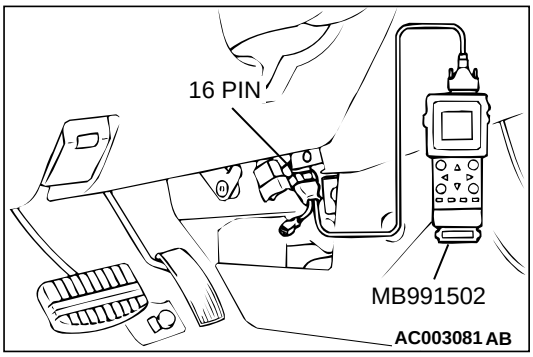
TCL TROUBLE CODE DIAGNOSIS

M1354000500038

Retrieving TCL Diagnostic Trouble Codes



Using Scan Tool MB991502

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

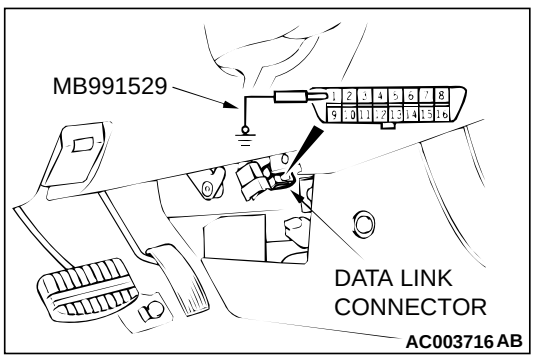
⚠ CAUTION

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

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

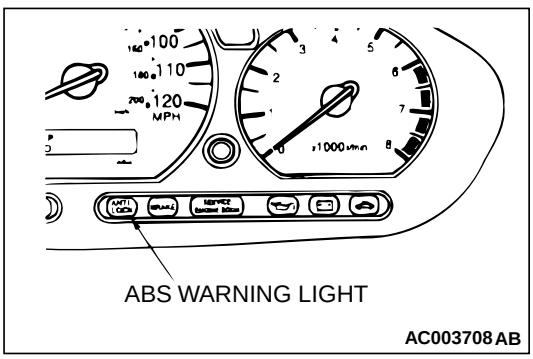
NOTE: The TCL system is controlled by the ABS-ECU. TCL diagnostic trouble codes are also indicated by flashing of the ABS warning light.

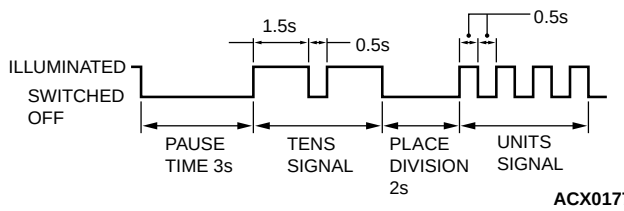
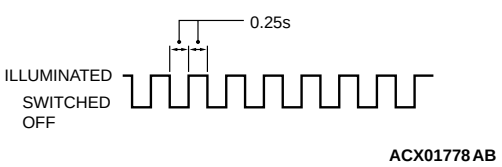


Required Special Tool:

- MB991529: Diagnostic Trouble Code Check Harness

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

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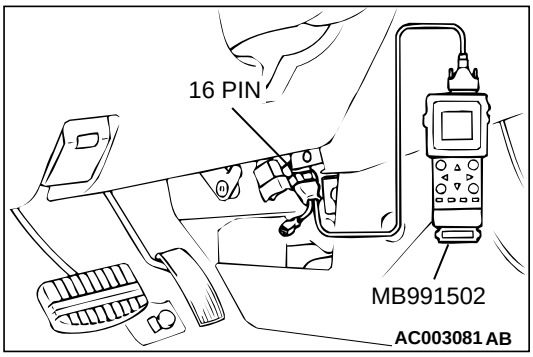
Erasing TCL Diagnostic Trouble Codes

Using Scan Tool MB991502



Required Special Tool:

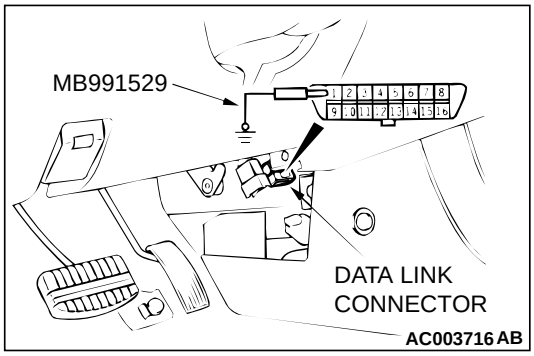
- MB991502: Scan Tool (MUT-II)

⚠ 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.

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.

Using the Special Tool MB991529

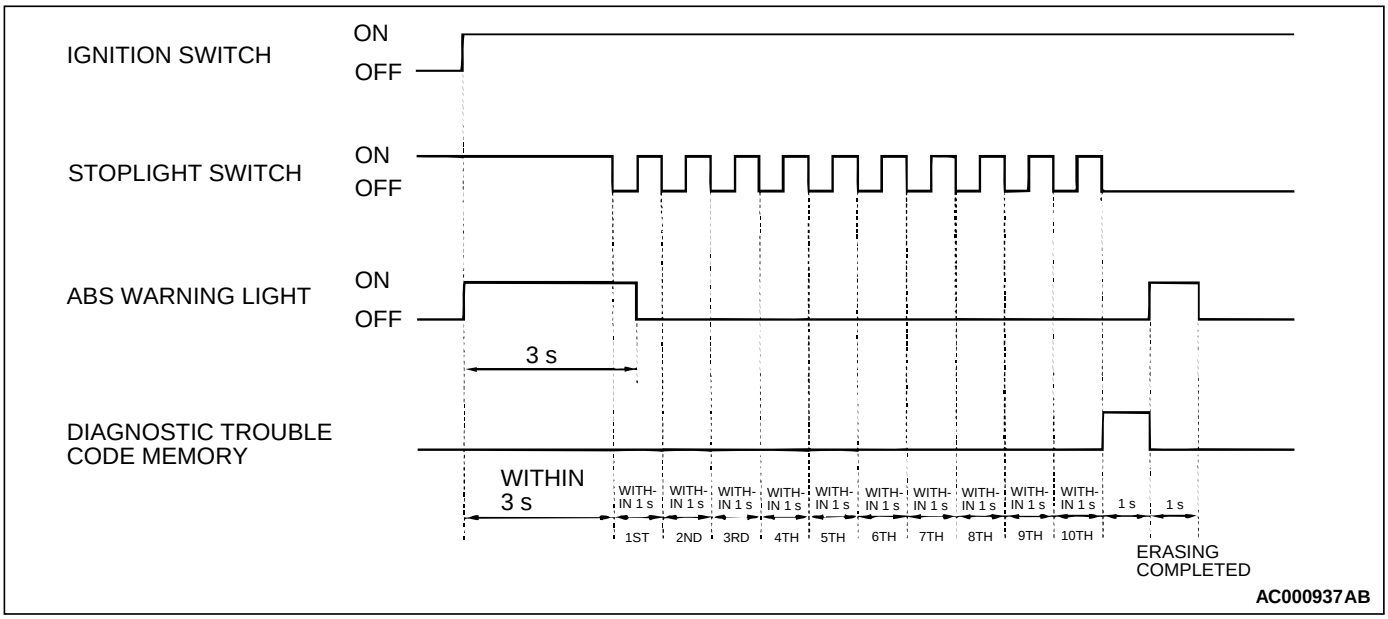


Required Special Tool:

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

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DIAGNOSTIC TROUBLE CODE CHART

M1354000600024

Refer to GROUP 35B – Diagnosis Trouble Code Chart.

SYMPTOM CHART

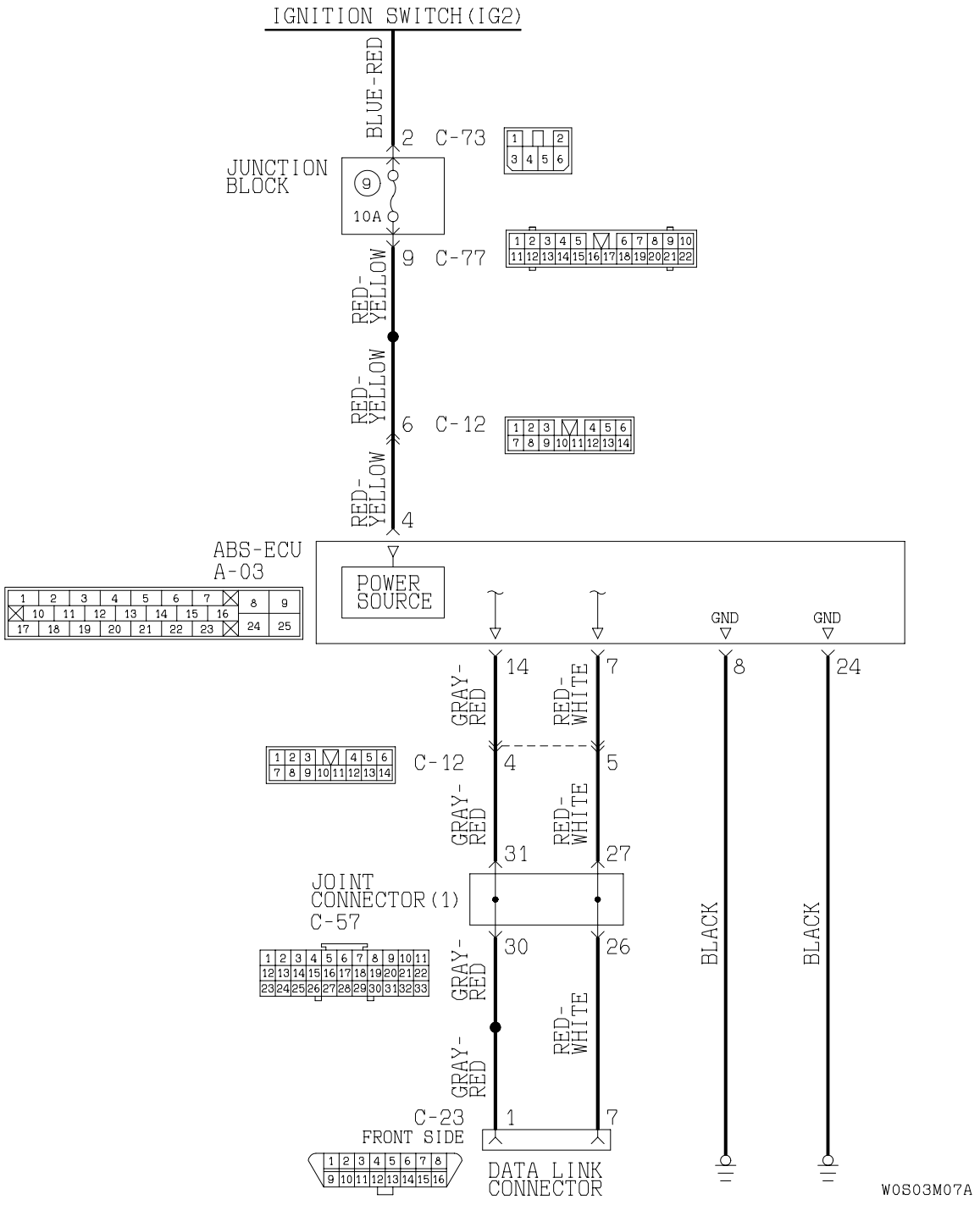
M1354000700021

SYMPTOMS	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication between the scan tool and all systems is not possible.	-	13A – Diagnosis Symptom chart P.13A-22 or 13B – Diagnosis Symptom chart P.13B-22.
Communication between the scan tool and the ABS-ECU is not possible.	1	P.35C-10
When the ignition key is turned to "ON" (Engine stopped), the TCL indicator does not illuminate.	2	P.35C-14
When the ignition key is turned to "ON" (Engine stopped), the TCL warning light does not illuminate.	3	P.35C-21
The TCL indicator remains illuminated after the engine is started.	4	P.35C-26
The TCL warning light remains illuminated after the engine is started.	5	P.35C-29
The TCL system does not operate.	6	P.35C-32

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Communication with scan tool is not possible. (Commnication with TCL only is not possible.)

Data Link Connector Circuit



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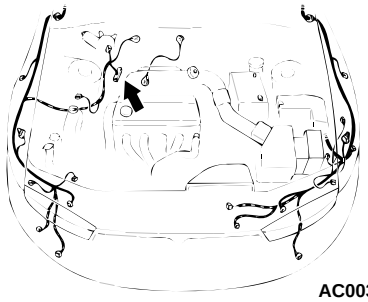
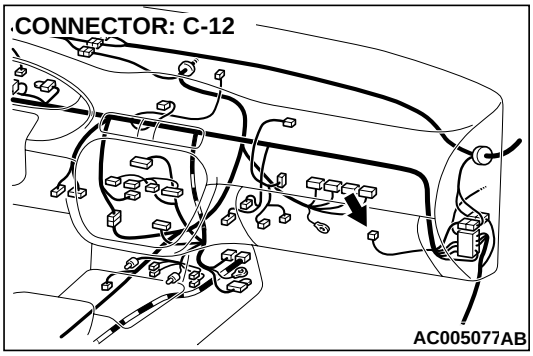
CONNECTOR: A-03



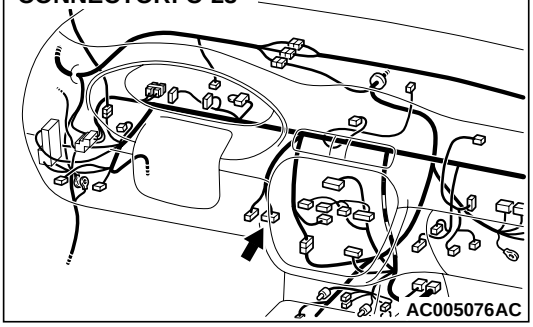
AC003695AB

CONNECTOR: C-12



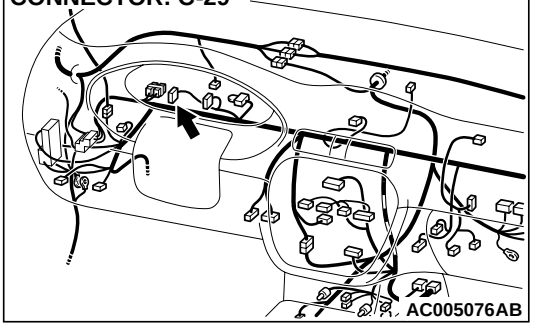
AC005077AB

CONNECTOR: C-23



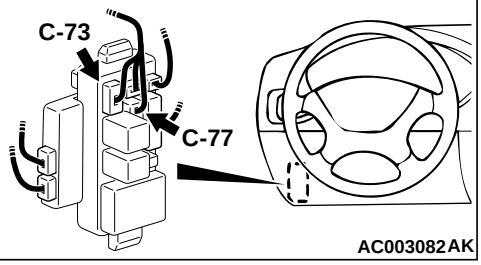
AC005076AC

CONNECTOR: C-29



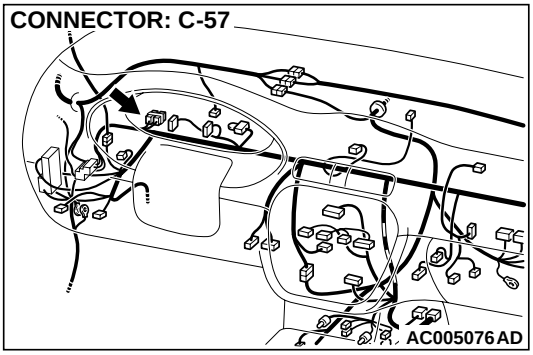
AC005076AB

CONNECTORS: C-73, C-77
JUNCTION BLOCK
(FRONT VIEW)



AC003082AK

CONNECTOR: C-57



AC005076AD

CIRCUIT OPERATION

- The diagnostic output is made from the ABS-ECU (terminal 11) to the diagnostic output terminal (terminal 11) 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 condition:

- 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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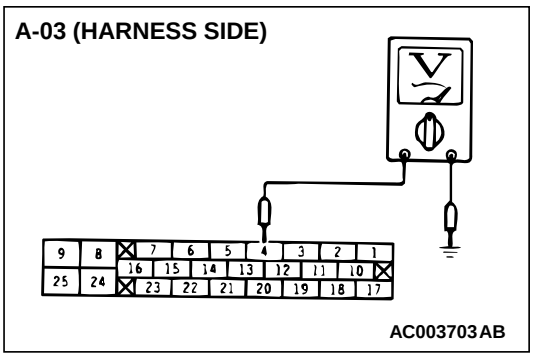
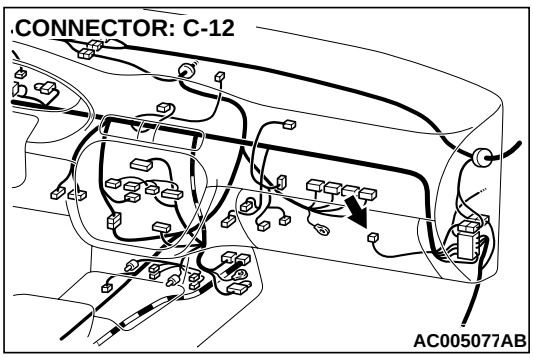


STEP 1. Check the power supply circuit at ABS-ECU connector A-03.

(1) Disconnect connector A-03 and measure at the harness side.
(2) Start the engine.
(3) Measure the voltage between terminal 4 and ground.

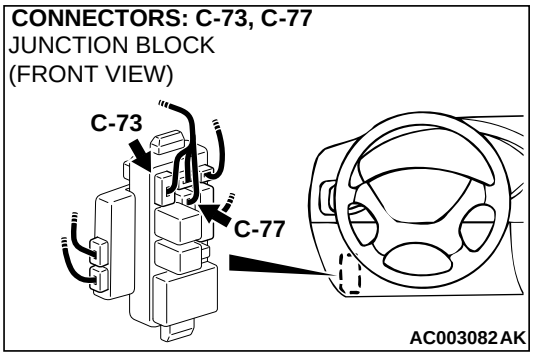
Q: Is the voltage approximately 12 volts?

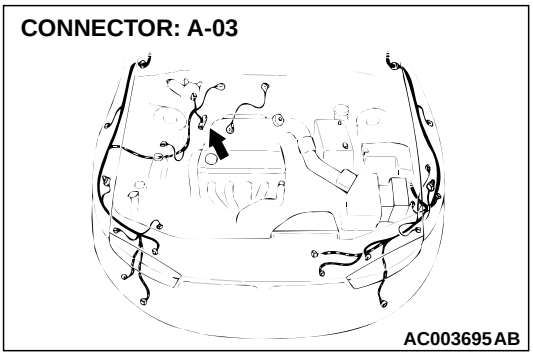
YES : Go to Step 3.
NO : Go to Step 2.



STEP: 2. Check the harness wire between ignition switch (IG2) and ABS-ECU connector A-03.

NOTE: After inspecting intermediate connector C-12, C-73 or C-77, inspect the wire. If intermediate connector C-12, C-73 or C-77 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector InspectionP.00E-2. If the connector has been repaired, go to Step 5 .





Q: Are any harness wires between ABS-ECU connector A-03 and ignition switch (IG2) damaged?

YES : Repair them and then go to Step 5.
NO : Go to Step 5.

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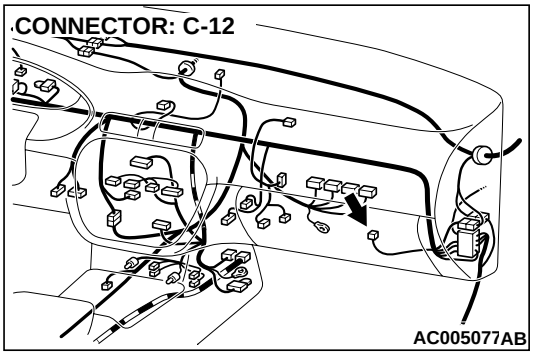
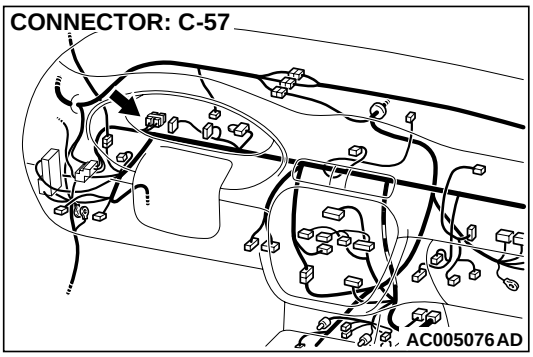
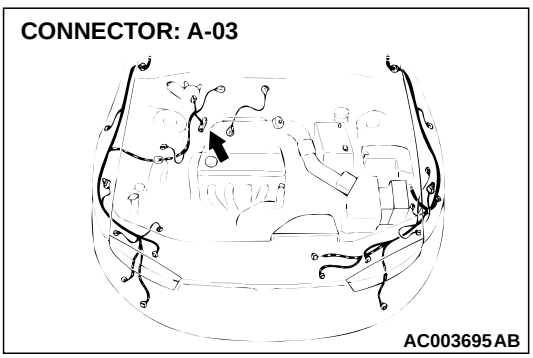
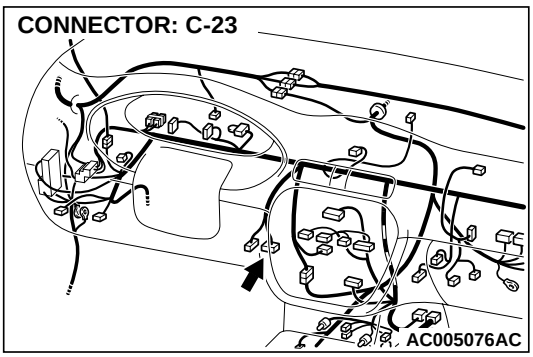
STEP: 3. Check the harness wires between ABS-ECU connector A-03 and data link connector C-23.

NOTE: After inspecting intermediate connector C-12, C-57 inspect the wire. If intermediate connector C-12, C-57 is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector InspectionP.00E-2. If the connector has been repaired, go to Step 5.









Q: Are any harness wires between ABS-ECU connector A-03 and data link connector C-23 damaged?

YES : Repair them and then go to Step 5.
NO : Go to Step 4.

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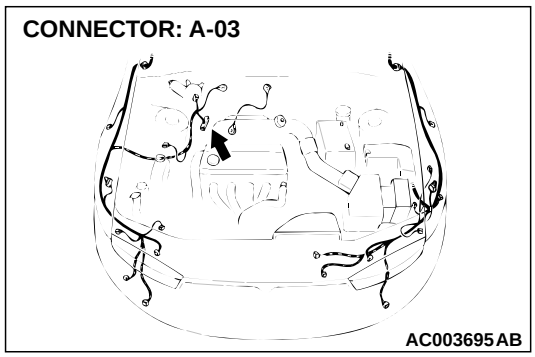

STEP: 4.Check the harness wires between ABS-ECU connector A-03 and ground.

Q: Are any harness wires between ABS-ECU connector A-03 and ground damaged?

YES : Repair them and then go to Step 5.

NO : Replace the ABS-ECU and then go to Step 5.

STEP: 5. Check symptoms.

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

YES : This diagnosis is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 2 : When the ignition switch is turned "ON" (engine stopped or after startup), the TCL indicator light does not illuminate.

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.

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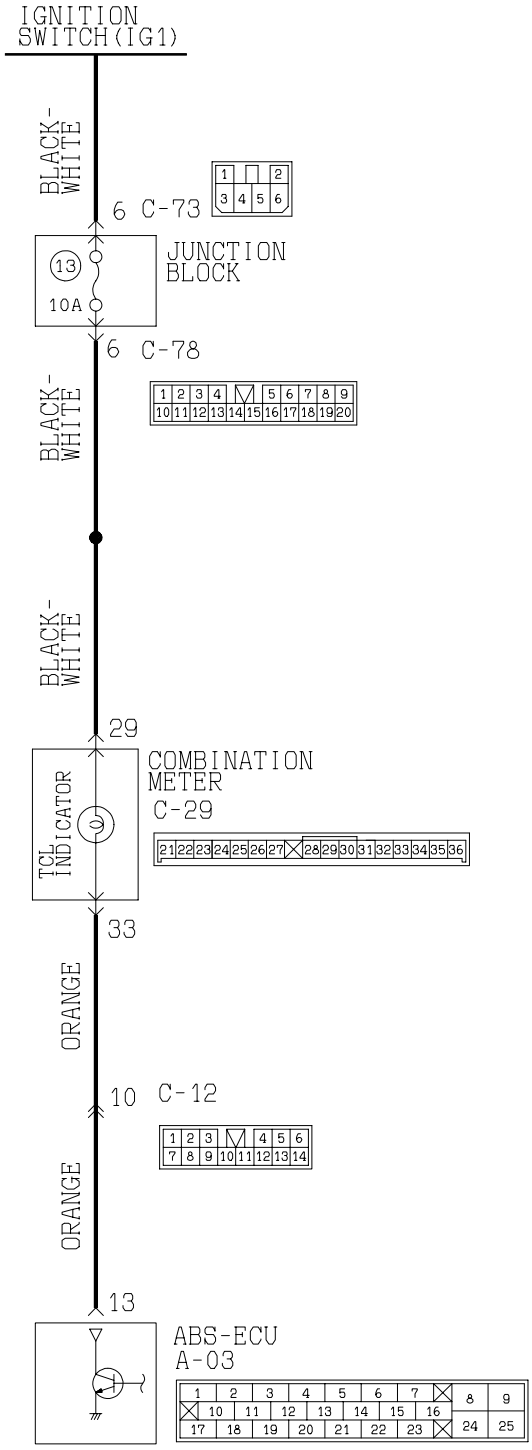
TCL Indicator Light Circuit



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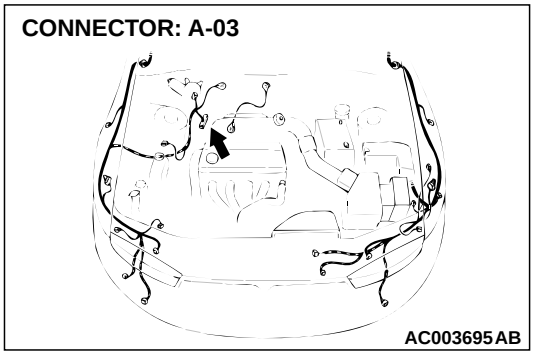
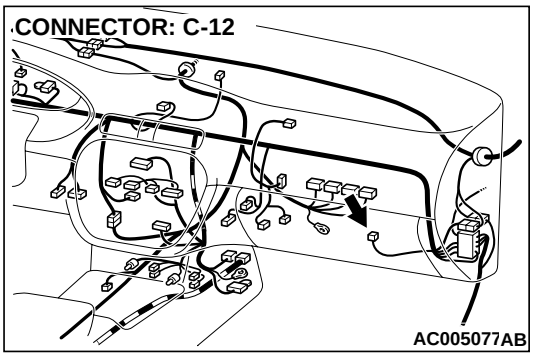
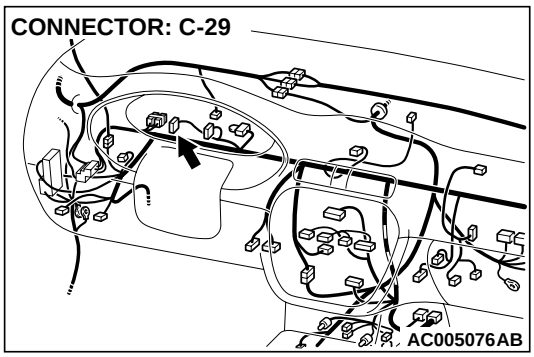
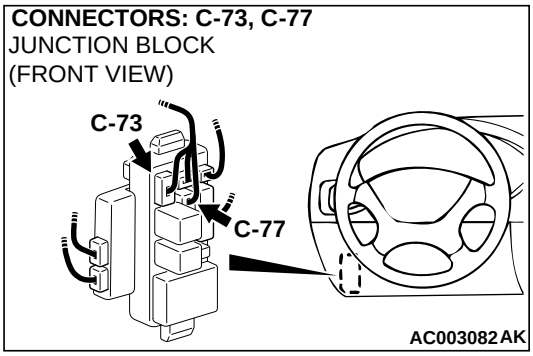








CIRCUIT OPERATION

- 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 3 seconds while running self-check. This light can be illuminated for 3 seconds upon startup or key ON, engine stopped.

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.

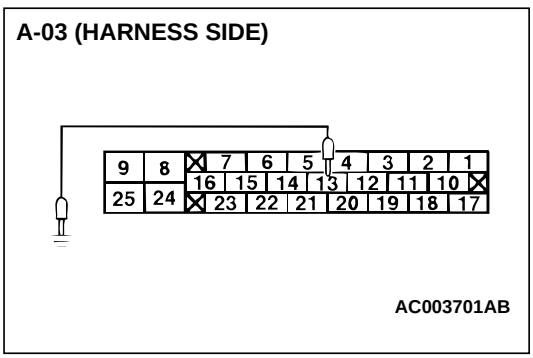
TROUBLESHOOTING HINTS

- 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



STEP 1. Check the power supply circuit at ABS-ECU connector A-03.

(1) Disconnect connector A-03 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.
(3) The TCL indicator light should illuminate if terminal 13 is grounded.

Q: Does the TCL indicator light illuminate?

YES : Replace the hydraulic unit (integrated with ABS-ECU) and then go to Step 9.
NO : Go to Step 2.

TSB Revision

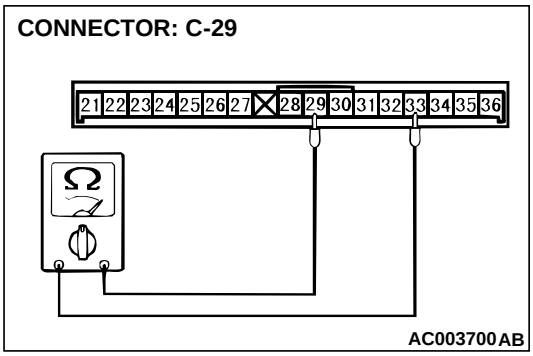
STEP: 2. Check the TCL indicator light bulb.

(1) Remove the combination meter (Refer to GROUP 54A, Combination Meter P.54A-65.).
(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.

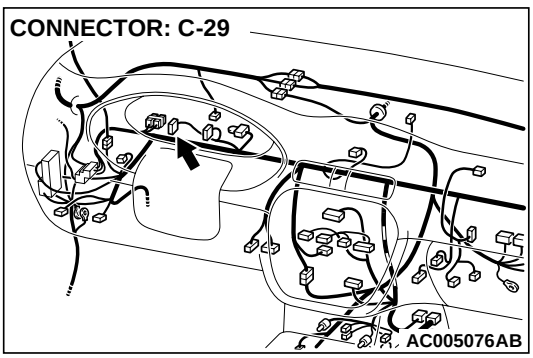


(1) Remove the combination meter.
(2) Remove the TCL indicator light bulb. Then measure the resistance between the bulb terminals.
(3) Install the TCL indicator light bulb to the combination meter, and then measure the resistance between connector C-29 terminals 29 and 33. The resistance reading at this 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).
NO (much the same) : Go to Step 4.

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



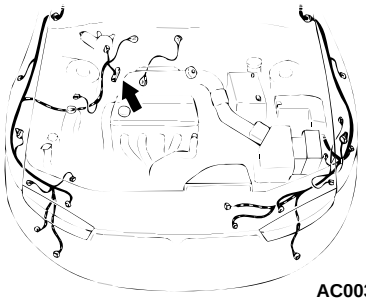
(1) Disconnect connector C-29, and check at the harness side.
(2) Turn the ignition switch to "ON" position.
(3) Measure the voltage between terminal 29 and ground. It should be approximately 12 volts (battery positive voltage).

Q: Is the voltage approximately 12 volts?

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

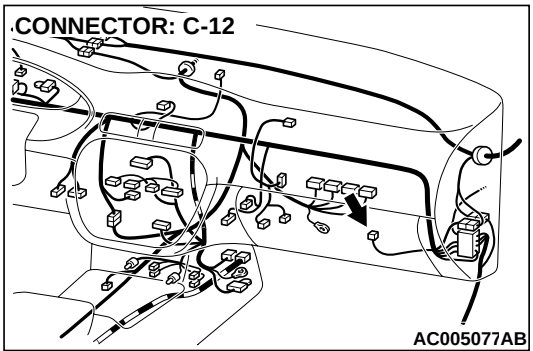
TSB Revision

CONNECTOR: A-03



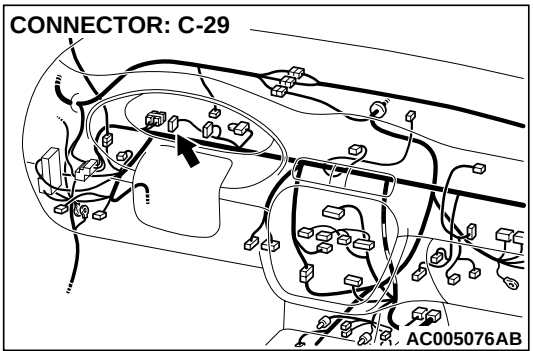
AC003695AB

CONNECTOR: C-12



AC005077AB

CONNECTOR: C-29



AC005076AB

STEP: 5. Check connectors C-12, C-29, and A-03.

Check connectors C-12, C-29, and A-03 (Refer to GROUP 00E, Harness Connector Inspection P.00E-2.).

Q: Is any of connectors damaged?

YES : Repair it and then go to Step 9.

NO : Go to Step 6 .

TSB Revision

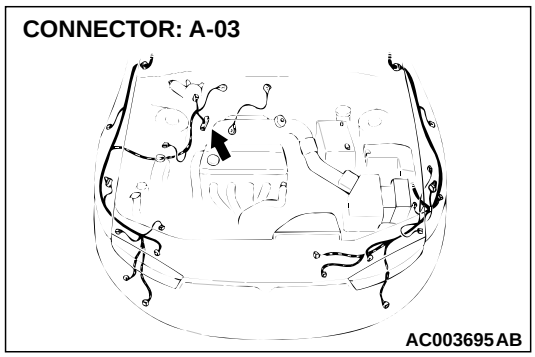
STEP 6. Check the continuity between the combination meter and the ABS-ECU.

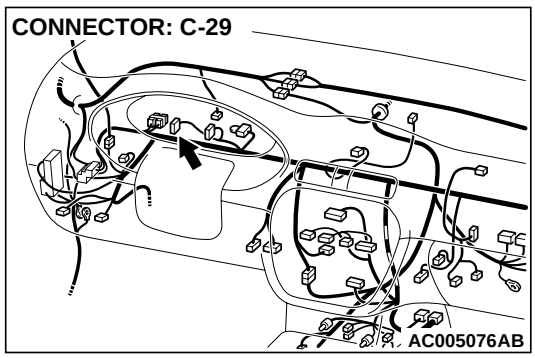
Check the continuity between combination meter connector C-29 and ABS-ECU connector A-03.

Q: Is there the continuity between combination meter connector C-29 and ABS-ECU connector A-03?

YES : Go to Step 9.

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





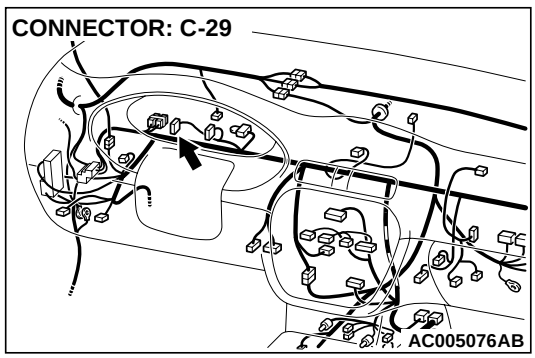
STEP 7. Check connectors C-29, C-73, and C-78.

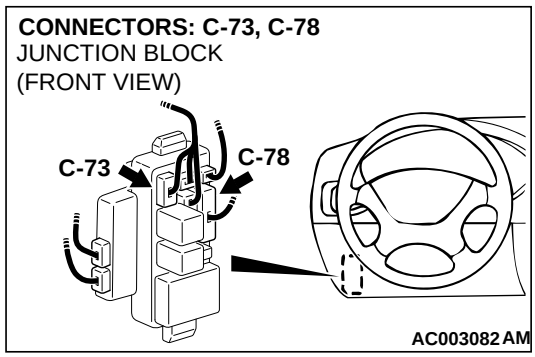
Check connectors C-29, C-73, and C-78 (Refer to GROUP 00E, Harness Connector Inspection P.00E-2.).

Q: Are any of the connectors damaged?

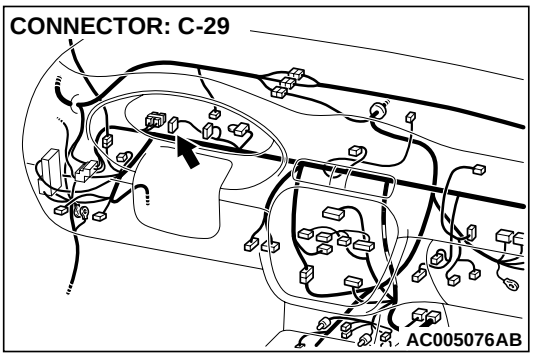
YES : Repair it and then go to Step 9.

NO : Go to Step 8.





TSB Revision



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

Q: Is there any continuity (less than 2 ohm) between the ignition switch (IG1) and combination meter connector C-29?

YES : 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 60 seconds when the ignition switch is turned to the "ON" position with engine stopped or upon startup?

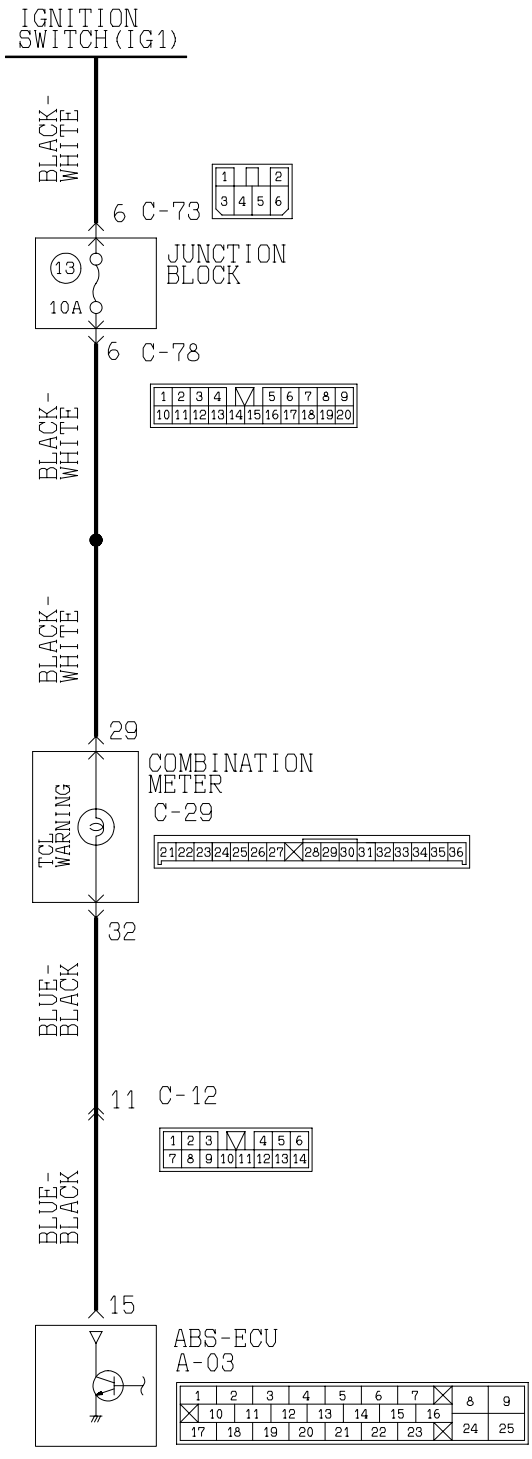
YES : This diagnosis is complete.

NO : Return to Step 1.

TSB Revision

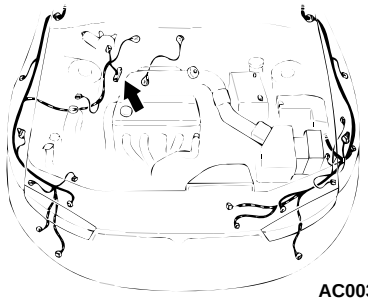
INSPECTION PROCEDURE 3: When the ignition switch is turned "ON" (engine stopped or after startup), the TCL warning light does not illuminate.

TCL Werning Light Circuit



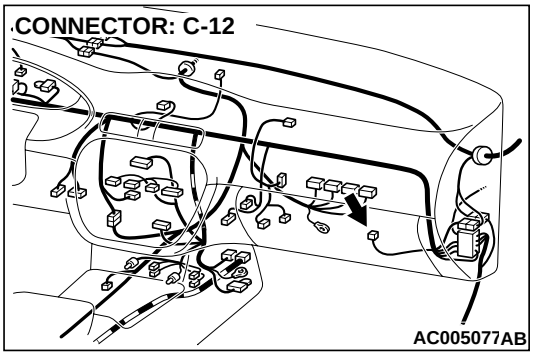
TSB Revision

CONNECTOR: A-03



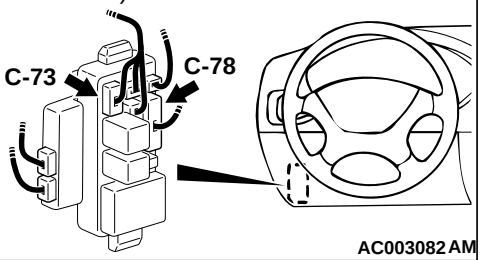
AC003695AB

CONNECTOR: C-12



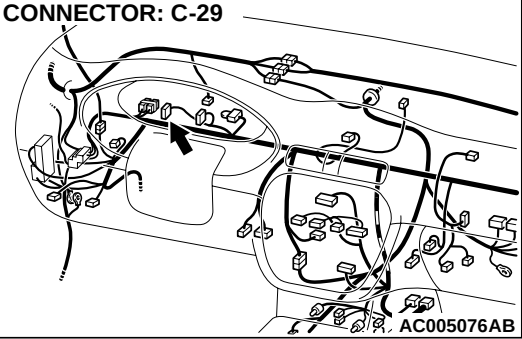
AC005077AB

CONNECTORS: C-73, C-78
JUNCTION BLOCK
(FRONT VIEW)



AC003082AM

CONNECTOR: C-29



AC005076AB

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 3 seconds while running self-check. This light can be illuminated for 3 seconds upon startup or ignition switch ON, engine stopped.

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.

TROUBLESHOOTING HINTS

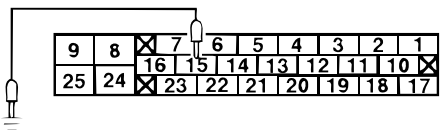
- Blown fuse
- Damaged wiring harness or connector
- Burnt out TCL warning light bulb
- Malfunction of the ABS-ECU

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

A-03 (HARNESS SIDE)



AC003702AB

STEP 1. Check the power supply circuit at ABS-ECU connector A-03.

(1) Disconnect connector A-03 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) The TCL warning light should illuminate when terminal 15 is grounded.

Q: Does the TCL warning light illuminate?

YES : Replace the hydraulic unit (integrated with ABS-ECU) and then go to Step 9.
NO : Go to Step 2.

TSB Revision

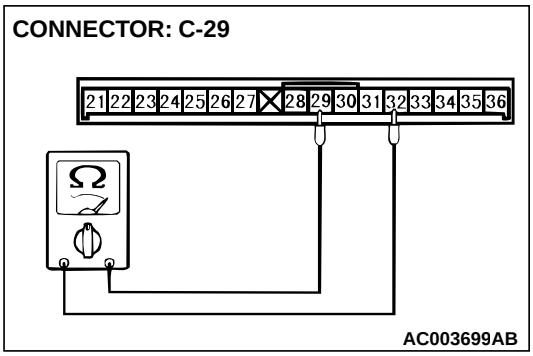
STEP 2. Check the TCL indicator light bulb.

(1) Remove the combination meter (Refer to GROUP 54A, Combination Meter P.54A-65.).
(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.

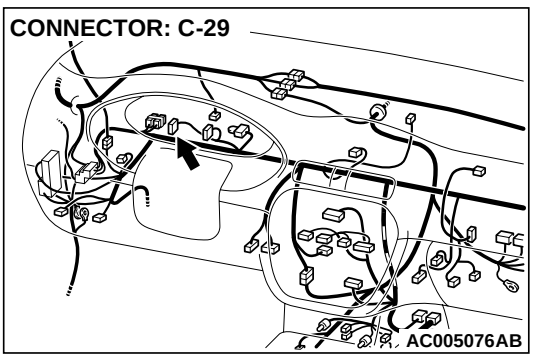


(1) Remove the combination meter.
(2) Remove the TCL indicator light bulb. Then measure the resistance between the bulb terminals.
(3) Install the TCL indicator light bulb to the combination meter, and then measure the resistance between connector C-29 terminals 29 and 32. The resistance reading at this 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).
NO (much the same) : Go to Step 4.

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

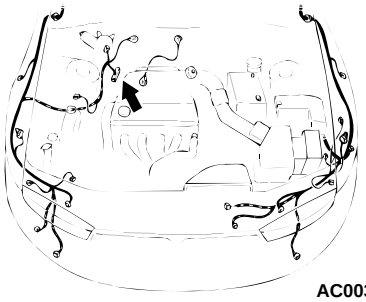


(1) Disconnect connector C-29, and check at the harness side.
(2) Turn the ignition switch to "ON" position.
(3) Measure the voltage between terminal 29 and ground. It should be approximately 12 volts (battery positive voltage.).

Q: Is the voltage approximately 12 volts?

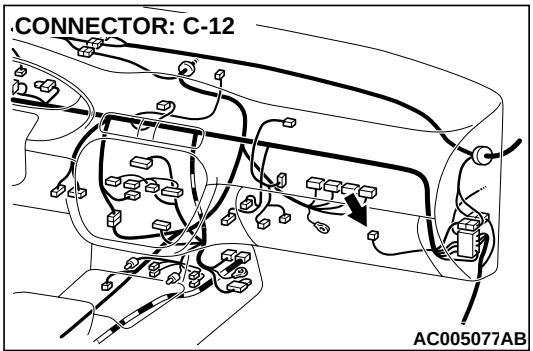
YES : Go to Step 5.
NO : Go to Step 7.

CONNECTOR: A-03



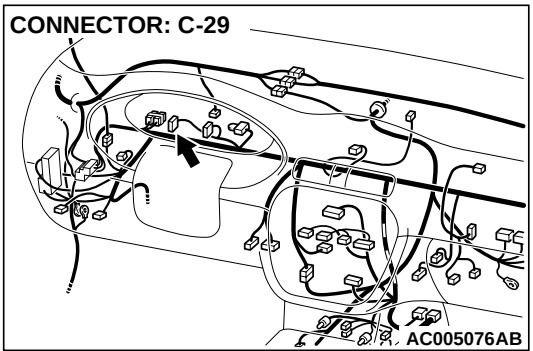
AC003695AB

CONNECTOR: C-12



AC005077AB

CONNECTOR: C-29



AC005076AB

STEP 5. Check connectors C-12, C-29, and A-03.

Check connectors C-12, C-29, and A-03 (Refer to GROUP 00E, Harness Connector Inspection P.00E-2.).

Q: Is any of connectors damaged?

YES : Repair it and then go to Step 9.

NO : Go to Step 6.

TSB Revision

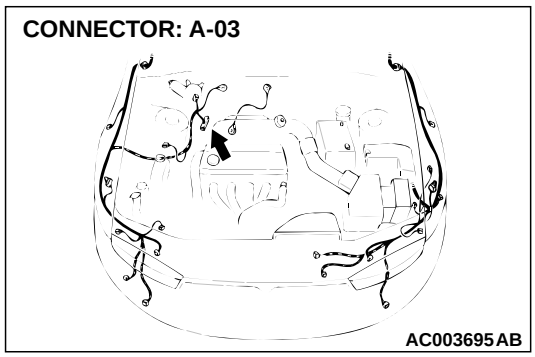
STEP 6. Check the continuity between the combination meter and the ABS-ECU.

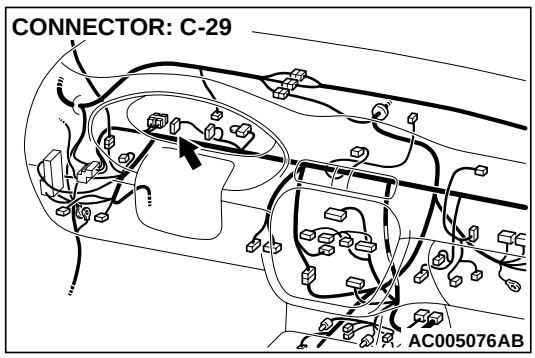
Check the continuity between combination meter connector C-29 and ABS-ECU connector A-03.

Q: Is there the continuity between combination meter connector C-29 and ABS-ECU connector A-03?

YES : Go to Step 9.

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





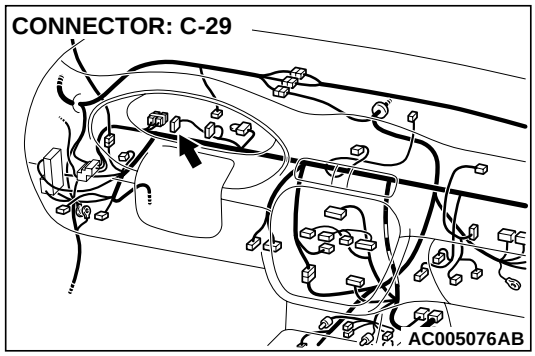
STEP 7. Check connectors C-29, C-73, and C-78.

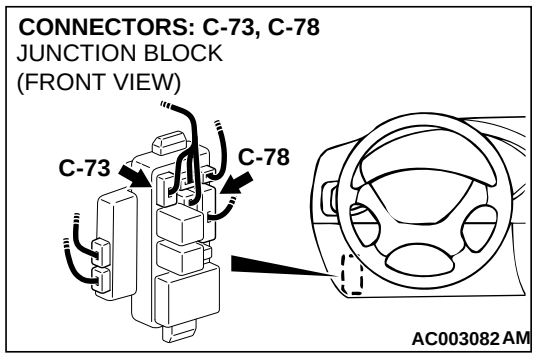
Check connectors C-29, C-73, and C-78 (Refer to GROUP 00E, Harness Connector Inspection P.00E-2.).

Q: Are any of the connectors damaged?

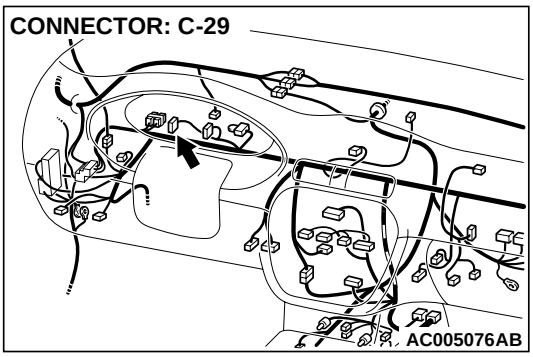
YES : Repair it and then go to Step 9.

NO : Go to Step 8.





TSB Revision



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

Q: Is there any continuity (less than 2 ohm) between the ignition switch (IG1) and combination meter connector C-29?

YES : 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?

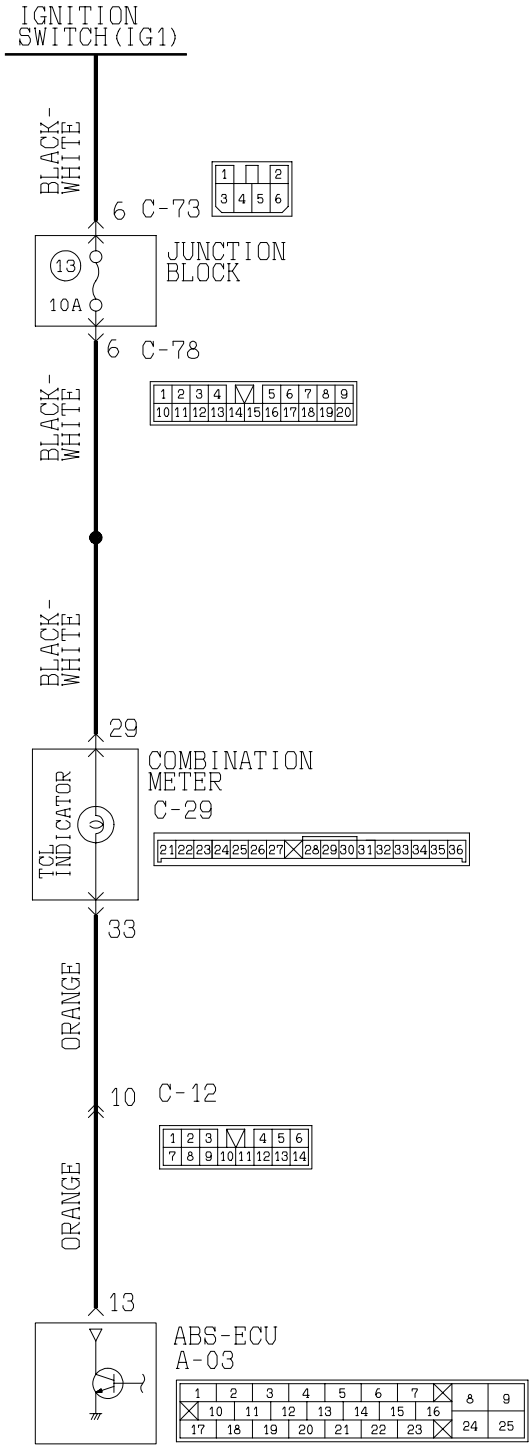
YES : This diagnosis is complete.

NO : Return to Step 1.

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 Indicator Light Circuit



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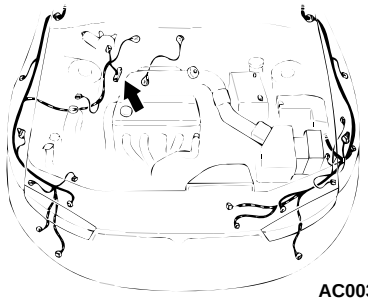
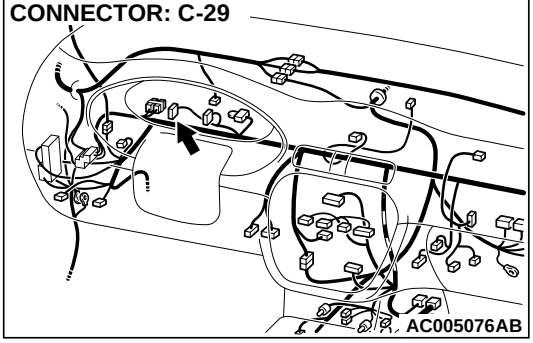
TSB Revision

CONNECTOR: A-03



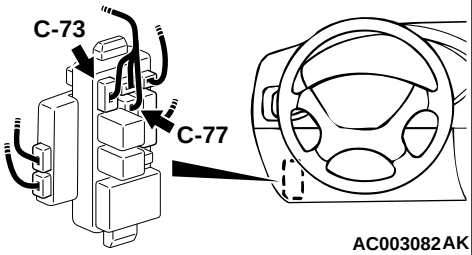
AC003695AB

CONNECTOR: C-29



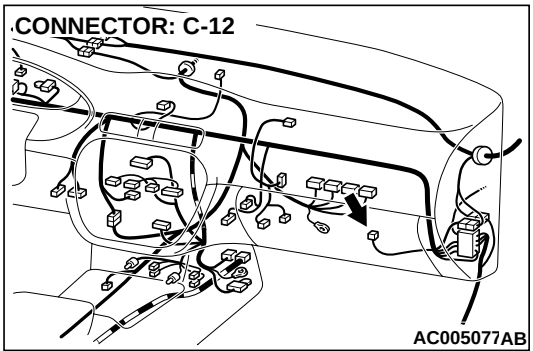
AC005076AB

CONNECTORS: C-73, C-77
JUNCTION BLOCK
(FRONT VIEW)



AC003082AK

CONNECTOR: C-12



AC005077AB

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 on startup. If turns off the light after 3 seconds when the ABS-ECU completes the self-check.

TECHNICAL DESCRIPTION (COMMENT)

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

TROUBLESHOOTING HINTS

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

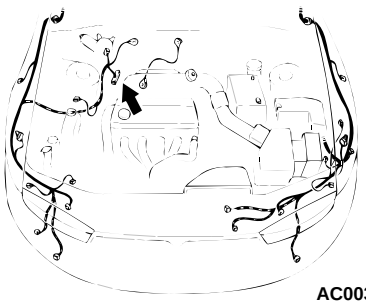
DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

STEP 1. Check the power supply circuit at the ABS-ECU connector A-03.

CONNECTOR: A-03



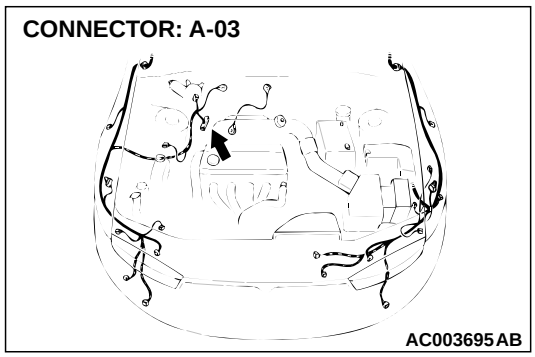
AC003695AB

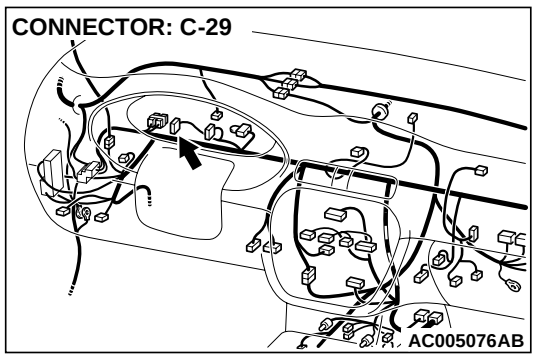
(1) Disconnect ABS-ECU connector A-03.
(2) Turn the ignition switch to the "ON" position.

Q: Is the TCL indicator light illuminate?

YES : Go to Step 2.
NO : Replace the Hydraulic unit (integrated with ABS-ECU) and then go to Step 3.

TSB Revision





STEP 2. Check the harness wires between ABS-ECU connector A-03 and TCL indicator light connector C-29.

Q: Are any harness wires between ABS-ECU connector A-03 and TCL indicator light connector C-29 damaged?

YES : Repair them 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 startup?

YES : This diagnosis is complete.

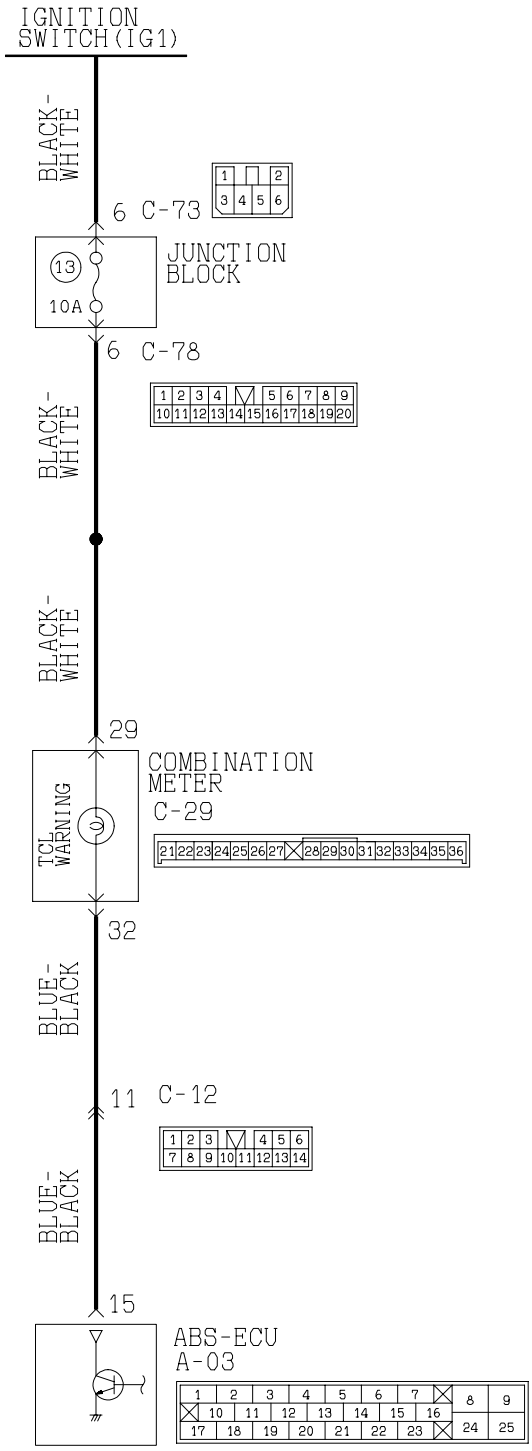
NO : Return to Step 1.

INSPECTION PROCEDURE 5: The TCL warning light remains illuminated after the engine is started

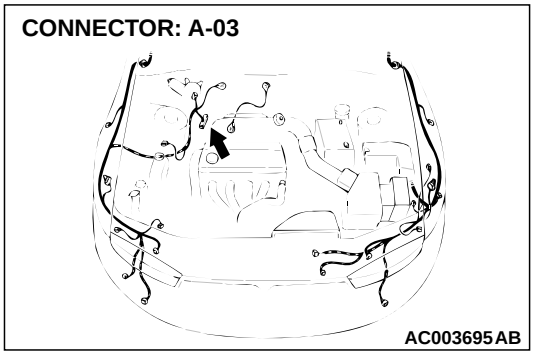
NOTE: This diagnosis procedure is limited to cases where communication with the scan tool is possible (ABS-ECU power supply is normal) and no diagnostic trouble code outputs.

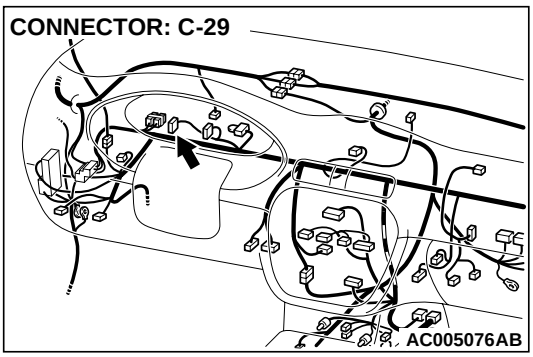
TSB Revision

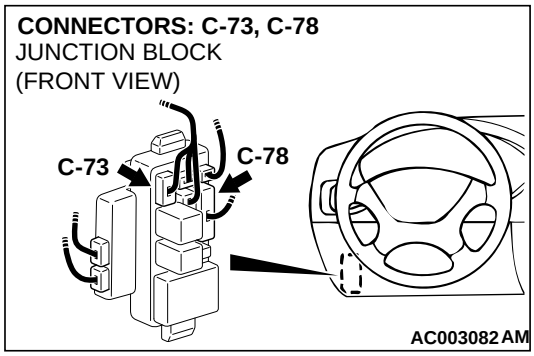
TCL Werning Light Circuit

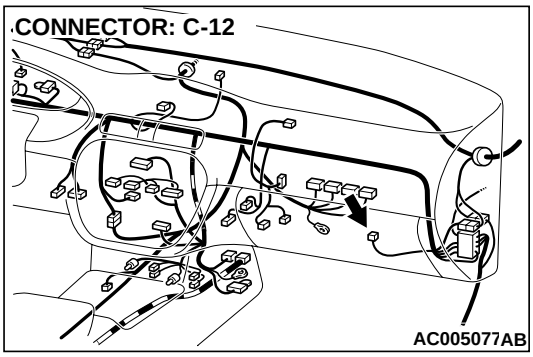


TSB Revision









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 on startup. If turns the light off after 3 seconds when the ABS-ECU completes the self-check.

TECHNICAL DESCRIPTION (COMMENT)

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

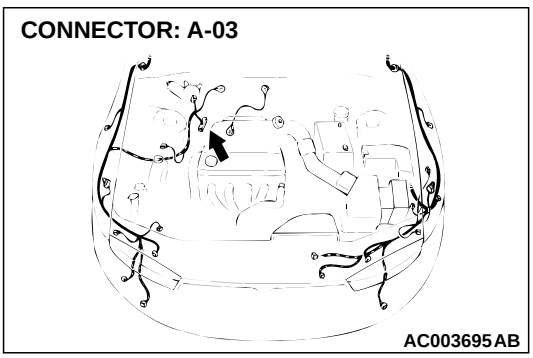
TROUBLESHOOTING HINTS

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

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set



STEP 1. Check the power supply circuit at ABS-ECU connector A-03.

(1) Disconnect ABS-ECU connector A-03.
(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) and then go to Step 3.

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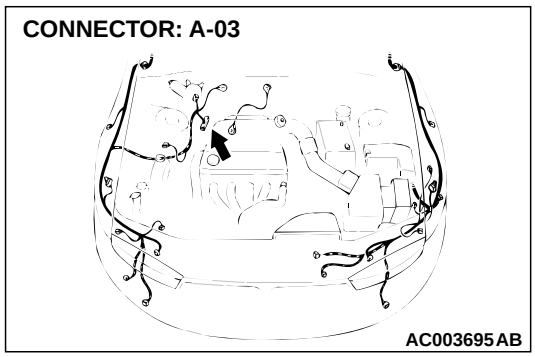

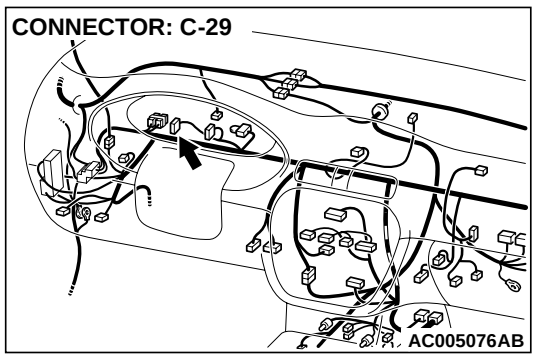

STEP 2. Check the harness wire between ABS-ECU connector A-03 and TCL warning light connector C-101.

Q: Are any harness wires between ABS-ECU connector A-02 and TCL indicator light connector C-29 damaged?

YES : Repair them 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 startup?

YES : This diagnosis is complete.

NO : Return to Step 1.

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

Malfunction of the hydraulic unit

DIAGNOSIS

Check the hydraulic unit.

- Refer to P.35C-37. If the hydraulic unit (integrated with ABS-ECU) is malfunctioning, replace it. Then check that the malfunction symptom is eliminated.

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DATA LIST REFERENCE TABLE

M1354003000021

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
ECU VOLTAGE	16	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	9 – 16 V
FR SNSR	11	Front-right wheel speed sensor	Drive the vehicle	Vehicle speeds displayed on the speedometer and scan tool are identical.
FL SNSR	12	Front-left wheel speed sensor		
RR SNSR	13	Rear-right wheel speed sensor		
RL SNSR	14	Rear-left wheel speed sensor		

ACTUATOR TEST REFERENCE TABLE

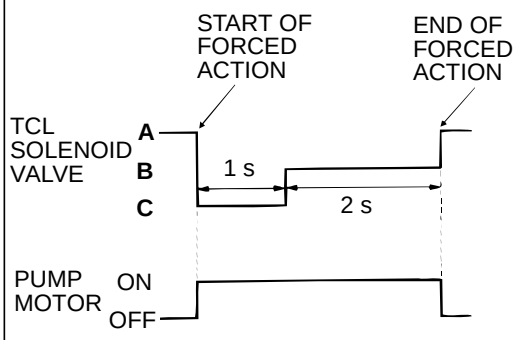
M1354003100028

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.

ACTIVATION PATTERN (NO.06,07)



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

AC000971AB

ACTUATOR TEST SPECIFICATIONS

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.

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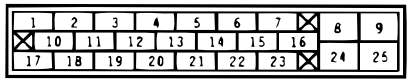
CHECK AT ABS-ECU

M1354003200025

TERMINAL VOLTAGE CHECK CHART

1. Measure the voltages between terminals (8) and (24) (ground terminals) and each respective terminal.
2. The terminal layouts are shown in the illustrations 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.



AC003648

CONNECTOR TERMINAL NO.	SIGNAL	CHECKING REQUIREMENT		NORMAL CONDITION
4	ABS-ECU power supply	Ignition switch: "ON"		Battery position voltage
		Ignition switch: "OFF"		Approximately 0 V
7	Scan tool	Connect the scan tool		Serial communication with scan tool
		Do not connect the scan tool		Approximately 0 V
9	Solenoid valve power supply	Always		Battery position voltage
14	Input from diagnostic indication selection	Connect the scan tool		Approximately 0 V
		Do not connect the scan tool		Battery position voltage
16	Output to ABS warning light relay control	Ignition switch:"ON"	The light is switch off.	2V or less
			The light is illuminated.	Battery position voltage
18	Input from stoplight switch	Ignition switch:"ON"	Stoplight switch:"ON"	Battery position voltage
			Stoplight switch:"OFF"	Approximately 0 V
25	Motor power supply	Always		Battery position voltage

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.

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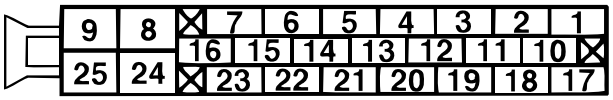
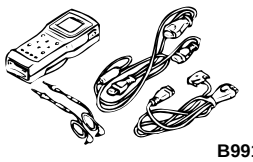
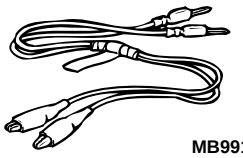
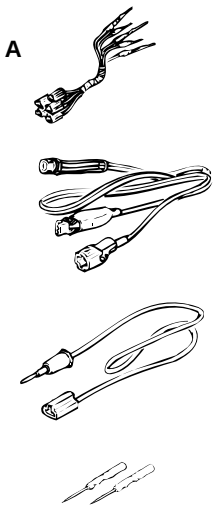


AC003647

CONNECTOR TERMINAL NO.	SIGNAL	NORMAL CONDITION
1 – 2	Front-left wheel speed sensor	1.28 – 1.92 kΩ
22 – 23	Rear-right wheel speed sensor	1.28 – 1.92 kΩ
19 – 20	Front-right wheel speed sensor	1.28 – 1.92 kΩ
5 – 6	Rear-left wheel speed sensor	1.28 – 1.92 kΩ
8 – body ground	Solenoid valve ground	Less than 2 ohms
24 – body ground	Motor ground	Less than 2 ohms

SPECIAL TOOLS

M1354000200026

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 (MUT-II)]
 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  MB991223 AH	MB991223 Harness set MB991219 A:Connector pin contact pressure inspection	MB991223 MB991709-01	Wheel speed sensor output voltage measurement

ON-VEHICLE SERVICE

BLEEDING

M1354003600023

⚠ 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

BLEEDING THE MASTER CYLINDER

Refer to GROUP 35A, On-vehicle Service – Bleeding P.35A-21.

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BLEEDING THE BRAKE LINE

⚠ 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-21.

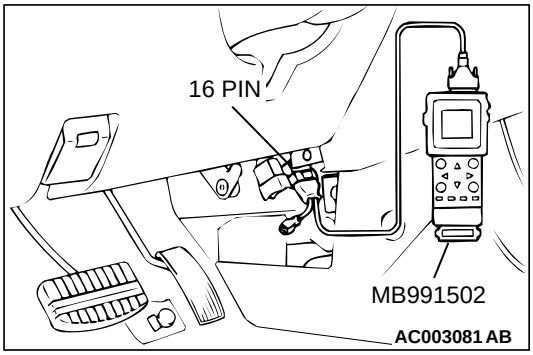
WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT

M1354003700020

Refer to GROUP 35B, On-vehicle Service – Wheel Speed Sensor Output Voltage Measurement P.35B-42.

HYDRAULIC UNIT CHECK

M1354003400029



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.**

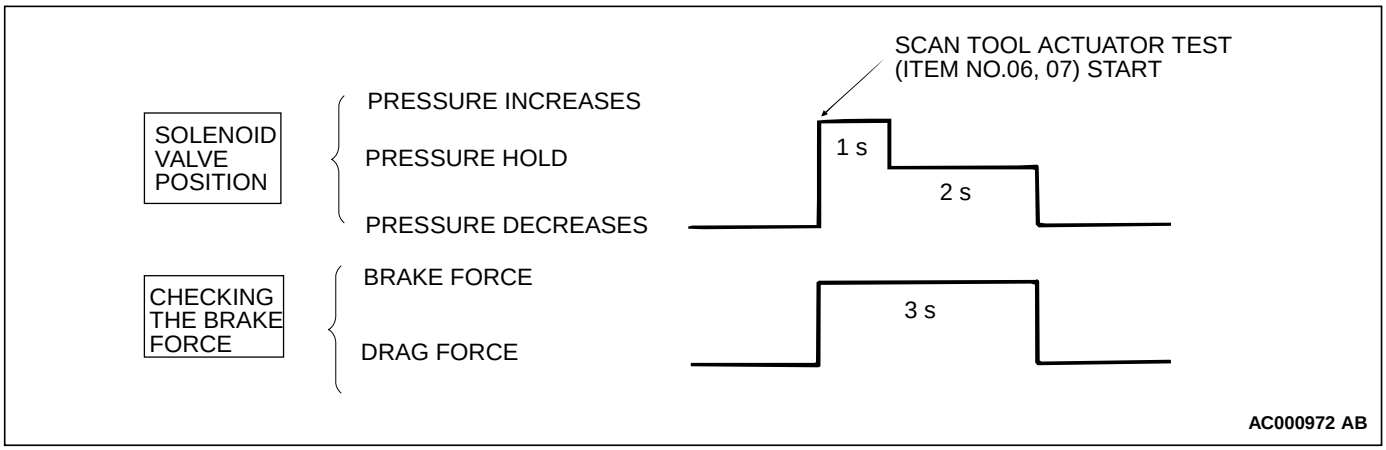
1. Jack up the vehicle. Then support the vehicle with rigid racks at the specified jack-up points or place the front or rear wheels on the rollers of the braking force tester.
2. Release the parking brake, and feel the drag force (drag torque) on each road wheel.

   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 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.

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