GROUP 23

AUTOMATIC TRANSAXLE

CONTENTS

GROUP 23A

AUTOMATIC TRANSAXLE

CONTENTS

GENERAL DESCRIPTION

M1231000100065

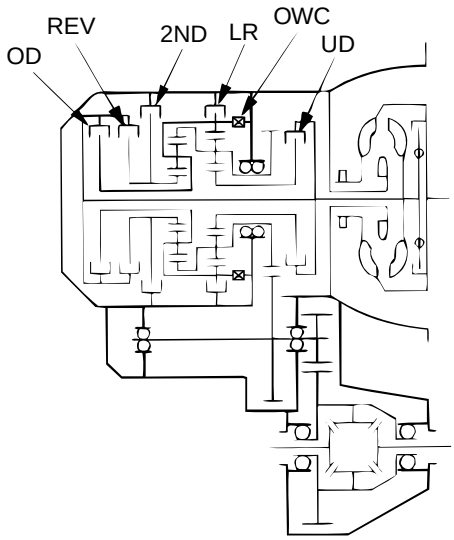
The A/T come in two models, namely, F4A42 and F4A51.

ITEMS		SPECIFICATIONS	
Transaxle model		F4A42	F4A51
Engine model		4G64 (2.4L Engine)	6G72 (3.0L Engine)
Torque converter	Type	3-element, 1-stage, 2-phase	
	Torque converter clutch	Provided (3rd to 4th)	
	Stall torque ratio	1.9	2.0
Transaxle type		4-speed forward, 1-speed reverse fully automatic	
Gear ratio	1st	2.842	2.842
	2nd	1.529	1.495
	3rd	1.000	1.000
	4th	0.712	0.731
	Reverse	2.480	2.720
Final gear ratio (Differential gear ratio)		4.042	3.735
Number of underdrive clutch discs		4	
Number of overdrive clutch discs		4	
Number of reverse clutch discs		2	
Number of low-reverse brake discs		6	
Number of second brake discs		3	4
Manual control type		P-R-N-D-3-2-L (7 positions)	
Shift pattern control		Electronic control (INVECS-II)	
Oil pressure control during shifting		Electronic control (each oil pressure independently controlled)	
Torque converter clutch control		Electronic control	
Speedometer gear ratio		29/36	

TRANSAXLE

The transaxle is configured of the torque converter and gear train. A 3-element, 1-step, 2-phase torque converter with built-in torque converter clutch is incorporated. The gear train is configured of three sets of multi-plate clutches, two sets of multi-plate brakes, one set of one-way clutches and two sets of planetary gears configured of the sun gears, carriers, pinion gears and annulus gears.

TRANSAXLE CONFIGURATION DRAWING



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COMPONENTS AND FUNCTIONS

COMPONENT		FUNCTION
Underdrive clutch	UD	connects the input shaft to the underdrive sun gear.
Reverse clutch	REV	connects the input shaft to the reverse sun gear.
Overdrive clutch	OD	connects the input shaft to the overdrive planetary carrier.
Low-reverse brake	LR	holds the low-reverse annulus gear and the overdrive planetary carrier.
Second brake	2ND	holds the reverse sun gear.
One-way clutch	OWC	restricts the rotation direction of the low-reverse annulus gear.

FUNCTION ELEMENT TABLE

OPERATING ELEMENT / SELECTOR LEVER POSITION		ENGINE START	PARKING MECHANISM	UNDERDRIVE CLUTCH (UD)	REVERSE CLUTCH (REV)	OVER-DRIVE CLUTCH (OD)	LOW-REVERSE BRAKE (LR)	SECOND BRAKE (2ND)
P	Parking	OK	×	–	–	–	×	–
R	Reverse	–	–	–	×	–	×	–
N	Neutral	OK	–	–	–	–	×	–
D	1st	–	–	×	–	–	×*	–
	2nd	–	–	×	–	–	–	×
	3rd	–	–	×	–	×	–	–
	4th	–	–	–	–	×	–	×
3	1st	–	–	×	–	–	×*	–
	2nd	–	–	×	–	–	–	×
	3rd	–	–	×	–	×	–	–

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OPERATING ELEMENT / SELECTOR LEVER POSITION		ENGINE START	PARKING MECHANISM	UNDERDRIVE CLUTCH (UD)	REVERSE CLUTCH (REV)	OVER-DRIVE CLUTCH (OD)	LOW-REVERSE BRAKE (LR)	SECOND BRAKE (2ND)
2	1st	–	–	×	–	–	×*	–
	2nd	–	–	×	–	–	–	×
L	1st	–	–	×	–	–	×	–

×: Function element

*NOTE: * operates only when the vehicle is stationary [at approximately 10 km/h (6.2 mph) or less].*

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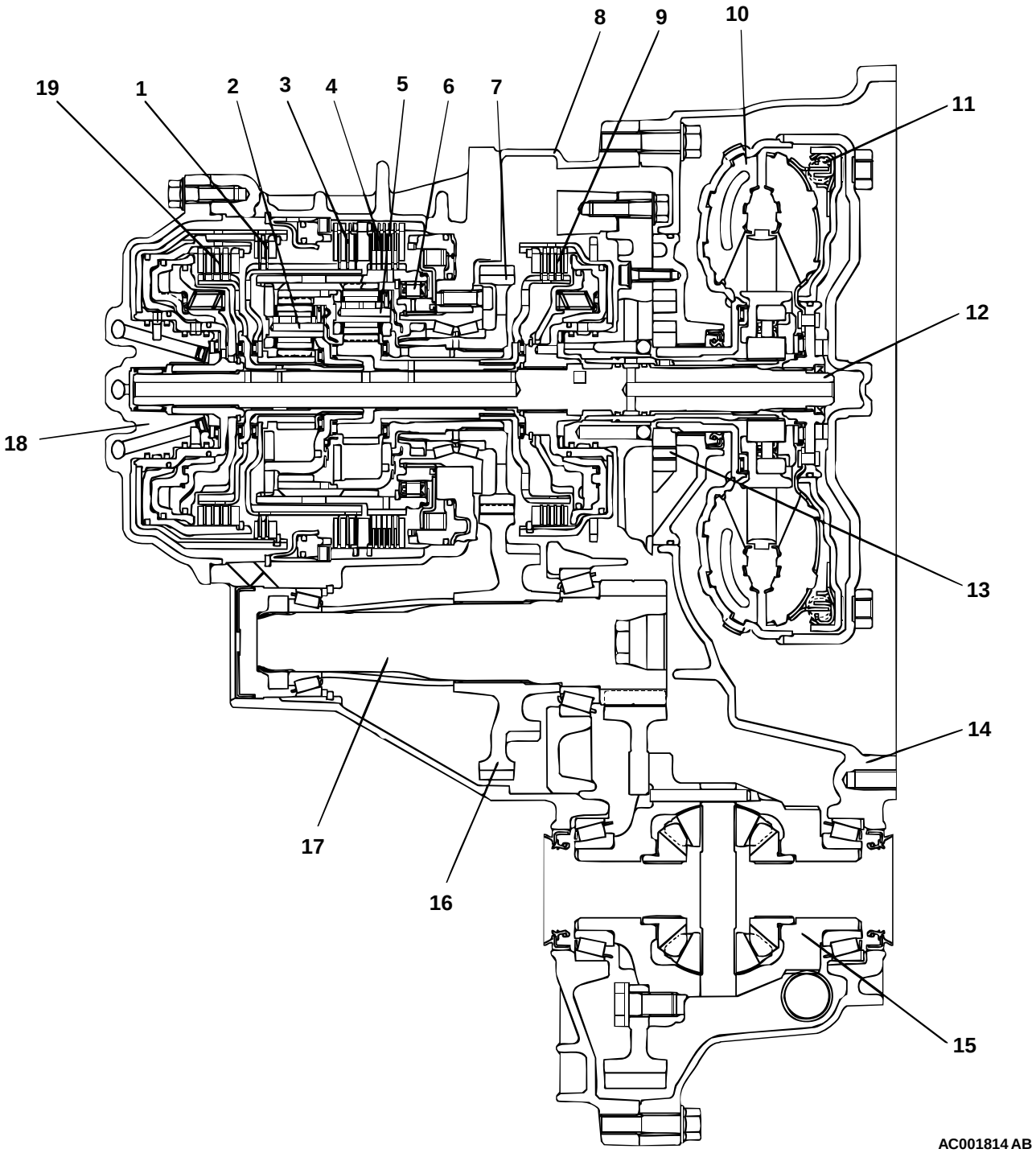
SECTIONAL VIEW <F4A42>



1. REVERSE CLUTCH
2. OVERDRIVE PLANETARY CARRIER
3. SECOND BRAKE
4. LOW-REVERSE BRAKE
5. OUTPUT PLANETARY CARRIER
6. ONE-WAY CLUTCH
7. TRANSFER DRIVE GEAR
8. TRANSAXLE CASE
9. UNDERDRIVE CLUTCH
10. TORQUE CONVERTER
11. TORQUE CONVERTER CLUTCH
12. INPUT SHAFT
13. OIL PUMP
14. TORQUE CONVERTER HOUSING
15. DIFFERENTIAL
16. TRANSFER DRIVEN GEAR
17. OUTPUT SHAFT
18. REAR COVER
19. OVERDRIVE CLUTCH

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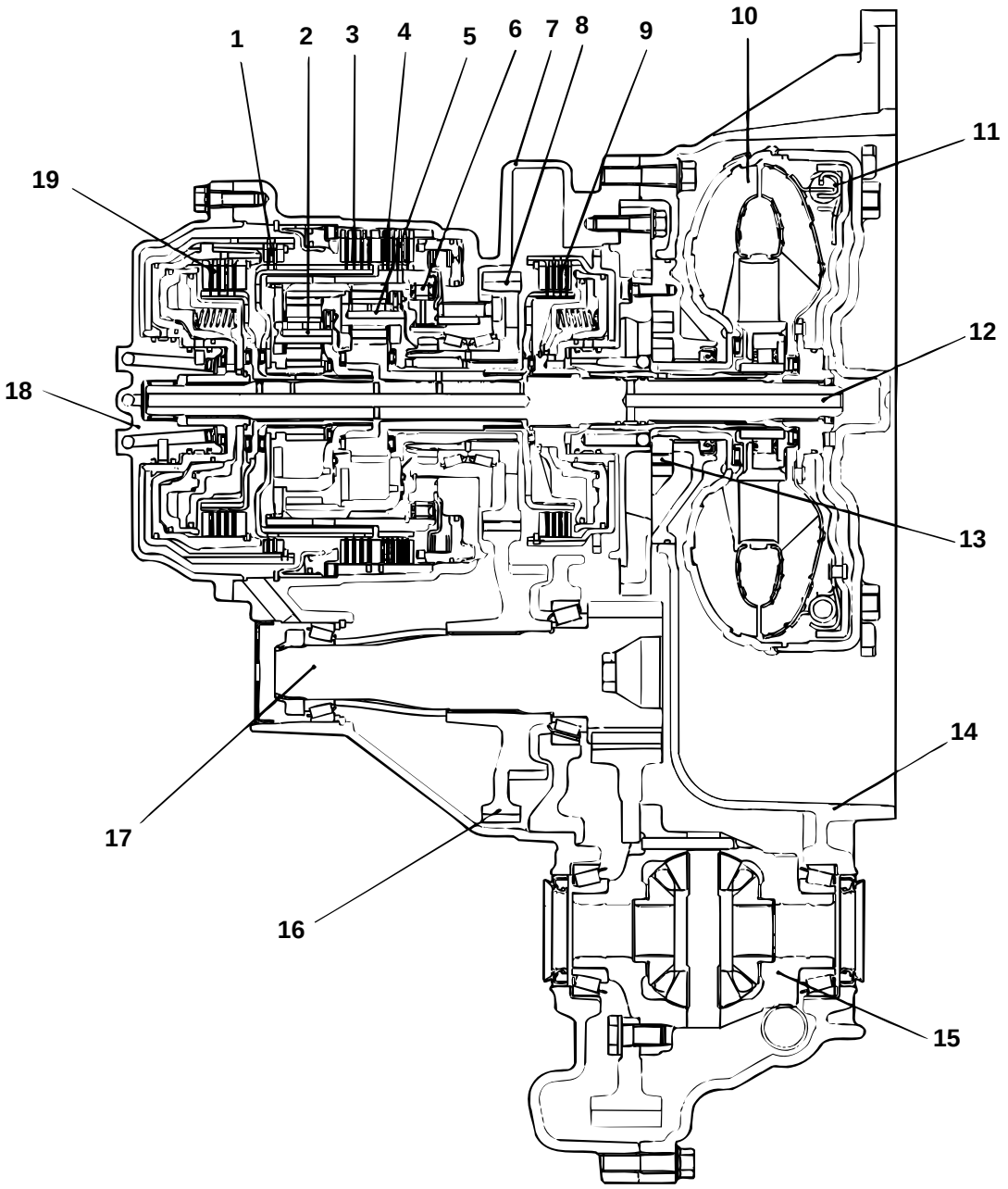
<F4A51>



1. REVERSE CLUTCH
2. OVERDRIVE PLANETARY CARRIER
3. SECOND BRAKE
4. LOW-REVERSE BRAKE
5. OUTPUT PLANETARY CARRIER
6. ONE-WAY CLUTCH
7. TRANSFER DRIVE GEAR
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15. DIFFERENTIAL
16. TRANSFER DRIVEN GEAR
17. OUTPUT SHAFT
18. REAR COVER
19. OVERDRIVE CLUTCH

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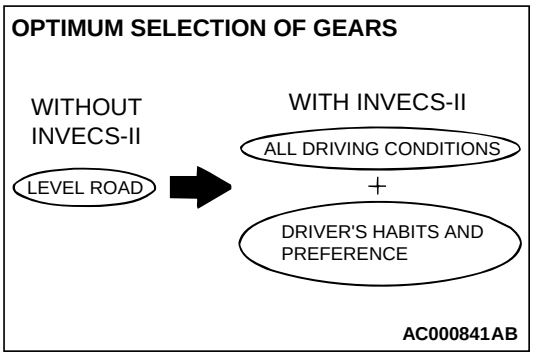
ELECTRONICALLY-CONTROLLED SYSTEM

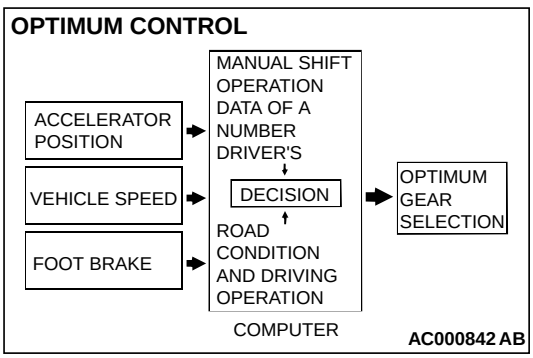
INVECS-II

- When in drive ("D" range), the new automatic transmission employs an innovative shift schedule to provide a high level of comfort and "easy driving style" that matches all driving conditions as well as the driver's driving style.
- INVECS-II features "Optimum Shift Control", which provides shift timing the average driver perceives to be the optimum timing under any road conditions, and "Adaptive Shift Control", which adjusts shift timing to match the driving habits and preferences of individual drivers.

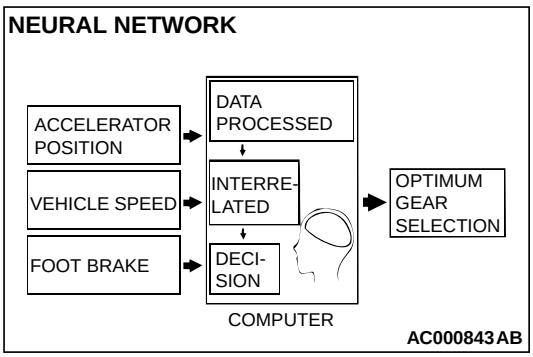


FEATURES

OPTIMUM SHIFT CONTROL



1. The shift patterns found satisfying by the typical driver for all ranges of driving are stored in the computer's memory. The computer uses this data to analyze road conditions and the driver's style of operation, and then outputs the optimal shift patterns stored in its memory to best match the conditions.



2. We introduce the latest in control technologies with an innovative new algorithm called the "neural network" that works to imitate the decision-making processes of the human brain. The neural network links a wide variety of input data regarding road and operating conditions, and instantly makes accurate shift control decisions.

ADAPTIVE SHIFT CONTROL

1. The computer learns the driving habits and preferences of each individual driver by processing driving data on engine output, tire load, foot brake operation, etc. It then uses this data to adjust shift timing to best suit the driver's style.
2. If the computer determines from the driving patterns that the driver is one who enjoys a relaxed, unhurried style, it adjusts timing to execute up-shifts at a lower engine speed to provide a smooth, quiet ride. On the other hand, if the computer determines the driver to prefer a sporty ride, it adjusts timing to shift up at a higher engine speed to provide more powerful response.

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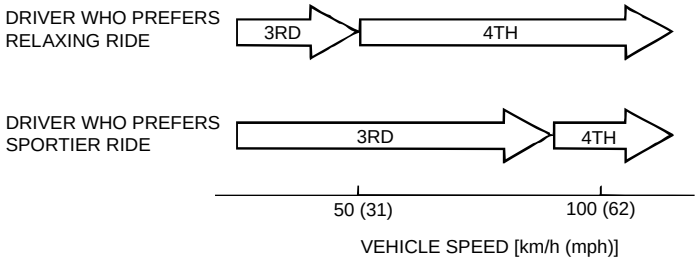
ADAPTIVE SHIFT CONTROL DURING ACCELERATION



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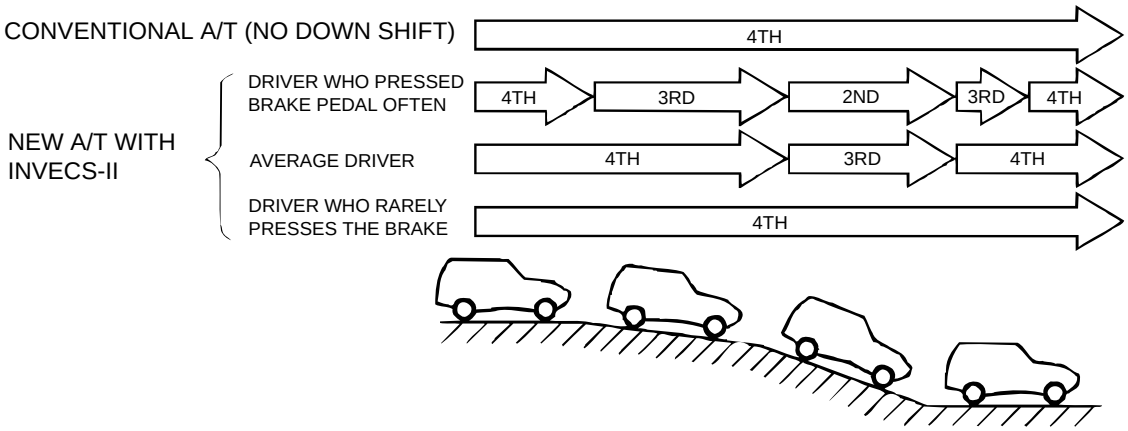
3. If the computer determines that the driver tends to apply the brakes often on a descending roadway, it adjusts timing to shift down sooner so that the engine brake is more effectively applied. Conversely, if the computer determines that the driver does not brake much while driving downhill, it delays downshifting to limit the effect of the engine brake.

ADAPTIVE SHIFT CONTROL ON DOWNGRADES



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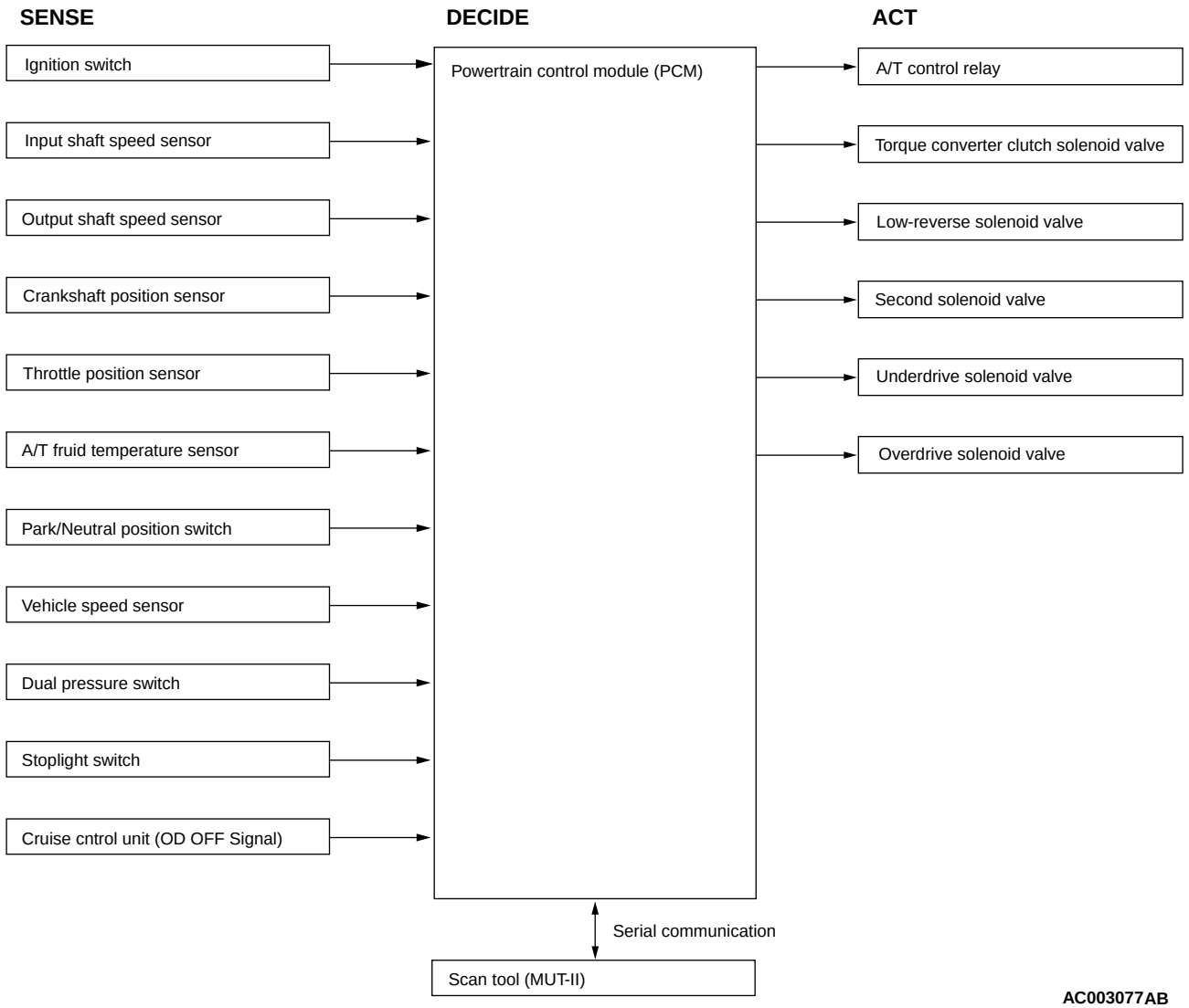
SYSTEM CONSTRUCTION DIAGRAM



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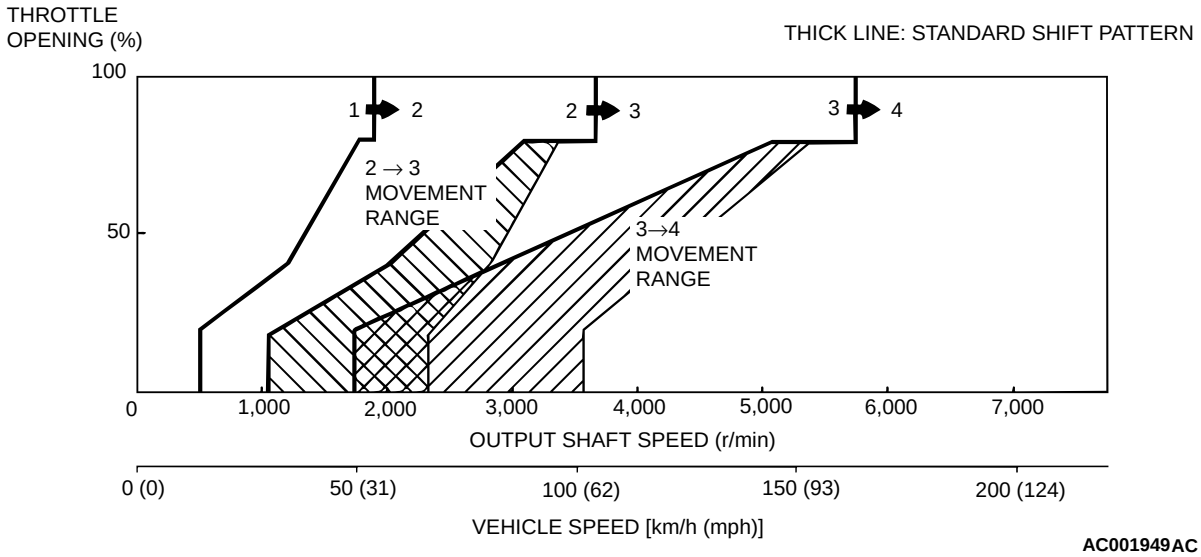
SHIFT PATTERN CONTROL

<2.4L ENGINE> UPSHIFT PATTERN



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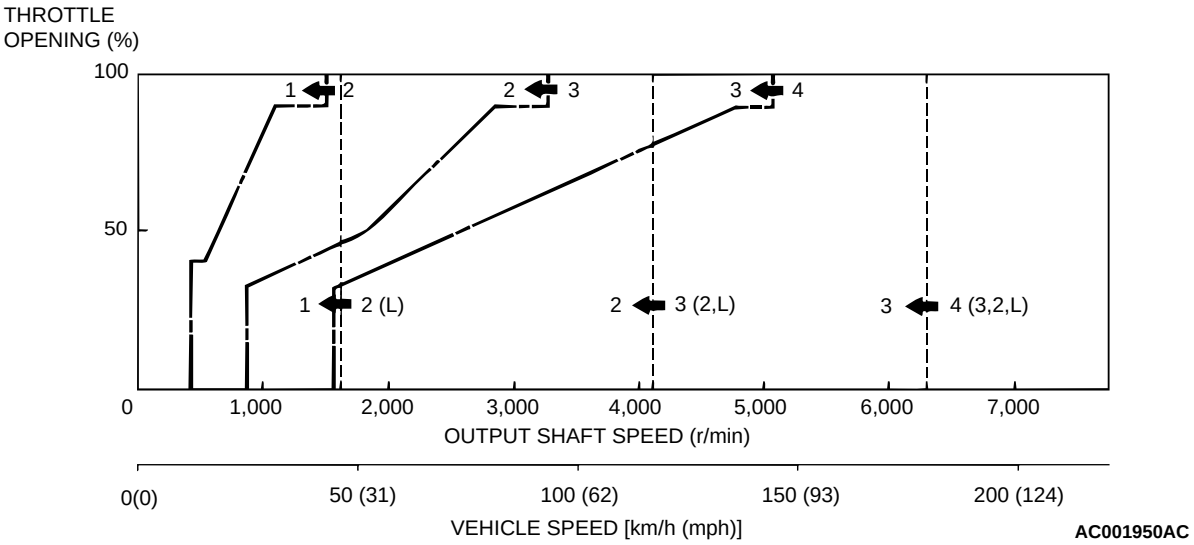
<2.4L ENGINE> DOWNSHIFT PATTERN



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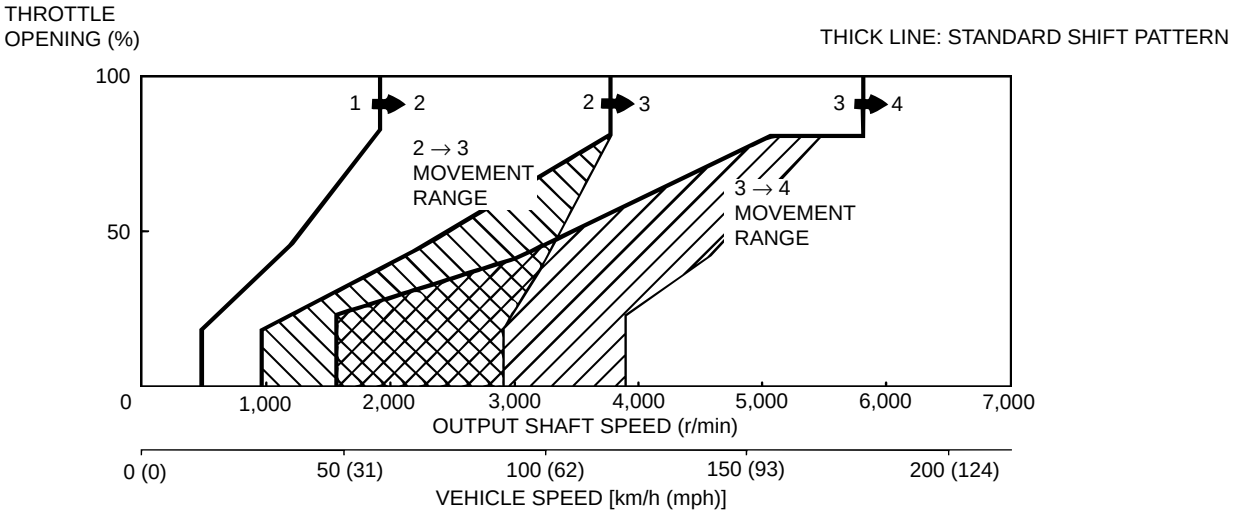
<3.0L ENGINE> UPSHIFT PATTERN



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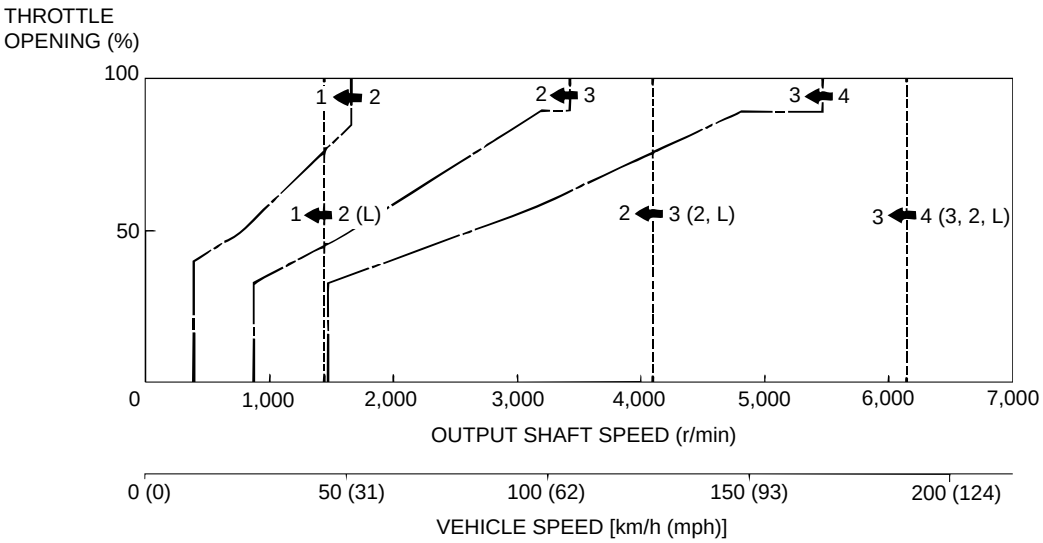
<3.0L ENGINE> DOWNSHIFT PATTERN



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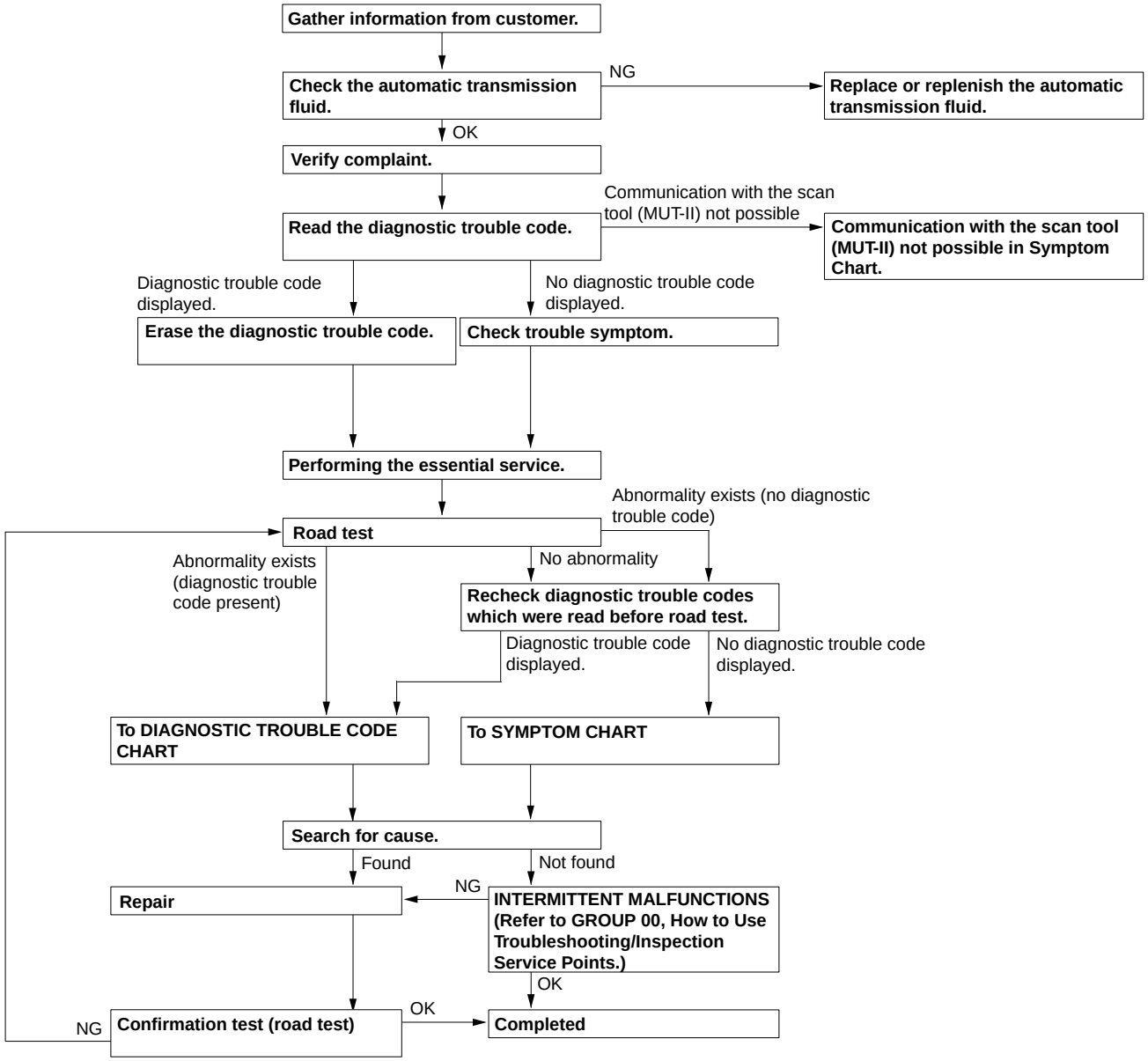
AUTOMATIC TRANSAXLE DIAGNOSIS

DIAGNOSTIC TROUBLESHOOTING FLOW

M1231013500029



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INTRODUCTION TO A/T DIAGNOSIS

M1231012300055

The mounting could be incorrect, the A/T fluid may be low, or a component of the transaxle may be faulty in the following conditions: noise or vibration is generated, A/T fluid leaks, the vehicle does not move forward or backward.

The following items are suspected as causes for the INVECS-II troubles: malfunctions of the PCM, the sensors, the switches, the harness or connectors.

A/T DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1231007600072

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an A/T fault.

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1. Gather as much information as possible about the complaint from the customer.
2. Verify that the condition described by the customer exists.
3. Check the vehicle for any A/T Diagnostic Trouble Code (DTC).
4. If you cannot verify the condition and there are no DTCs, the malfunction is intermittent. For information on how to cope with intermittent malfunctions, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
5. If you can verify the condition but there are no DTCs, or the system cannot communicate with the scan tool, refer to the Symptom Chart.
6. If there is a DTC, record the number of the code, then erase the code from memory using the scan tool.
7. Reconfirm the symptom using the Road Test.
8. If DTC is set again, go to Inspection Chart for Diagnostic Trouble Codes.
9. If DTC is not set again, the malfunction is intermittent. For information on how to cope with intermittent malfunctions, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
10. After repairs are completed, conduct a Road Test duplicating the complaint set conditions to confirm the malfunction has been eliminated.

A/T DIAGNOSTIC TROUBLE CODE DIAGNOSIS

M1231007700057

ON-BOARD DIAGNOSTICS

The powertrain control module (PCM) monitors its input/output signals (some signals all time and others under specified conditions). When an irregular signal is initially monitored, the PCM decides that a malfunction has occurred. There are 25 diagnostic items. The diagnostic results can be read with a scan tool. Diagnostic trouble codes are kept in memory by direct battery feed. The codes are retained in memory if the ignition switch is "LOCK" (OFF). Diagnostic trouble codes will, however, be erased when a battery terminal or the PCM connector is disconnected. In addition, the diagnostic trouble code can also be erased by the scan tool MUT-II (MB991502).

NOTE: If a sensor is disconnected with the ignition switch is "ON," a diagnostic trouble code is memorized. In this case, erase the DTC using the scan tool.

The 25 diagnostic items are all indicated sequentially from the smallest code number.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991502: Scan Tool (MUT-II)

⚠ CAUTION

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

NOTE: If the battery positive voltage is low, diagnostic trouble codes will not be output. Check the battery if the scan tool cannot display.

NOTE: If the battery is disconnected or if the powertrain control module connector is disconnected, the diagnostic trouble codes will be erased. Do not disconnect the battery or powertrain control module before the diagnostic trouble codes have been read.

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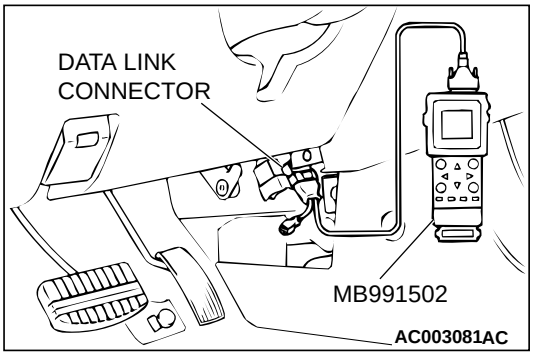
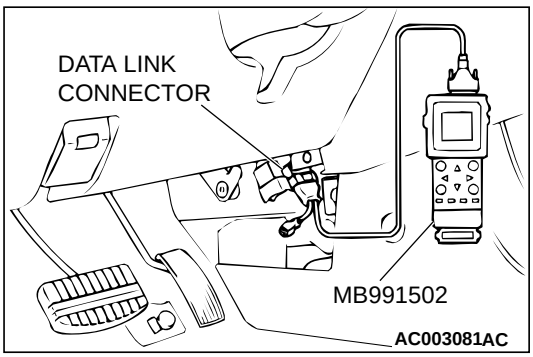


1. Connect the scan tool MB991502 to the data link connector.
2. Turn the ignition switch to "ON" position.
3. Record the diagnostic trouble codes for A/T.
4. Refer to the Diagnostic Trouble Code Chart.
5. Turn the ignition switch to "LOCK" (OFF) and then back to "ON" again.
6. Erase the diagnostic trouble code by selecting DTC erase from SPECIAL MENU screen, using scan tool.
7. Check for diagnostic trouble codes. Confirm the scan tool displays "normal."
8. Turn the ignition switch to "LOCK" (OFF) position.
9. Disconnect the scan tool.

INSPECTION USING SCAN TOOL, ROAD TEST AND DATA LIST

Required Special Tool:
MB991502: Scan Tool (MUT-II)

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



1. Connect the scan tool MB991502 to data link connector.
2. Turn the ignition switch to "ON" position.
3. Carry out inspection by means of the Road Test or Data List function. If there is an abnormality, check and repair the chassis harnesses and components. Refer to P.23A-17, Road Test. Refer to P.23A-259, Data List Reference Table.
4. Re-check using scan tool and check that the abnormal input and output have returned to normal because of the repairs.
5. Erase the diagnostic trouble code(s).
6. Turn the ignition switch to "LOCK" (OFF) position.
7. Disconnect the scan tool from the data link connector.
8. Start the engine again and do a test drive to confirm that the problem is eliminated.

FAIL-SAFE/BACKUP FUNCTION

M1231008300052

When malfunctions of the main sensors or actuators are detected by the PCM, the transaxle is controlled by pre-set control logic to maintain safe conditions for driving.

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MALFUNCTIONING ITEM		JUDGEMENT CONDITION	CONTROL CONTENTS DURING MALFUNCTION
Input shaft speed sensor		No output pulse from the input shaft speed sensor is detected for one second or more when the vehicle speed is 30 km/h (19 mph) or more.	The diagnostic trouble code is displayed when the judgement condition occurs once. When the judgement condition is met four times, the transaxle holds 3rd gear or 2nd gear depending on speed as a fail-safe.
Output shaft speed sensor		Output from the output shaft speed sensor is continuously 50 % or less of the output from the vehicle speed sensor one second or more when the vehicle speed is 30 km/h (19 mph) or more.	The diagnostic trouble code is displayed when the judgement condition occurs once. When the judgement condition is met four times, the transaxle holds 3rd gear or 2nd gear depending on speed as a fail-safe.
Low-reverse solenoid valve		Solenoid valve resistance is below 2.7 W for 0.32 seconds.	When the judgement condition is met four times, the A/T control relay is turned off.
Underdrive solenoid valve			
Second solenoid valve			
Overdrive solenoid valve			
Torque converter clutch solenoid valve			
Incomplete shifting	1st	Gear ratio value which is sent from the output shaft speed sensor is not identical to the output from the input shaft speed sensor for one second after shifting finished.	The diagnostic trouble code is displayed and the judgement condition occurs once. When the judgement condition is met four times, the A/T control relay is turned off.
	2nd		
	3rd		
	4th		
	Reverse		
A/T control relay		A/T control relay voltage is less than seven volts for 0.1 second after the ignition switch is turned "ON."	Switch the A/T control relay off.
Abnormality in the PCM		Abnormality has occurred in the PCM.	Switch the A/T control relay off.

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ROAD TEST

M1231007800054

Check by the following procedures

STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
1	Ignition switch: (LOCK) OFF	Ignition switch (1) ON	Data list No. 54 (1) Control Relay Voltage [V]	A/T Control relay output voltage	54	A/T Control relay system (P.23A-208.)
2	Ignition switch: ON Engine: Stopped Selector lever position: P	Selector lever position (1) P, (2) R, (3) N, (4) D, (5) 3, (6) 2, (7) L	Data list No. 61 (1) P, (2) R, (3) N, (4) D, (5) 3, (6) 2, (7) L	Park/ Neutral position switch	27, 28	Park/Neutral position switch system (P.23A-124, P.23A-143.)
		Accelerator pedal (1)Fully closed (2)Depressed (3)Fully open	Data list No. 11 (1)535 – 735 mV (2)Gradually rises from (1) (3)4,500 – 5,500 mV	TPS	11, 12, 14	TPS system (P.23A-39, P.23A-48, P.23A-56.)
		Brake pedal (1)Depressed (2)Released	Data list No. 26 (1)ON (2)OFF	Stoplight switch	26	Stoplight switch system (P.23A-117.)
3	Ignition switch: ST Engine: Stopped	Starting test with lever in P or N range	Starting should be possible	Starting	-	Vehicles does not move (P.23A-216.)
4	Warming up	Drive for 15 minutes or more so that the A/T fluid temperature becomes 70 – 80°C. (158 – 176°F)	Data list No. 15 Gradually rises to 70 – 80°C (158 – 176°F)	A/T fluid temperature sensor	15, 16	A/T fluid temperature sensor system (P.23A-66, P.23A-73.)
5	Engine: Idling Selector lever position: N	Brake pedal (Retest) (1)Depressed (2)Released	Data list No. 26 (1)ON (2)OFF	Stoplight switch	26	Stoplight switch system (P.23A-117.)
		A/C switch (1)ON (2)OFF	Data list No. 65 (1)ON (2)OFF	Dual pressure switch	-	Vehicle shifts differently with A/C engaged (P.23A-247.)
		Accelerator pedal (1)Fully closed (2)Depressed	Data list No. 21 (1)Engine tachometer and the MUT-II shows the same engine speed (2)Gradually rises from (1)	Crankshaft position sensor	21	Crankshaft position sensor system (P.23A-78.)

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STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
5	Engine: Idling Selector lever position: N	Selector lever position (1)N → D (2)N → R	Should be no abnormal shift shocks Time delay when engaging should be within 2 seconds	Malfunction when starting	-	Engine stalls when moving selector lever from N to D or N to R (P.23A-224.)
					-	Shift shocks when shifting from N to D and long delay (P.23A-225.)
					-	Shift shocks when shifting from N to R and long delay (P.23A-228.)
					-	Shift shocks when shifting from N to D, N to R and long delay (P.23A-231.)
				Does not move	-	Does not move forward (P.23A-218.)
					-	Does not move backward (P.23A-220.)
					-	Does not move (forward or backward) (P.23A-223.)

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STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
6	Selector lever position: N (on a flat and straight road.)	Selector lever position and vehicle speed (Each condition should be maintained for 10 seconds or more.) (1)Idling in L range (Vehicle stopped) (2)Driving at constant speed of 10 km/h (6.2 mph) in L position (3)Driving at constant speed of 30 km/h (19 mph) in 2 position (4)Driving at constant speed of 50 km/h (31 mph) in 3 position (5)Driving at constant speed of 50 km/h (31 mph) in D position	Data list No. 63 (2) 1st, (3) 2nd, (4) 3rd, (5) 4th	Shift position	-	-
			Data list No. 31 (2) 0 %, (3) 100 %, (4) 100 %, (5) 100 %	Low-reverse solenoid valve duty %	31	Low-reverse solenoid valve system (P.23A-156.)
			Data list No. 32 (2) 0 %, (3) 0 %, (4) 0 %, (5) 100 %	Underdrive solenoid valve duty %	32	Underdrive solenoid valve system (P.23A-164.)
			Data list No. 33 (2)100 %, (3) 0 %, (4) 100 %, (5) 0 %	Second solenoid valve duty %	33	Second solenoid valve system (P.23A-170.)
			Data list No. 34 (2) 100 %, (3) 100 %, (4) 0 %, (5) 0 %	Overdrive solenoid valve duty %	34	Overdrive solenoid valve system (P.23A-177.)
			Data list No. 29 (1)0 km/h (0 mph) (4)50 km/h (31 mph)	Vehicle speed sensor	29	Vehicle speed sensor system (P.23A-150.)
			Data list No. 22 (4) 1,600 – 1,900 r/min <2.4L Engine> 1,300 – 1.600 r/min <3.0L Engine>	Input shaft speed sensor	22	Input shaft speed sensor system (P.23A-94.)
			Data list No. 23 (4) 1,600 – 1,900 r/min <2.4L Engine> 1,300 – 1,600 r/min <3.0L Engine>	Output shaft speed sensor	23	Output shaft speed sensor system (P.23A-105.)

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STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
7	Selector lever position: 3 (on a flat and straight road.)	Selector lever position and vehicle speed (1)Driving at speed of 50 km/h (31 mph) in 3rd gear (2)Driving at constant speed of 50 km/h (31 mph) (3)Release accelerator pedal (Speed under 50 km/h (31 mph))	Data list No. 36 (2)70 – 90 % (3)70 – 90 %→ 0 %	Torque converter clutch solenoid valve duty %	36, 52, 53	Torque converter clutch solenoid system (P.23A-184, P.23A-201, P.23A-206.)
			Data list No. 52 (2)–10 to 10 r/min (3)–300 to –100 or 100 to 300 r/min	Torque converter clutch amount of slippage		
8	Use the scan tool (MUT-II) to stop the INVECS-II function. Selector lever position: D (on a flat and straight road.)	Monitor data list No. 11, 23, and 63 with the scan tool (MUT-II). (1)Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). (2)Slowly decelerate to a stop. (3)Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). (4)While driving at 60 km/h (37 mph) in 4th gear, shift down to 3 range. (5)While driving at 40 km/h (25 mph) in 3rd gear, shift down to 2 range. (6)While driving at 20 km/h (12 mph) in 2nd gear, shift down to L range.	For (1), (2) and (3), the reading should be the same as the specified output shaft speed, and no abnormal shift shocks should occur. For (4), (5) and (6), downshifting should occur immediately after moving the selector lever.	Malfunction when shifting	-	Shift shocks and slipping (P.23A-233.)
				Does not shift according to instructions	-	Early or late shifting in all gears (P.23A-234.)
					-	Early or late shifting in some gears (P.23A-237.)
				Does not shift	-	No diagnostic trouble code (P.23A-239.)
					22	Input shaft speed sensor system (P.23A-94.)
					23	Output shaft speed sensor system (P.23A-105.)

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STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
8	Use the scan tool (MUT-II) to stop the INVECS-II function. Selector lever position: D (on a flat and straight road.)	Monitor data list No. 11, 23, and 63 with the scan tool (MUT-II). (1)Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). (2)Slowly decelerate to a stop. (3)Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). (4)While driving at 60 km/h (37 mph) in 4th gear, shift down to 3 range. (5)While driving at 40 km/h (25 mph) in 3rd gear, shift down to 2 range. (6)While driving at 20 km/h (12 mph) in 2nd gear, shift down to L range.	For (1), (2) and (3), the reading should be the same as the specified output shaft speed, and no abnormal shift shocks should occur. For (4), (5) and (6), downshifting should occur immediately after moving the selector lever.	Does not shift from 1 to 2 or 2 to 1	31	Low-reverse solenoid valve system (P.23A-156.)
					33	Second solenoid valve system (P.23A-170.)
					41	1st gear incorrect ratio (P.23A-192.)
					42	2nd gear incorrect ratio (P.23A-192.)
				Does not shift from 2 to 3 or 3 to 2	33	Second solenoid valve system (P.23A-170.)
					34	Overdrive solenoid valve system (P.23A-177.)
					42	2nd gear incorrect ratio (P.23A-192.)
					43	3rd gear incorrect ratio (P.23A-192.)
				Does not shift from 3 to 4 or 4 to 3	32	Underdrive solenoid valve system (P.23A-164.)
					33	Second solenoid valve system (P.23A-170.)
					43	3rd gear incorrect ratio (P.23A-192.)
					44	4th gear incorrect ratio (P.23A-192.)

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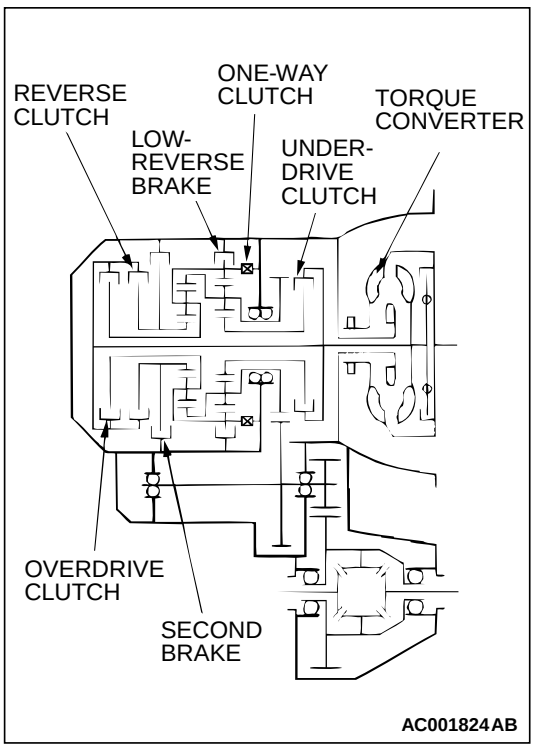
STEP	CONDITION BEFORE TEST/ OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
9	Selector lever position: N (on a flat and straight road.)	Monitor data list No. 22 and No. 23 with the scan tool (MUT-II). (1)Move selector lever to R range, drive at constant speed of 10 km/h (6.2 mph).	The ratio between data list No. 22 and No. 23 should be the same as the gear ratio when reversing.	Does not engage	22	Input shaft speed sensor system (P.23A-94.)
					23	Output shaft speed sensor system (P.23A-105.)
					46	Reverse gear incorrect ratio (P.23A-192.)



TORQUE CONVERTER STALL TEST

M1231005400049

This test measures the maximum engine speed when the selector lever is at the "D" or "R" position and the torque converter stalls this test the operation of the torque converter, starter motor and one-way clutch operation and the holding performance of the clutches and brakes in the transaxle.

⚠ *WARNING*

Do not let anybody stand in front of or behind the vehicle while this test is being carried out.

1. Check the A/T fluid level and temperature. Check the engine coolant temperature.
   - A/T fluid level: At the "HOT" mark on the dipstick
   - A/T fluid temperature: 70 – 80 °C (158 - 176 °F)
   - Engine coolant temperature: 80 – 100 °C (176 - 212 °F)
2. Chock both rear wheels.
3. Connect a tachometer.
4. Apply the parking and service brakes fully.
5. Start the engine.
6. Move the selector lever to the "D" position. Fully depress the accelerator pedal and read the maximum engine speed.

⚠ CAUTION

- **The throttle should not be left fully open for any more than eight seconds.**
- **If carrying out the stall test two or more times, move the selector lever to the "N" position and run the engine at 1,000 r/min to let the A/T fluid cool down before carrying out subsequent tests.**

Standard value: Stall speed: 2,100 – 2,600 r/min

7. Move the selector lever to the "R" position and repeat step 6.

Standard value: Stall speed: 2,100 – 2,600 r/min

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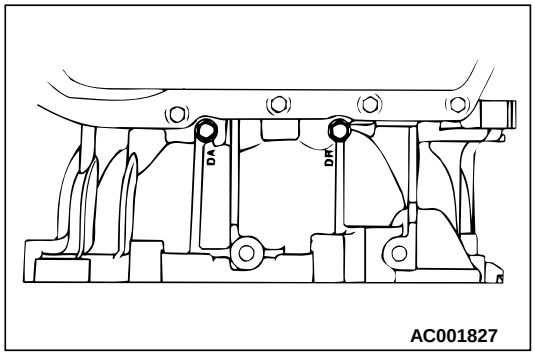
TORQUE CONVERTER STALL TEST JUDGEMENT RESULTS

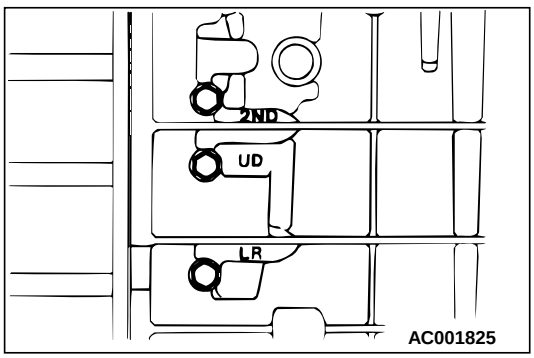
1. Stall speed is too high in both "D" range only
   - Low line pressure
   - Low-reverse brake slippage and malfunction of one-way clutch
2. Stall speed is too high in "D" range only
   - Underdrive clutch slippage
3. Stall speed is too high in "R" range only
   - Reverse clutch slippage
4. Stall speed too low in both "D" and "R" ranges
   - Malfunction of torque converter
   - Insufficient engine output

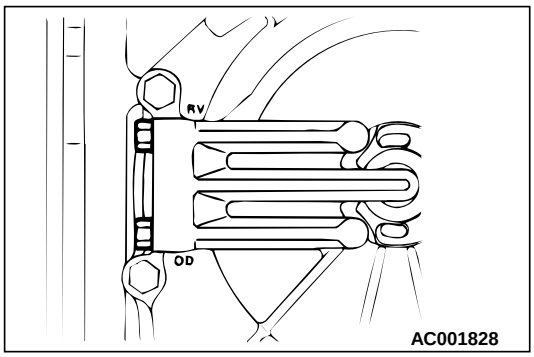
HYDRAULIC PRESSURE TESTS

M1231005500057

1. Check the A/T fluid level and temperature. Check engine coolant temperature.
   - A/T fluid level: "HOT" mark on the dipstick
   - A/T fluid temperature: 70 - 80°C (158 - 176°F)
   - Engine coolant temperature: 80 - 100°C (176 - 212°F)
2. Jack up the vehicle so that the wheels are free to turn.







3. Connect the special tools (2,942 kPa (427 psi) oil pressure gauge [MD998330] and adapters [MD998332, MD998900]) to each pressure discharge port.

   NOTE:
   - *2ND: Second brake pressure port*
   - *UD: Underdrive clutch pressure port*
   - *LR: Low-reverse brake pressure port*
   - *DA: Torque converter apply pressure port*
   - *DR: Torque converter release pressure port*
   - *RV: Reverse clutch pressure port*
   - *OD: Overdrive clutch pressure port*
4. Measure the hydraulic pressure at each port under the conditions given in the standard hydraulic pressure table, and check that the measured values are within the standard value ranges.
5. If a value is outside the standard range, correct the problem while referring to the hydraulic pressure test diagnosis table.

STANDARD HYDRAULIC PRESSURE TEST

MEASUREMENT CONDITION			STANDARD HYDRAULIC PRESSURE kPa (psi)					
SELECTOR LEVER POSITION	SHIFT POSITION	ENGINE SPEED (r/min)	UNDERDRIVE CLUTCH PRESSURE [UD]	REVERSE CLUTCH PRESSURE [RV]	OVERDRIVE CLUTCH PRESSURE [OD]	LOW-REVERSE BRAKE PRESSURE [LR]	SECOND BRAKE PRESSURE [2ND]	TORQUE CONVERTER PRESSURE [DR]
P	–	2,500	–	–	–	220 – 360 (32 – 52)	–	250 – 390 (37 – 57)
R	Reverse	2,500	–	1,270 – 1,770 (185 – 256)	–	1,270 – 1,770 (185 – 256)	–	500 – 700 (73 – 101)
N	–	2,500	–	–	–	220 – 360 (32 – 52)	–	250 – 390 (37 – 57)

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MEASUREMENT CONDITION			STANDARD HYDRAULIC PRESSURE kPa (psi)					
SELECTOR LEVER POSITION	SHIFT POSITION	ENGINE SPEED (r/min)	UNDERDRIVE CLUTCH PRESSURE [UD]	REVERSE CLUTCH PRESSURE [RV]	OVERDRIVE CLUTCH PRESSURE [OD]	LOW-REVERSE BRAKE PRESSURE [LR]	SECOND BRAKE PRESSURE [2ND]	TORQUE CONVERTER PRESSURE [DR]
L	1st gear	2,500	1,010 – 1,050 (147 – 152)	–	–	–	1,010 – 1,050 (147 – 152)	500 – 700 (73 – 101)
2	2nd gear	2,500	1,010 – 1,050 (147 – 152)	–	–	–	1,010 – 1,050 (147 – 152)	500 – 700 (73 – 101)
3	3rd gear	2,500	784 – 882 (113 – 128)	–	784 – 882 (113 – 128)	–	–	–
D	4th gear	2,500	–	–	784 – 882 (113 – 128)	–	784 – 882 (113 – 128)	–

NOTE: If the torque converter pressure is measured, the engine speed should be 1,500 r/min or less.

HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

SYMPTOMS	PROBABLE CAUSE
All hydraulic pressures are high.	Incorrect transaxle control cable adjustment
	Malfunction of the regulator valve
All hydraulic pressures are low.	Incorrect transaxle control cable adjustment
	Malfunction of the oil pump
	Clogged internal oil filter
	Clogged oil cooler
	Malfunction of the regulator valve
	Malfunction of the relief valve
	Incorrect valve body installation
Hydraulic pressure is abnormal in reverse gear only.	Malfunction of the regulator valve
	Clogged orifice
	Incorrect valve body installation
Hydraulic pressure is abnormal in 3rd or 4th gear only.	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction of the regulator valve
	Malfunction of the switch valve
	Clogged orifice
	Incorrect valve body installation

TSB Revision

SYMPTOMS	PROBABLE CAUSE
Only underdrive hydraulic pressure is abnormal.	Malfunction of the oil seal K
	Malfunction of the oil seal L
	Malfunction of the oil seal M
	Malfunction of the underdrive solenoid valve
	Malfunction of the underdrive pressure control valve
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only reverse clutch hydraulic pressure is abnormal.	Malfunction of the oil seal A
	Malfunction of the oil seal B
	Malfunction of the oil seal C
	Clogged orifice
	Incorrect valve body installation
Only overdrive hydraulic pressure is abnormal.	Malfunction of the oil seal D
	Malfunction of the oil seal E
	Malfunction of the oil seal F
	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only low-reverse hydraulic pressure is abnormal.	Malfunction of the oil seal I
	Malfunction of the oil seal J
	Malfunction of the low-reverse solenoid valve
	Malfunction of the low-reverse pressure control valve
	Malfunction of the switch valve
	Malfunction of the fail safe valve A
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only second hydraulic pressure is abnormal.	Malfunction of the oil seal G
	Malfunction of the oil seal H
	Malfunction of the oil seal O
	Malfunction of the second solenoid valve
	Malfunction of the second pressure control valve
	Malfunction of the fail safe valve B
	Clogged orifice
	Incorrect valve body installation

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SYMPTOMS	PROBABLE CAUSE
Only torque converter pressure is abnormal.	Clogged oil cooler
	Malfunction of the oil seal N
	Malfunction of the torque converter clutch solenoid
	Malfunction of the torque converter pressure control valve
	Malfunction of the torque converter pressure control valve
	Clogged orifice
	Incorrect valve body installation
Pressure applied to element which should not receive pressure.	Incorrect transaxle control cable adjustment
	Malfunction of the manual valve
	Malfunction of check ball
	Incorrect valve body installation

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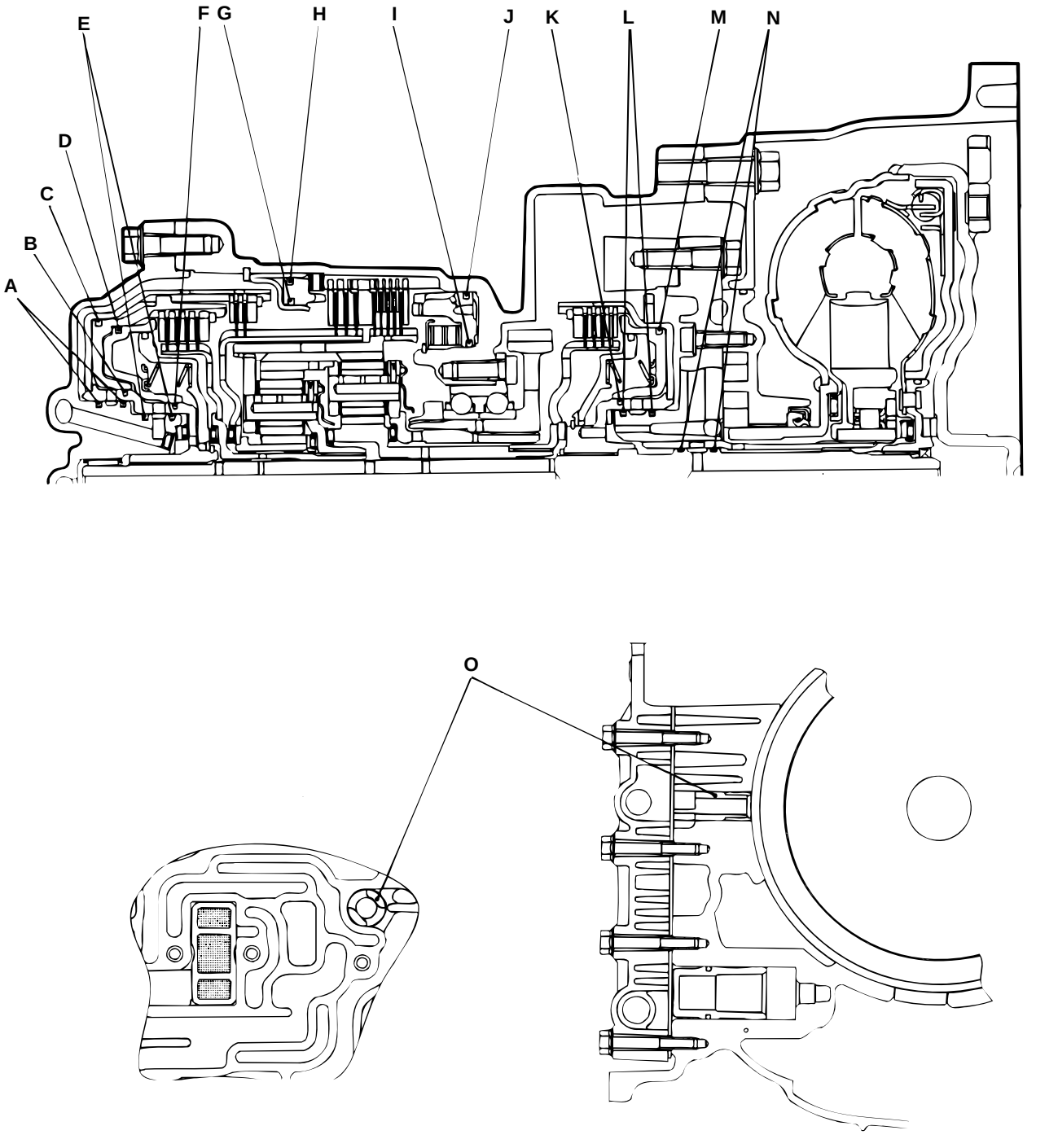
OIL SEAL LAYOUT

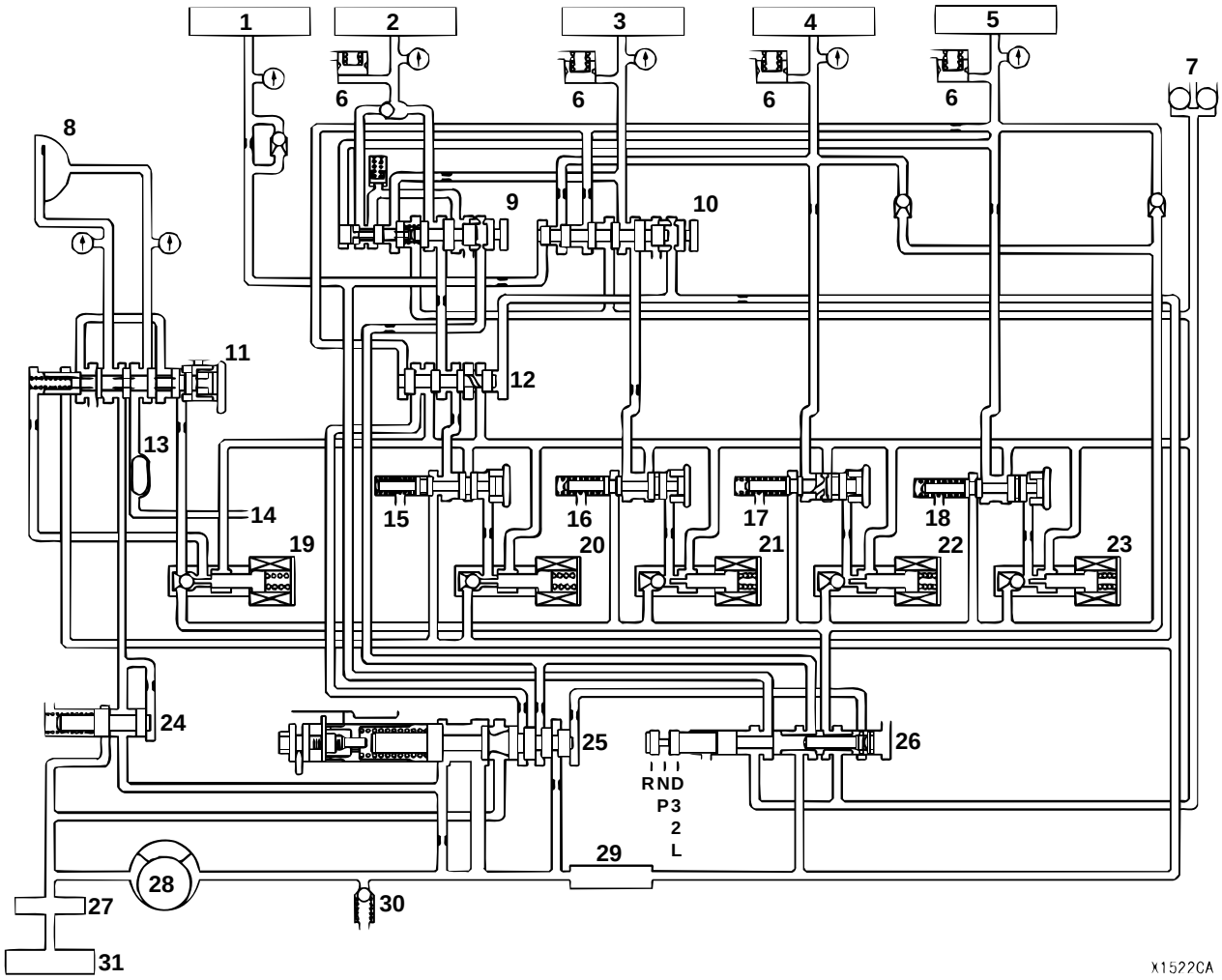


TSB Revision

HYDRAULIC CIRCUIT

M1231008800046

PARKING AND NEUTRAL



: LINE PRESSURE

: OIL PUMP SUCTION PRESSURE

: TORQUE CONVERTER CLUTCH PRESSURE

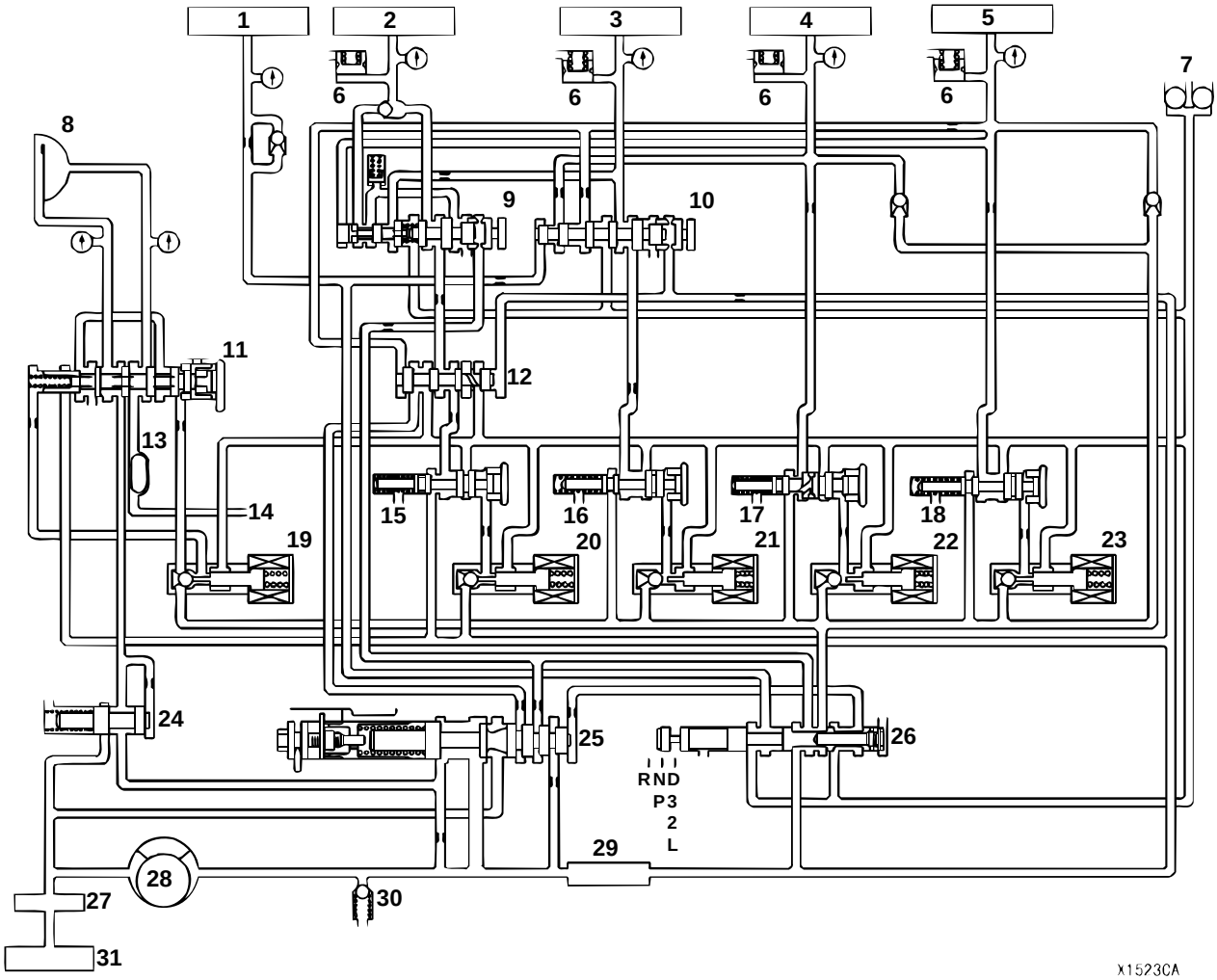
: TORQUE CONVERTER AND LUBRICATION PRESSURE

: TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE

1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
8. TORQUE CONVERTER CLUTCH
9. FAIL SAFE VALVE A
10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
25. REGULATOR VALVE
26. MANUAL VALVE
27. OIL FILTER
28. OIL PUMP
29. OIL STRAINER
30. RELIEF VALVE
31. OIL PAN

TSB Revision

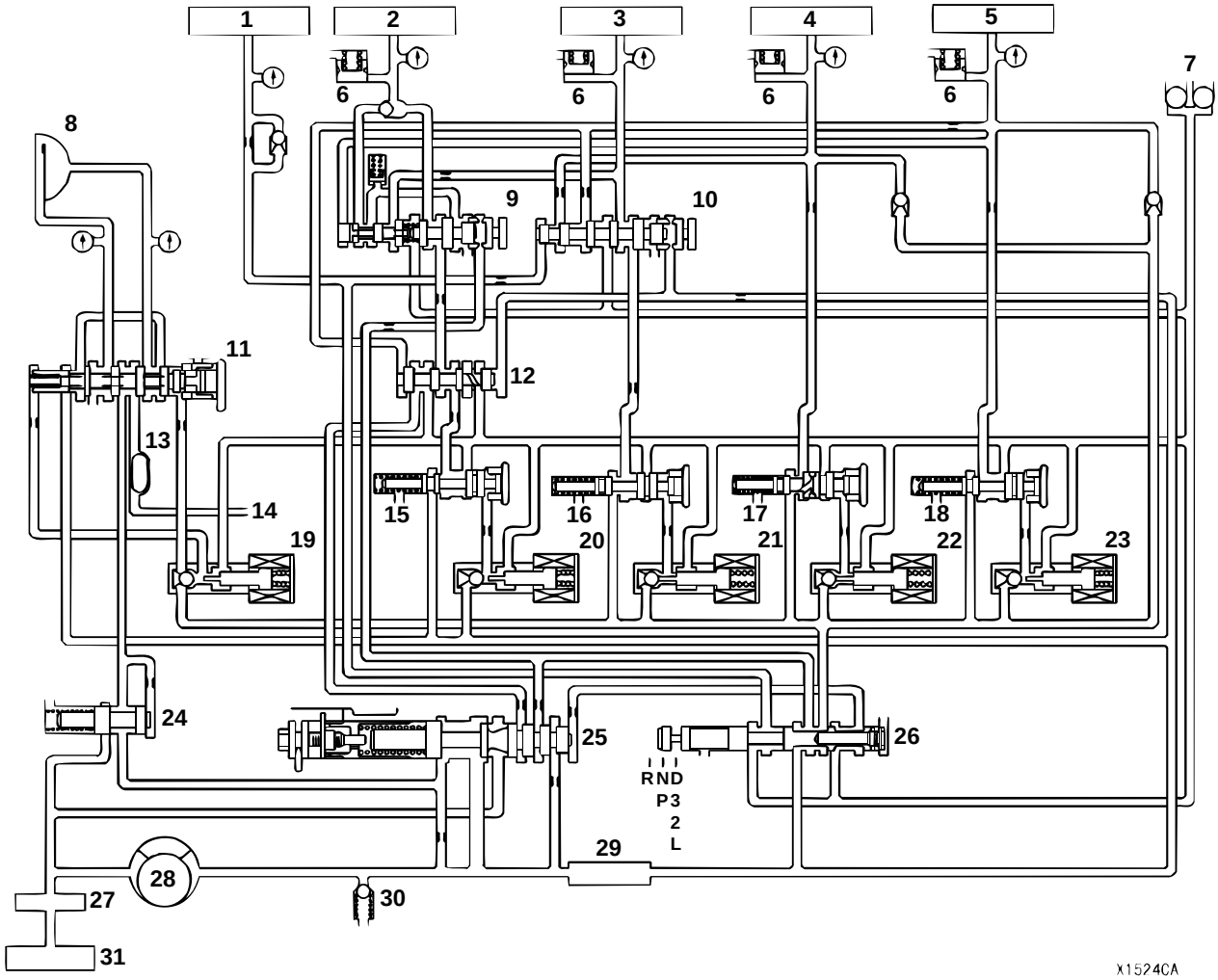
1ST GEAR



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
8. TORQUE CONVERTER CLUTCH
9. FAIL SAFE VALVE A
10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
25. REGULATOR VALVE
26. MANUAL VALVE
27. OIL FILTER
28. OIL PUMP
29. OIL STRAINER
30. RELIEF VALVE
31. OIL PAN

TSB Revision

2ND GEAR



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
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4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
8. TORQUE CONVERTER CLUTCH
9. FAIL SAFE VALVE A
10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
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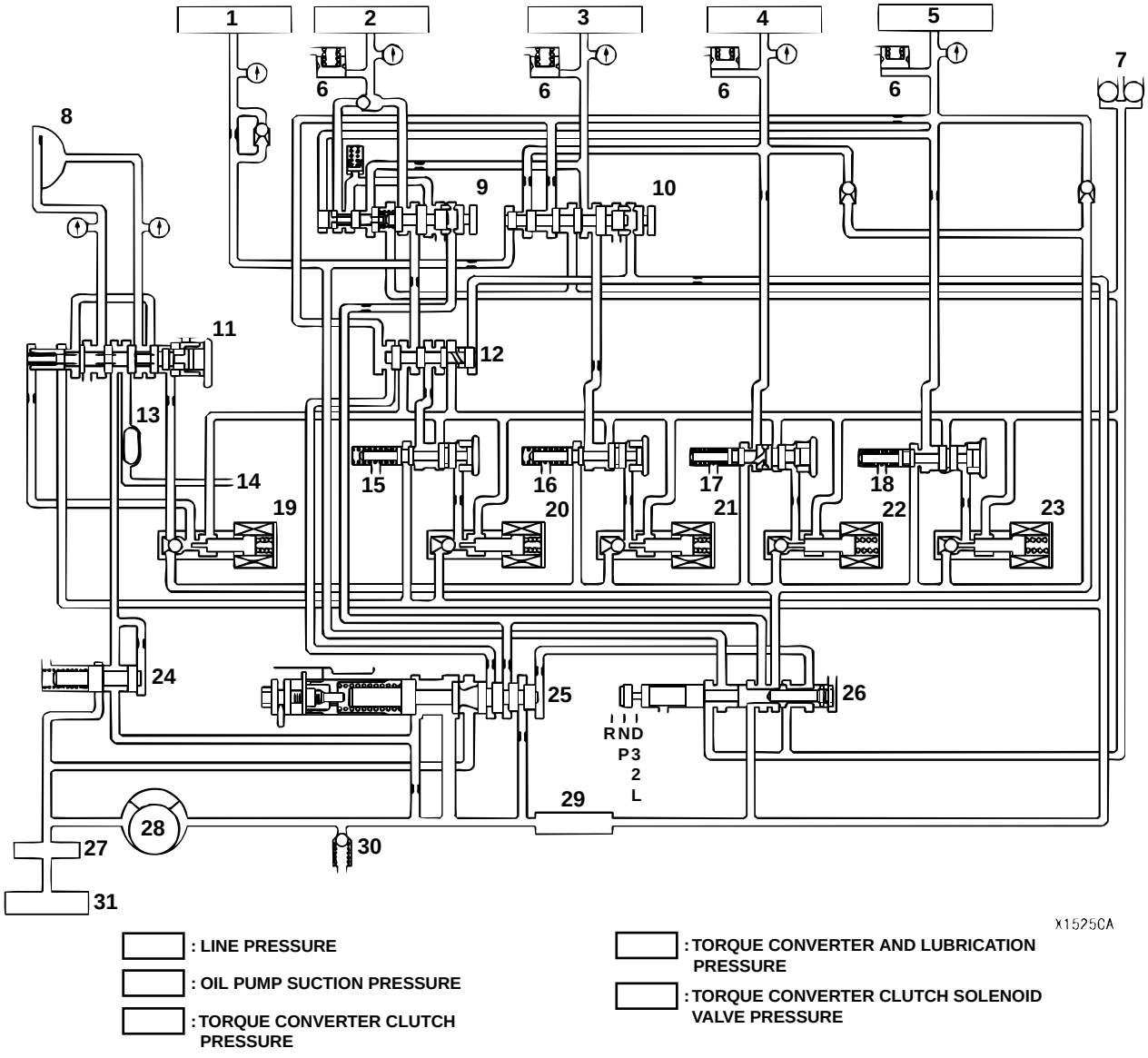
31. OIL PAN

TSB Revision

3RD GEAR



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
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6. ACCUMULATOR
7. CHECK BALL
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11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
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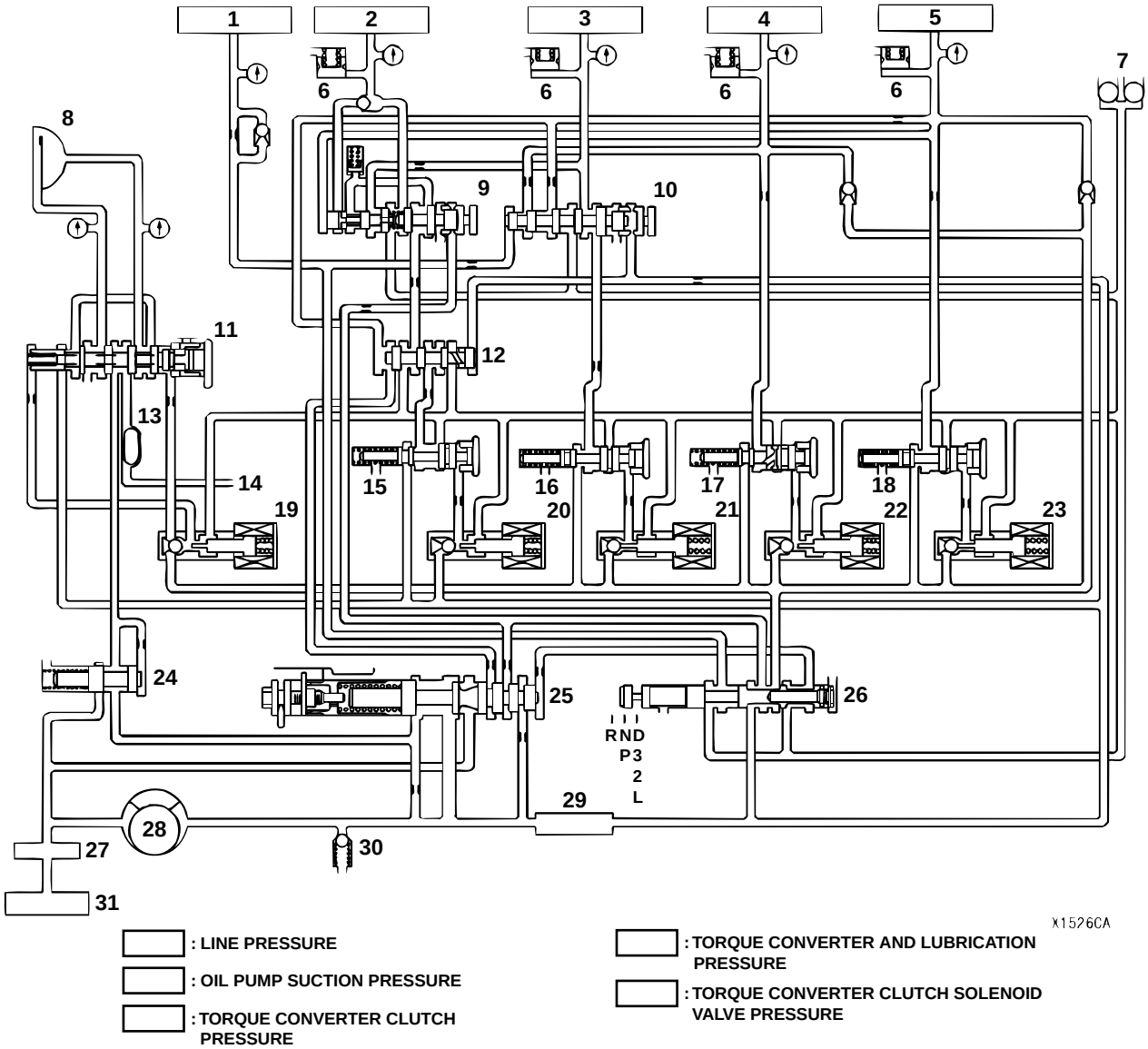
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
25. REGULATOR VALVE
26. MANUAL VALVE
27. OIL FILTER
28. OIL PUMP
29. OIL STRAINER
30. RELIEF VALVE
31. OIL PAN

TSB Revision

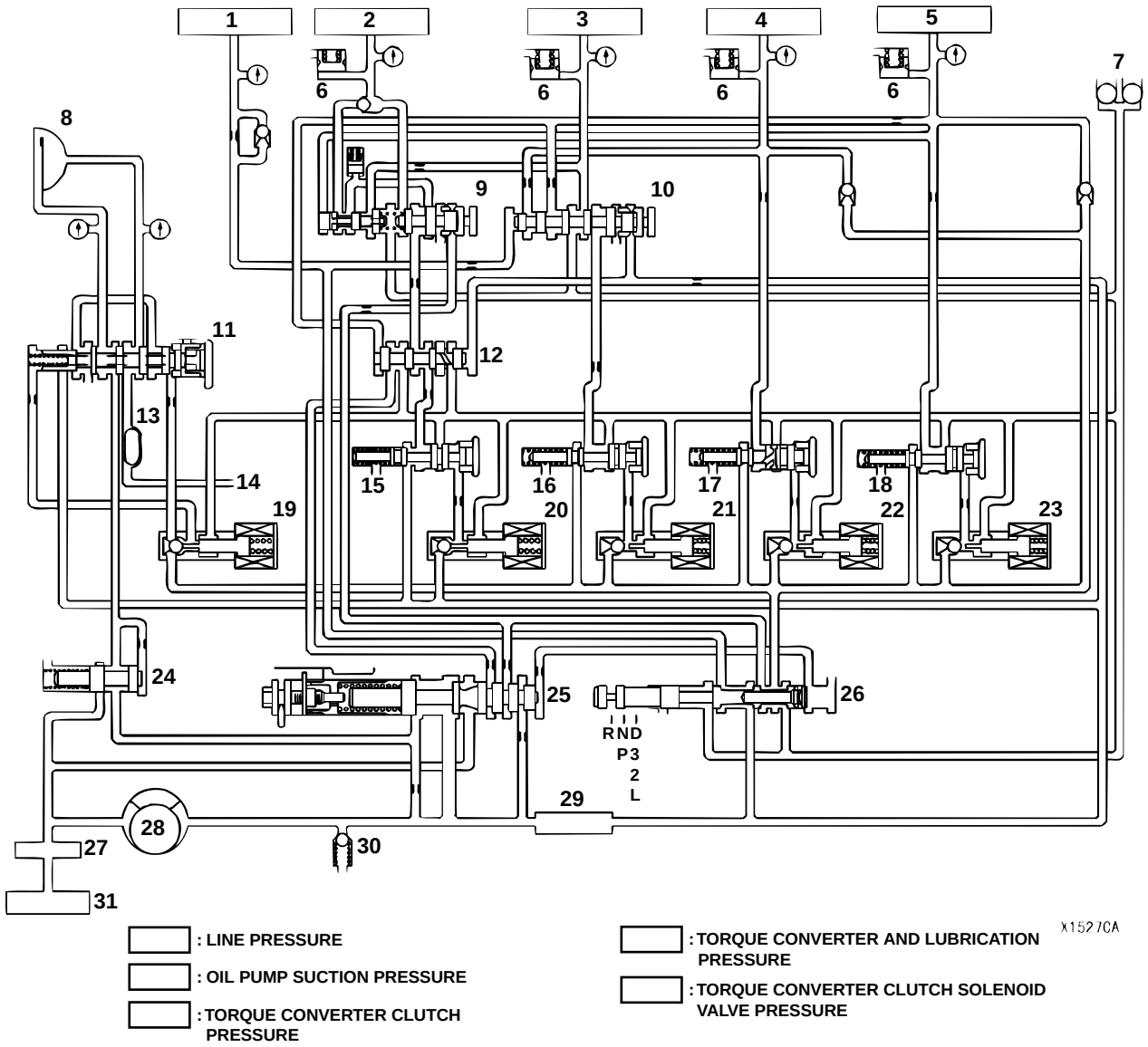
4TH GEAR



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
8. TORQUE CONVERTER CLUTCH
9. FAIL SAFE VALVE A
10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
25. REGULATOR VALVE
26. MANUAL VALVE
27. OIL FILTER
28. OIL PUMP
29. OIL STRAINER
30. RELIEF VALVE
31. OIL PAN

TSB Revision

REVERSE



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
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10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
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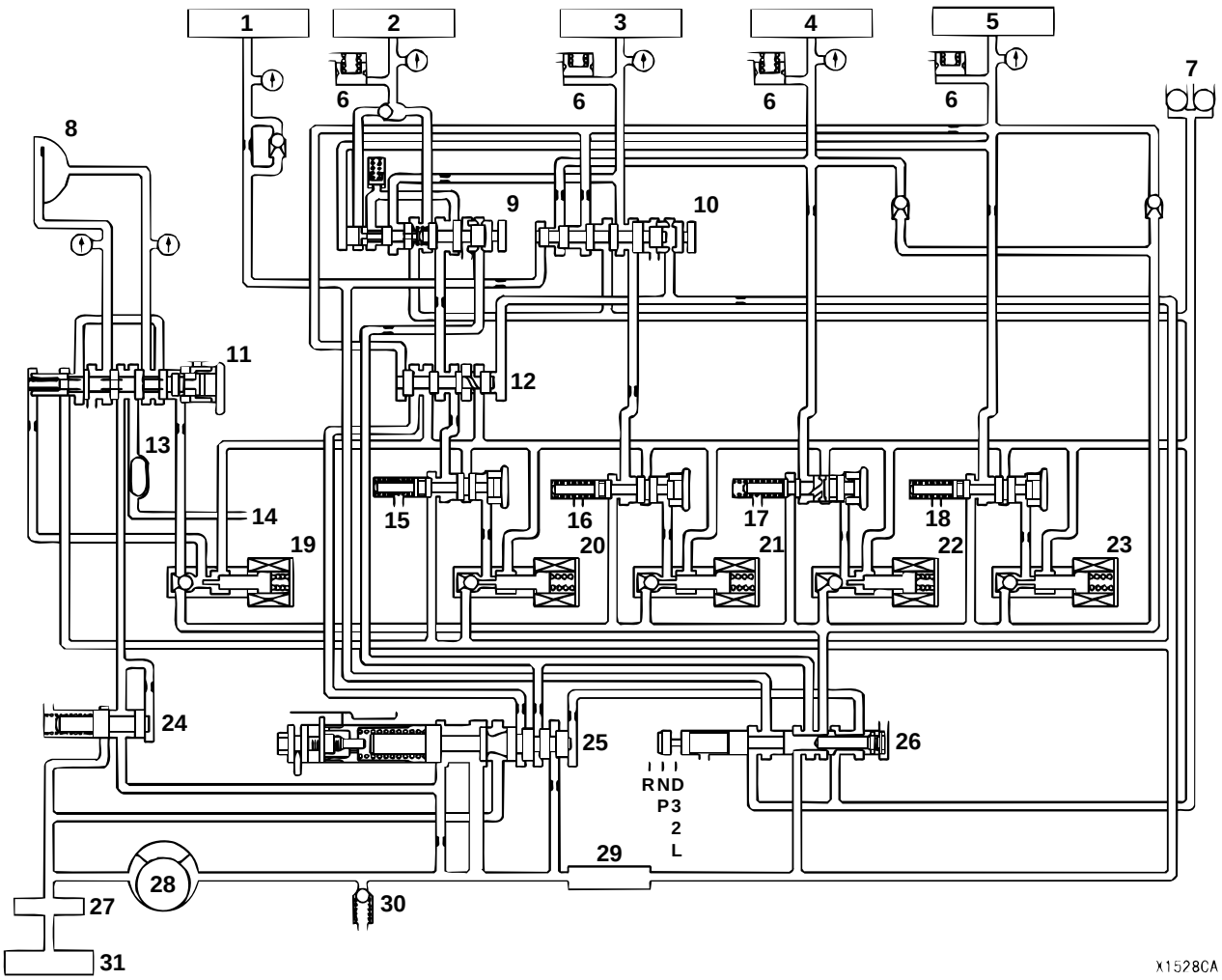
30. RELIEF VALVE
31. OIL PAN

TSB Revision

FAIL-SAFE (IN CASE OF FAIL-SAFE VALVE A OPERATION)



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
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15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
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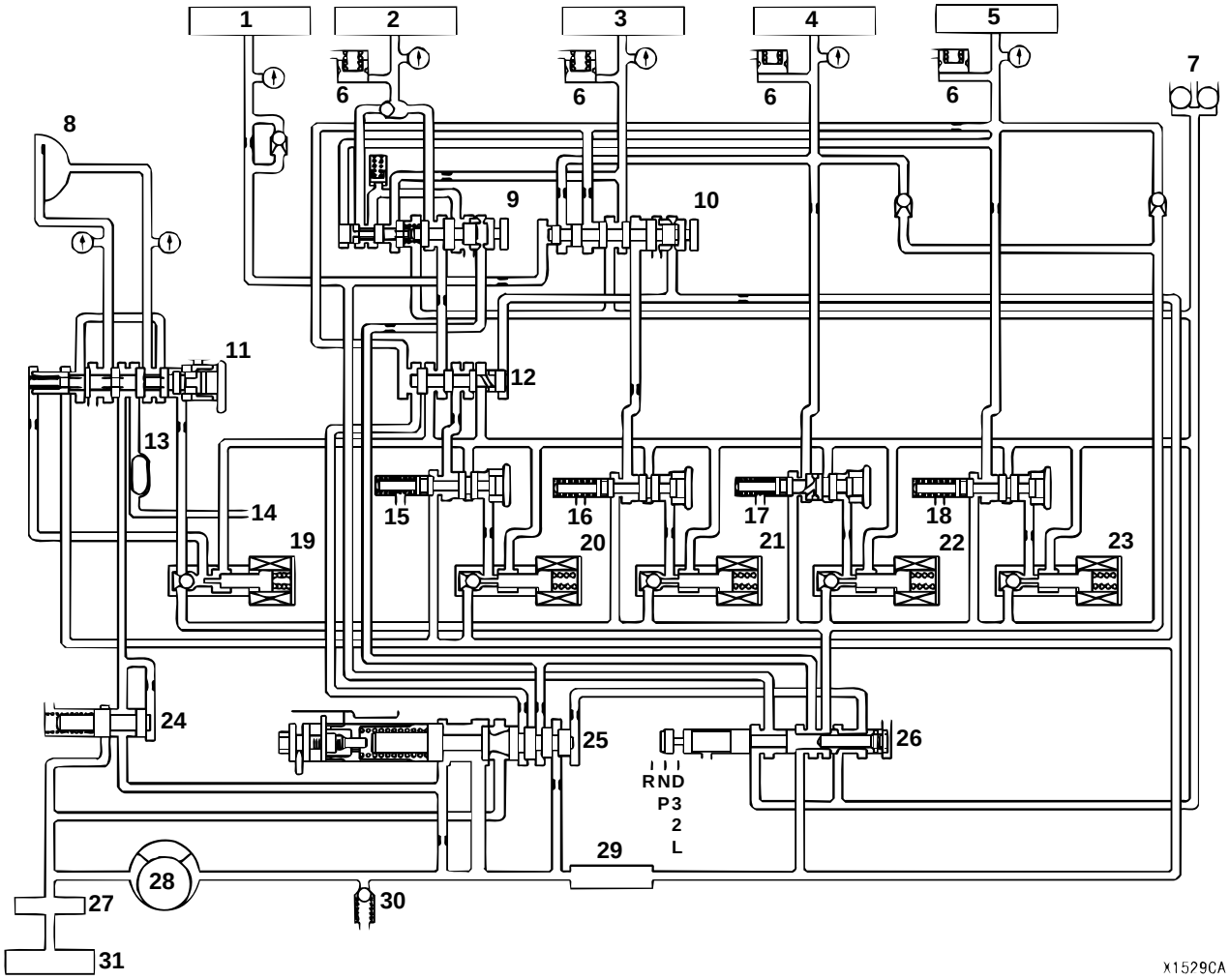
30. RELIEF VALVE
31. OIL PAN

TSB Revision

FAIL-SAFE (IN CASE OF FAIL-SAFE VALVE B OPERATION)

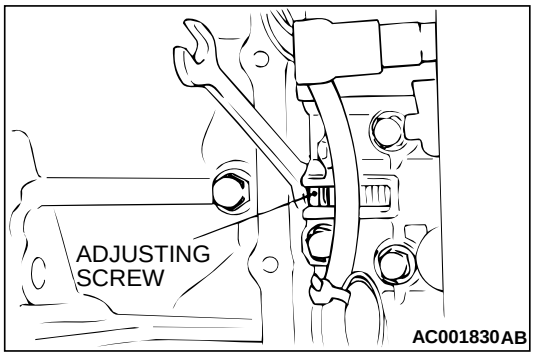


1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
8. TORQUE CONVERTER CLUTCH
9. FAIL SAFE VALVE A
10. FAIL SAFE VALVE B
11. TORQUE CONVERTER CLUTCH CONTROL VALVE
12. SWITCH VALVE
13. A/T FLUID COOLER
14. LUBRICATION
15. LOW-REVERSE PRESSURE CONTROL VALVE
16. SECOND PRESSURE CONTROL VALVE
17. UNDERDRIVE PRESSURE CONTROL VALVE
18. OVERDRIVE PRESSURE CONTROL VALVE
19. TORQUE CONVERTER CLUTCH SOLENOID VALVE
20. LOW-REVERSE SOLENOID VALVE
21. SECOND SOLENOID VALVE
22. UNDERDRIVE SOLENOID VALVE
23. OVERDRIVE SOLENOID VALVE
24. TORQUE CONVERTER PRESSURE CONTROL VALVE
25. REGULATOR VALVE
26. MANUAL VALVE
27. OIL FILTER
28. OIL PUMP
29. OIL STRAINER
30. RELIEF VALVE
31. OIL PAN

TSB Revision

LINE PRESSURE ADJUSTMENT

M1231001700059



1. Drain the A/T fluid.
   NOTE: Be sure to perform the hydraulic pressure test before attempting any adjustments.
2. Remove the valve body cover.
3. Turn the adjusting screw shown in the illustration to adjust the line pressure to the standard value. The pressure increases when the screw is turned to the left.
   NOTE: When adjusting the line pressure, adjust to the middle of the standard value range.
   Standard value: 1,010 – 1,050 kPa (147 – 152 psi)
4. Install the valve body cover. Pour in one quart A/T fluid.
5. Repeat the hydraulic pressure test. (Refer to P.23A-23.) Readjust the line pressure if necessary.

DIAGNOSTIC TROUBLE CODE CHART

M1231007900040

CODE	DIAGNOSIS ITEM		REFERENCE PAGE
11	Throttle position sensor system	Short circuit	P.23A-39
12		Open circuit	P.23A-48
14		Sensor out of adjustment	P.23A-56
15	A/T fluid temperature sensor system	Open circuit	P.23A-66
16		Short circuit	P.23A-73
21	Crankshaft position sensor system	Open circuit	P.23A-78
22	Input shaft speed sensor system	Short circuit/open circuit	P.23A-94
23	Output shaft speed sensor system	Short circuit/open circuit	P.23A-105
26	Stoplight switch system	Short circuit	P.23A-117
27	Park/Neutral position switch system	Open circuit	P.23A-124
28		Short circuit	P.23A-143
29	Vehicle speed sensor system	Short circuit/open circuit	P.23A-150
31	Low-reverse solenoid valve system	Short circuit/open circuit	P.23A-156
32	Underdrive solenoid valve system	Short circuit/open circuit	P.23A-164
33	Second solenoid valve system	Short circuit/open circuit	P.23A-170
34	Overdrive solenoid valve system	Short circuit/open circuit	P.23A-177
36	Torque converter clutch solenoid system	Short circuit/open circuit	P.23A-184
41	1st gear incorrect ratio		P.23A-192
42	2nd gear incorrect ratio		P.23A-192
43	3rd gear incorrect ratio		P.23A-192
44	4th gear incorrect ratio		P.23A-192
46	Reverse gear incorrect ratio		P.23A-192

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CODE	DIAGNOSIS ITEM		REFERENCE PAGE
52	Torque converter clutch solenoid system	Defective system	P.23A-201
53		Lock-up stuck on	P.23A-206
54	A/T Control relay system	Short circuit to ground/open circuit	P.23A-208

SYMPTOM CHART

M1231008000051

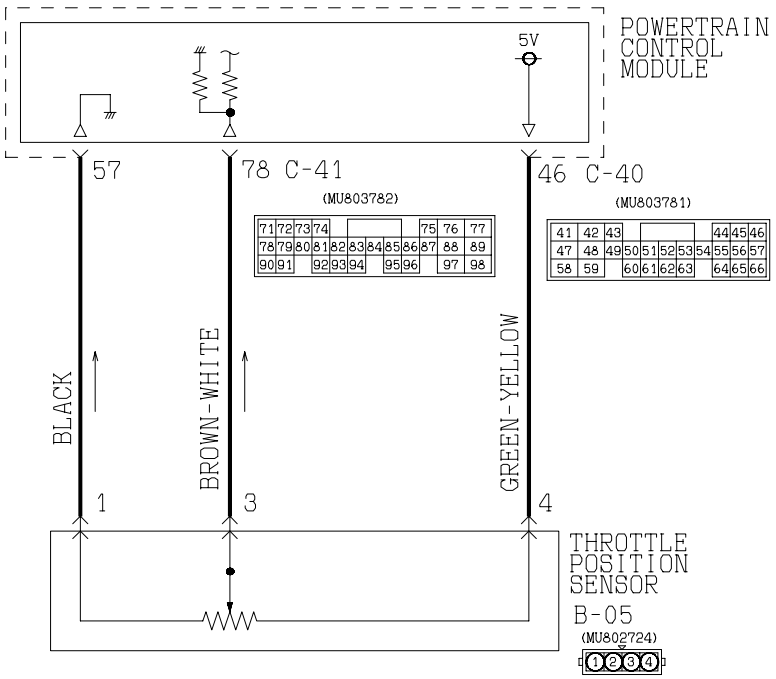
SYMPTOMS			INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication with scan tool is not possible	Communication with all systems is impossible	2.4L Engine	-	Group 13A, diagnosisP.13A-312
		3.0L Engine	-	Group 13B, diagnosisP.13B-389
	Communication with the PCM only is impossible	2.4L Engine	-	Group 13A, diagnosisP.13A-314
		3.0L Engine	-	Group 13B, diagnosisP.13B-391
Driving impossible	Vehicle does not move		1	P.23A-216
	Does not move forward		2	P.23A-218
	Does not move backward		3	P.23A-220
	Does not move (forward or backward)		4	P.23A-223
Malfunction when engaging	Engine stalls when moving selector lever from "N" to "D" or "N" to "R"		5	P.23A-224
	Shift shocks when shifting from "N" to "D" and long delay		6	P.23A-225
	Shift shocks when shifting from "N" to "R" and long delay		7	P.23A-228
	Shift shocks when shifting from "N" to "D" or "N" to "R" and long delay		8	P.23A-231
Malfunction when shifting	Shift shocks and slipping		9	P.23A-233
Does not shift properly	Early or late shifting in all gears		10	P.23A-234
	Early or late shifting in some gears		11	P.23A-237
Does not shift	No diagnostic trouble codes		12	P.23A-239
Malfunction while driving	Poor acceleration		13	P.23A-242
	Vibration		14	P.23A-244
Vehicle shifts differently with A/C engaged			15	P.23A-247
Transaxle won't downshift under load with auto-cruise engaged			16	P.23A-255

TSB Revision

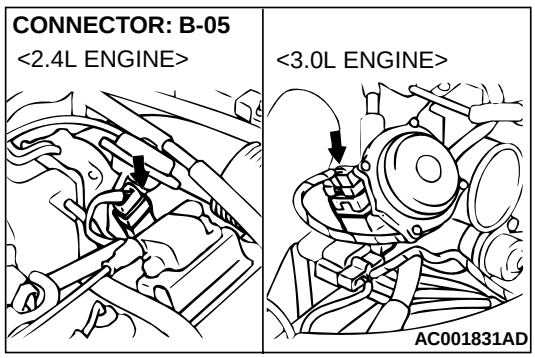
DIAGNOSTIC TROUBLE CODE PROCEDURES

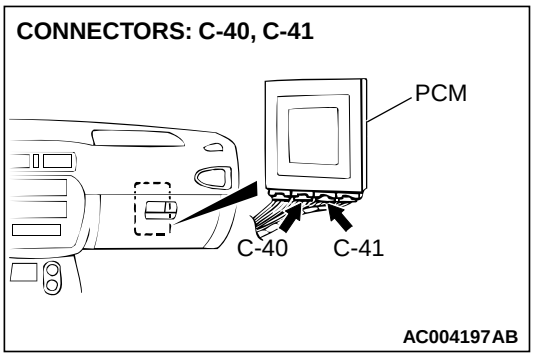
DTC 11: Throttle Position Sensor System (Short Circuit)

Throttle Position Sensor System Circuit



AC004610AB





CIRCUIT OPERATION

- When the throttle valve shaft rotates from the idle position to the fully opened position, the resistance between the TPS output terminal (terminal 3) and ground terminal (terminal 1) will increase according to the rotation.
- Voltage at pin 78 increases from around 0.7 volts at closed throttle to about 5 volts at wide open throttle.

DTC SET CONDITIONS

If the PCM output voltage is 4.8 volts or higher when the engine is idling, the output is judged to be too high and diagnostic trouble code number "11" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the throttle position sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

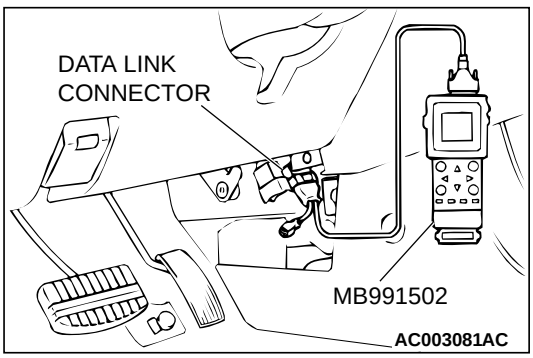
TSB Revision

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

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



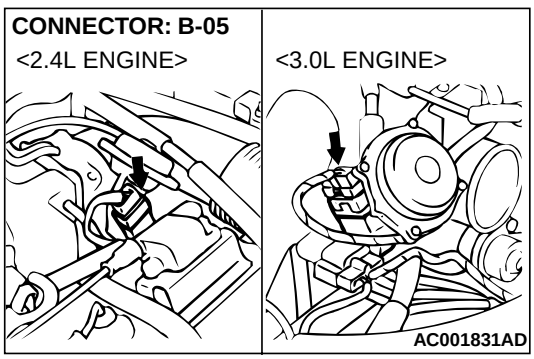
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

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

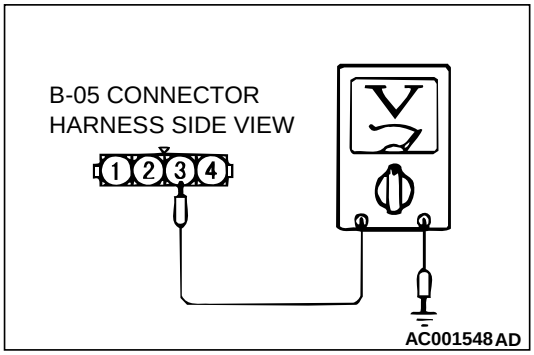
Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 2.

STEP 2. Check the sensor output voltage at throttle position sensor connector B-05 by backprobing.



(1) Do not disconnect connector B-05.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 3 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

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

Q: Is the voltage normal?

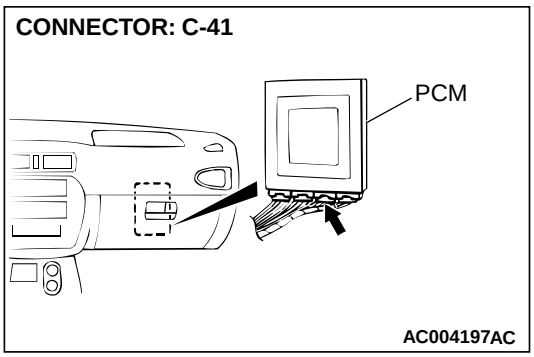
YES : Go to Step 3.
NO : Go to Step 7.

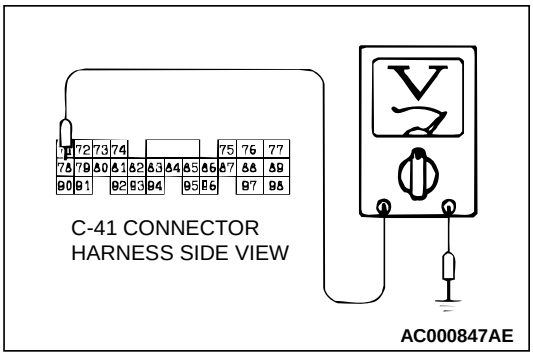
TSB Revision

STEP 3. Check the sensor output voltage at PCM connector C-41 by backprobing.

(1) Do not disconnect connector C-41.

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





(3) Measure the voltage between terminal 78 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

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

Q: Is the voltage normal?

YES : Go to Step 4.

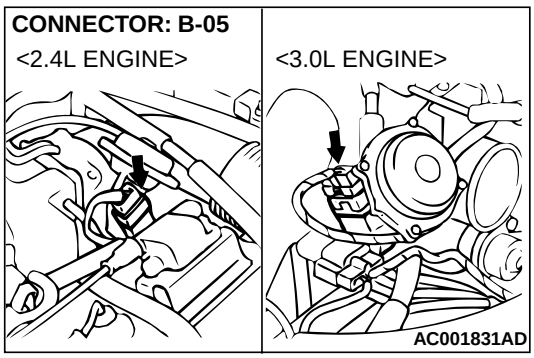
NO : Go to Step 6.

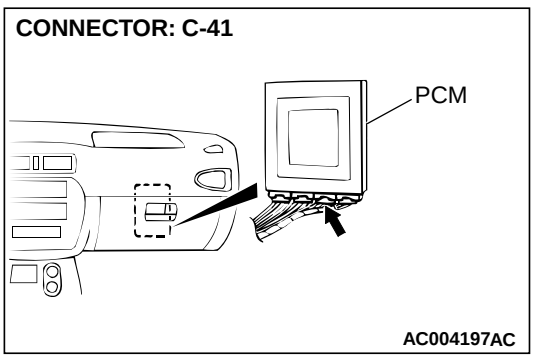
STEP 4. Check connectors B-05 at throttle position sensor and C-41 at the PCM for damage.

Q: Are the connectors in good condition?

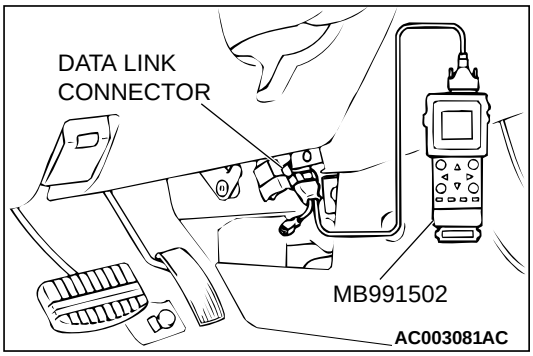
YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



STEP 5. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

⚠ CAUTION

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

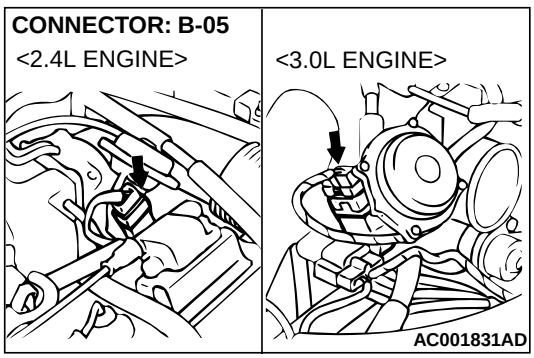
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to the data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in the idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in the full-open position, voltage should be between 4,500 and 5,500 mV.

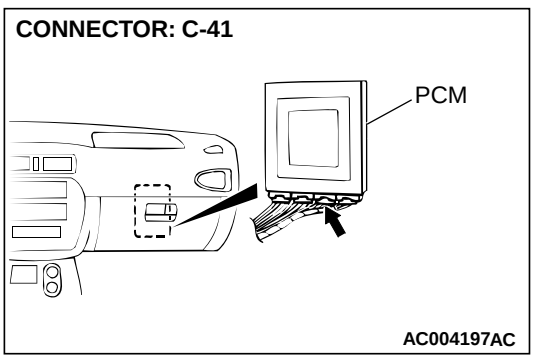
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.





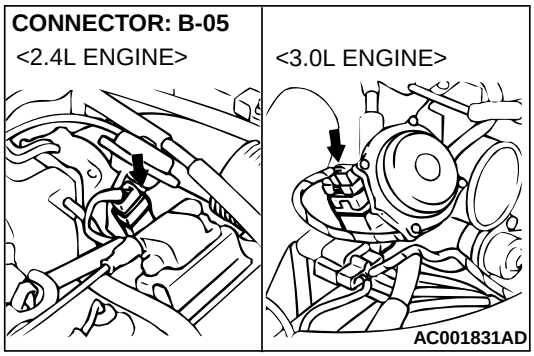
STEP 6. Check connectors B-05 at throttle position sensor and C-41 at PCM for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

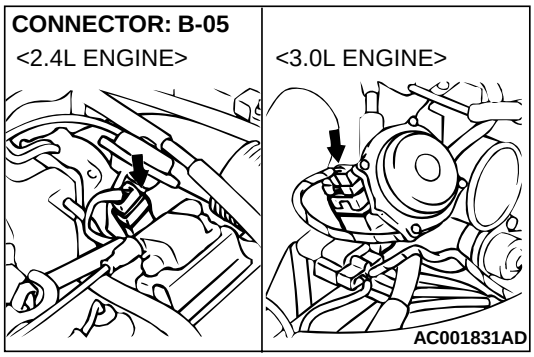


STEP 7. Check connector B-05 at throttle position sensor for damage.

Q: Is the connector in good condition?

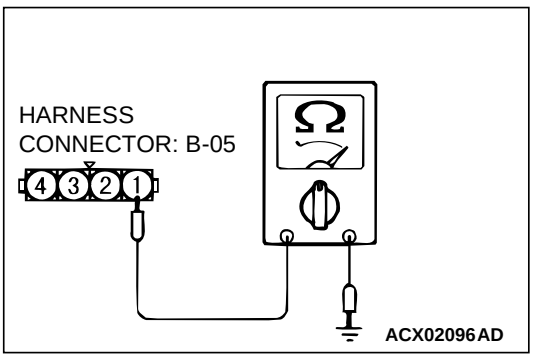
YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 8. Check the continuity at throttle position sensor connector B-05.

(1) Disconnect connector B-05 and measure at the harness side.

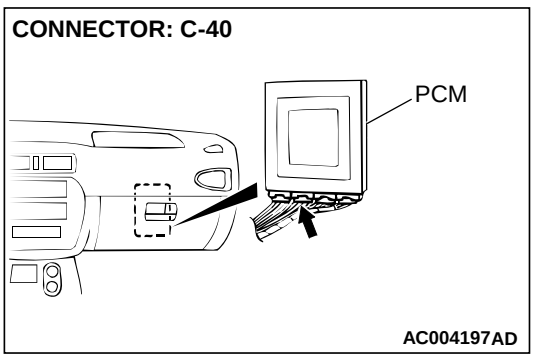


(2) Check for the continuity between terminal 1 and ground.
- Should be less than 2 ohm.

Q: Is the continuity normal?

YES : Go to Step 11.

NO : Go to Step 9.



STEP 9. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

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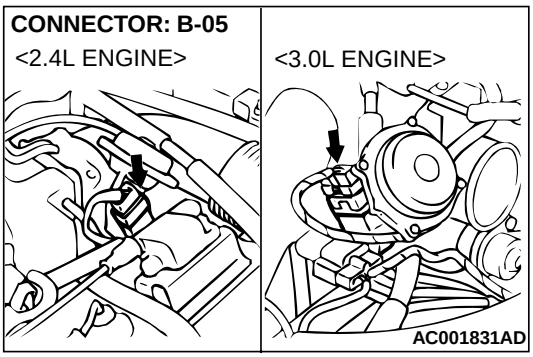
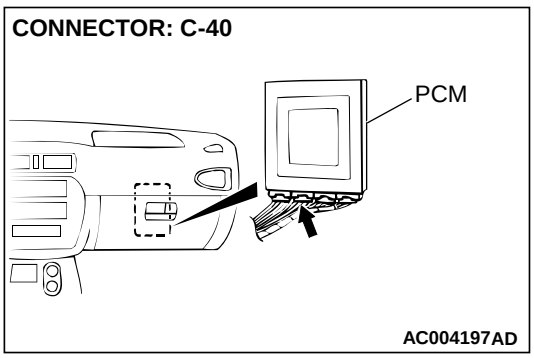
STEP 10. Check harness for open circuit or damage between throttle position sensor connector B-05 terminal 1 and PCM connector C-40 terminal 57.

Q: Is the harness wire in good condition?

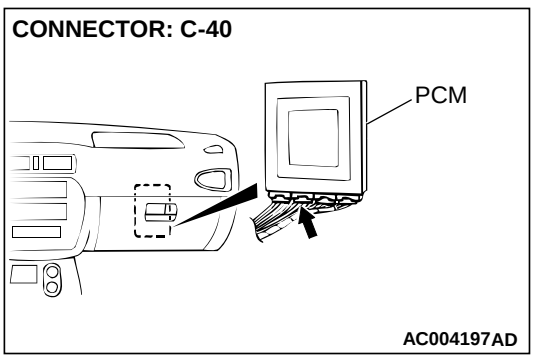
YES : Go to Step 5.
NO : Repair it.

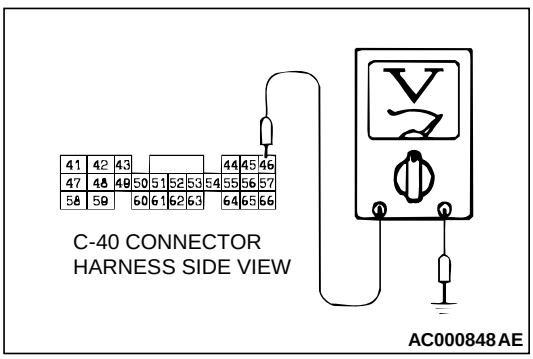




STEP 11. Check the power supply voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 46 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

Q: Is the voltage normal?

YES : Go to Step 14.
NO : Go to Step 12.

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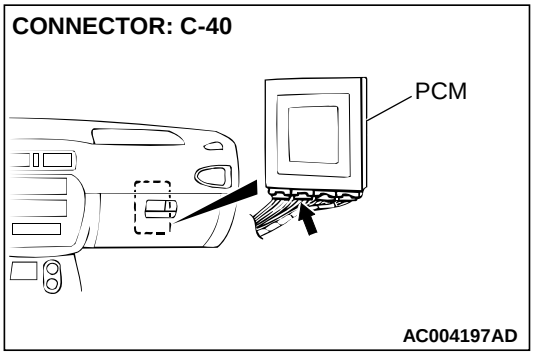
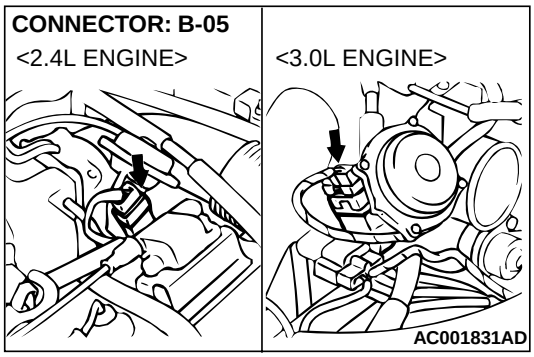


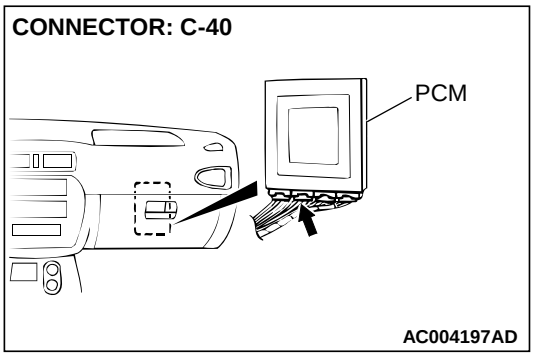
STEP 12. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 13.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





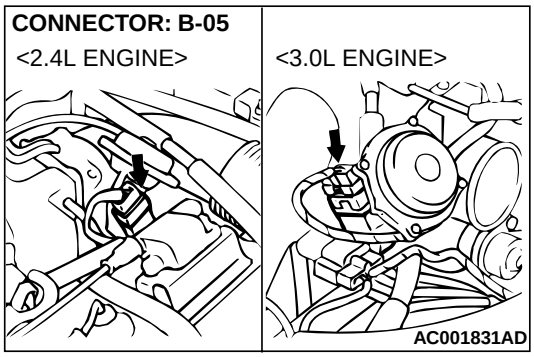
STEP 13. Check harness for damage between throttle position sensor connector B-05 terminal 4 and PCM connector C-40 terminal 46.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

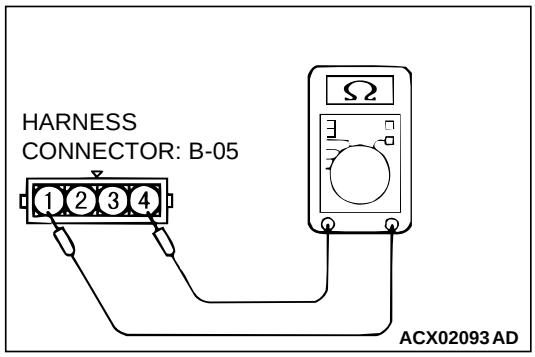
NO : Repair it.

TSB Revision



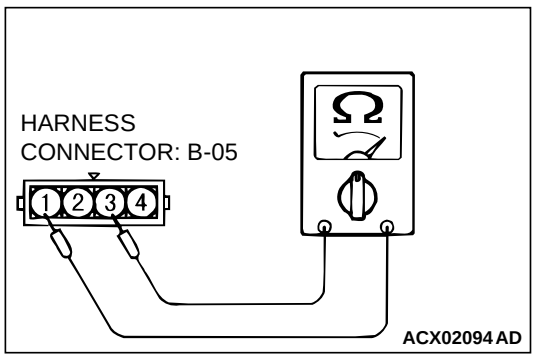
STEP 14. Check the throttle position sensor.

(1) Disconnect connector B-05 and measure at the sensor side.



(2) Measure the resistance between connector terminal 1 and 4.

Standard value: 3.5 – 6.5 kΩ



(3) Measure resistance between the throttle position sensor side connector terminal 1 and 3.

(4) Move the throttle valve from idle position to full-open position.

- Resistance should change smoothly in proportion to opening angle of the throttle valve.

Q: Is the resistance normal?

YES : Go to Step 15.

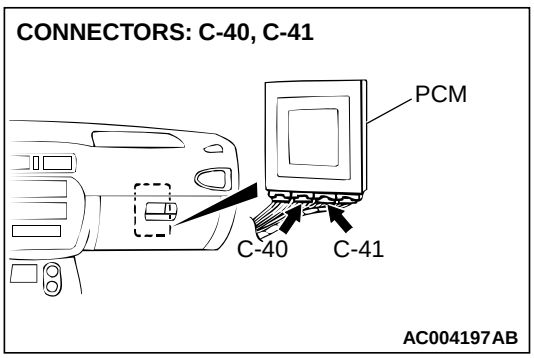
NO : Replace the throttle position sensor. Refer to GROUP 13A <2.4L Engine>, Throttle Body Assembly P.13A-451 or 13B <3.0L Engine>, Throttle Body Assembly P.13B-528.

STEP 15. Check connectors C-40, C-41 at PCM for damage.

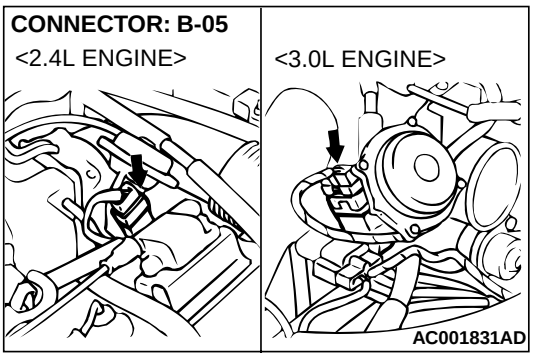
Q: Are the connectors in good condition?

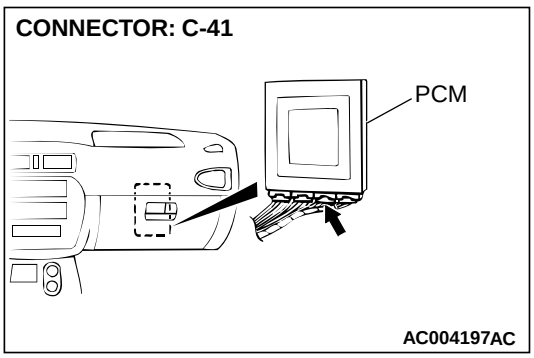
YES : Go to Step 16.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision



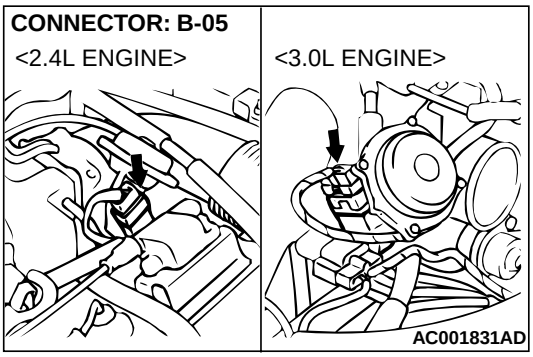


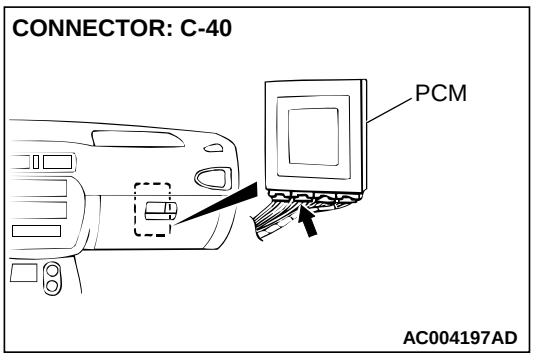
STEP 16. Check harness for damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.

Q: Is the harness wire in good condition?

YES : Go to Step 17.

NO : Repair it.





STEP 17. Check harness for damage between throttle position sensor connector B-05 terminal 1 and PCM connector C-40 terminal 57.

Q: Is the harness wire in good condition?

YES : Throttle position sensor adjustment. Refer to GROUP 13A <2.4L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13A-437 or 13B <3.0L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13B-519.

NO : Repair it.

TSB Revision

DTC 12: Throttle Position Sensor System (Open Circuit)

Throttle Position Sensor System Circuit
Refer to P.23A-39.

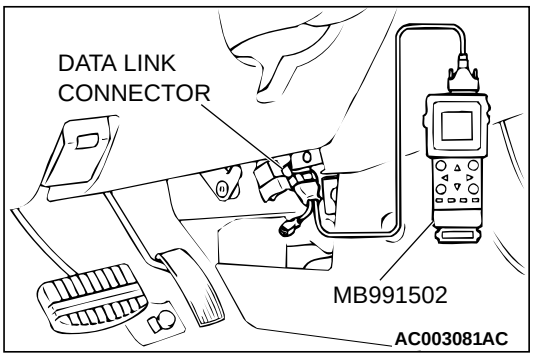
CIRCUIT OPERATION
Refer to P.23A-39.

DTC SET CONDITIONS
If TPS output voltage is 0.2 volts or lower at times other than when the engine is idling, the output is judged to be too low and diagnostic trouble code number "12" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of the throttle position sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

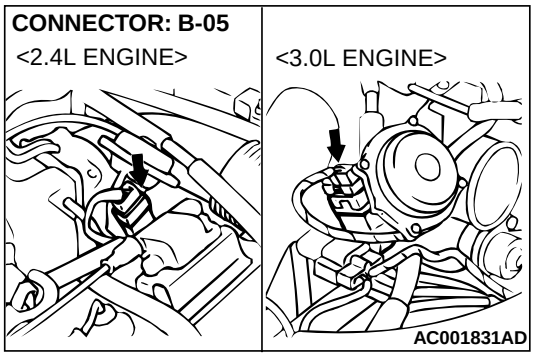
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

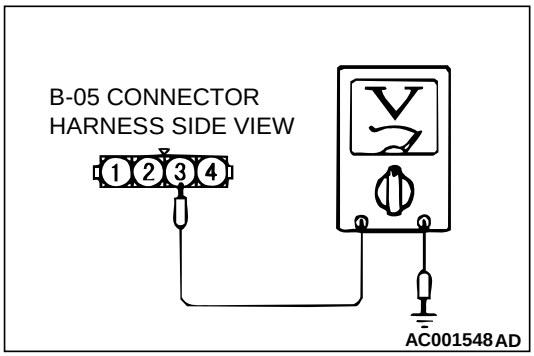
NO : Go to Step 2.

TSB Revision



STEP 2. Check the sensor output voltage at throttle position sensor connector B-05 by backprobing.

(1) Do not disconnect connector B-05.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 3 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

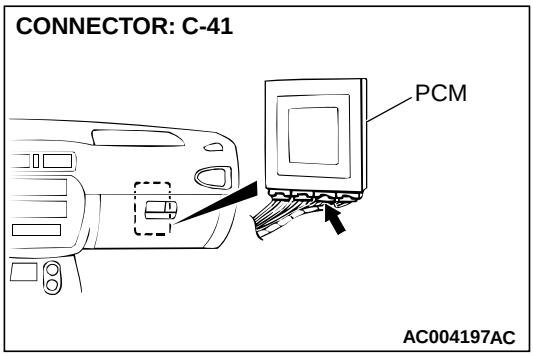
(4) Turn the ignition switch to "LOCK" (OFF) position.

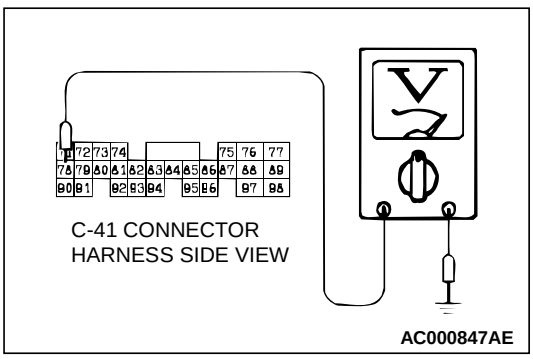
Q: Is the voltage normal?

YES : Go to Step 3.
NO : Go to Step 7.

STEP 3. Check the sensor output voltage at PCM connector C-41 by backprobing.

(1) Do not disconnect connector C-41.
(2) Turn the ignition switch to "ON" position.





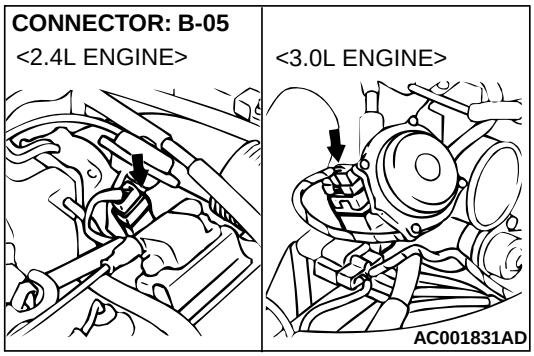
(3) Measure the voltage between terminal 78 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

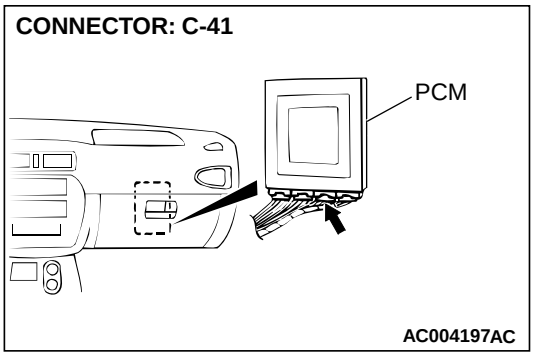
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 4.
NO : Go to Step 6.

TSB Revision



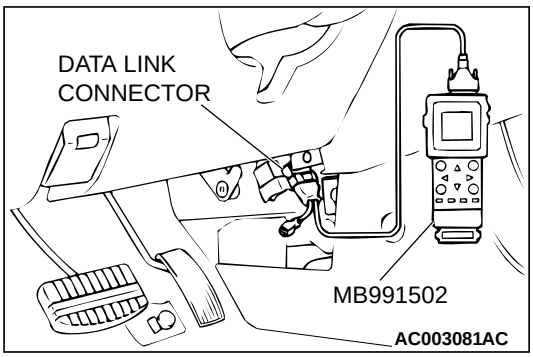


STEP 4. Check connectors B-05 at the throttle position sensor and C-41 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 5. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

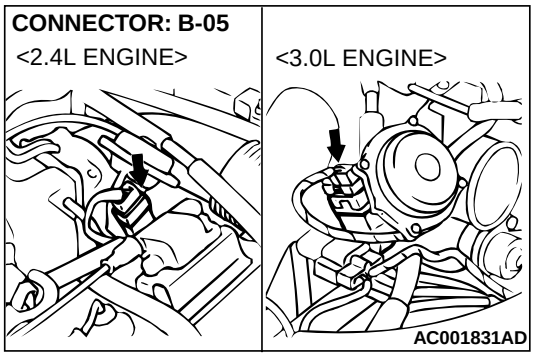
(4) Turn the ignition switch to "LOCK" (OFF) position.

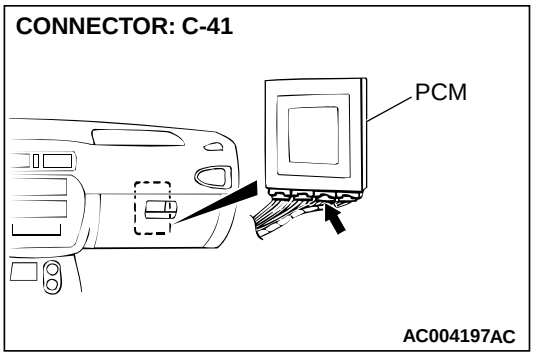
Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision



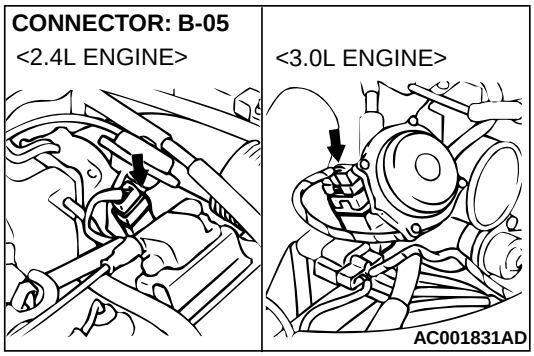


STEP 6. Check connectors B-05 at throttle position sensor and C-41 at PCM for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.

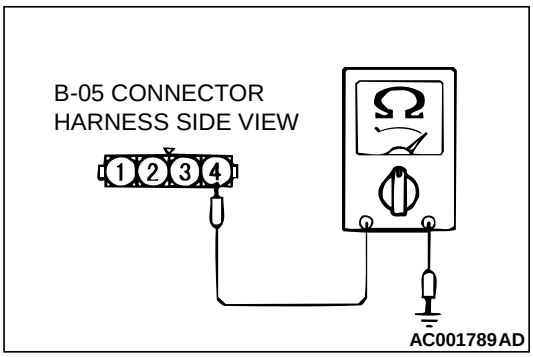
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 7. Check the power supply voltage at throttle position sensor connector B-05 by backprobing.

(1) Do not disconnect connector B-05.

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



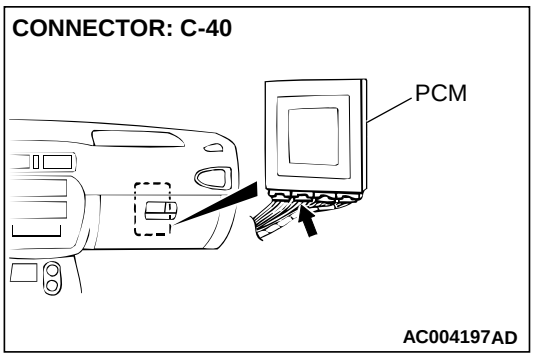
(3) Measure the voltage between terminal 4 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

Q: Is the voltage normal?

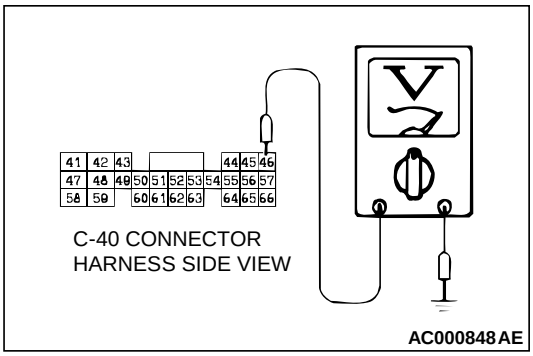
YES : Go to Step 12.

NO : Go to Step 8.



STEP 8. Check the power supply voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 46 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

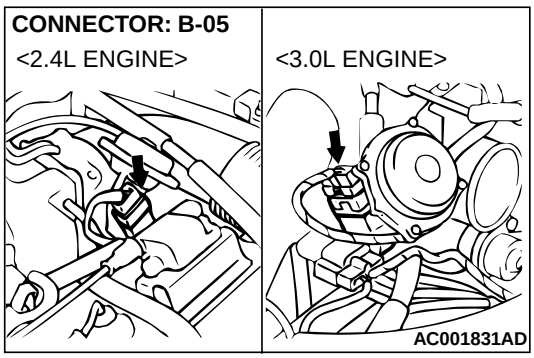
Q: Is the voltage normal?

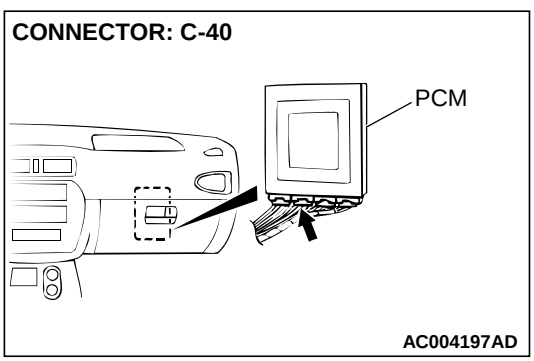
YES : Go to Step 9.
NO : Go to Step 10.

STEP 9. Check connectors B-05 at throttle position sensor and C-40 at PCM for damage.

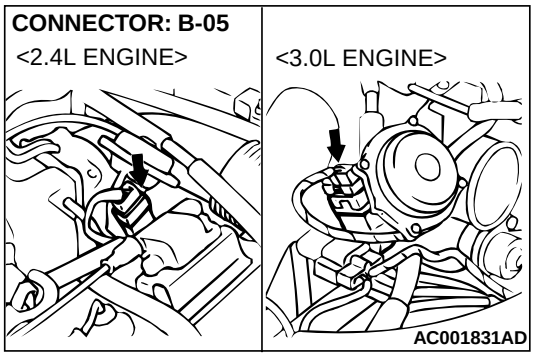
Q: Are the connectors in good condition?

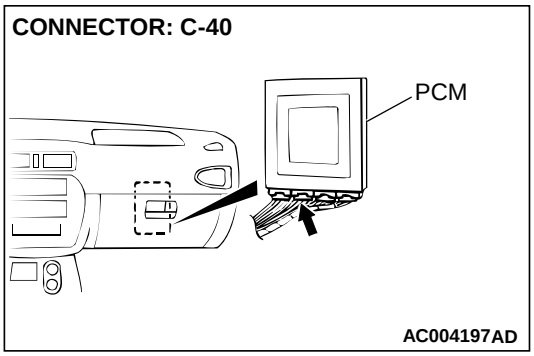
YES : Repair it because of harness open circuit or damage between throttle position sensor connector B-05 terminal 4 and PCM connector C-40 terminal 46.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



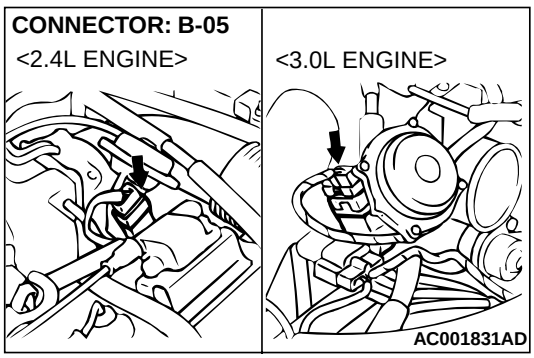


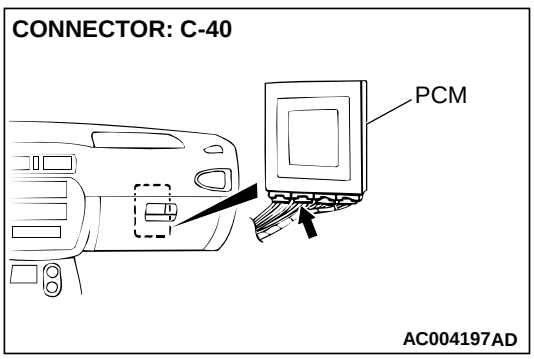
STEP 10. Check connectors B-05 at throttle position sensor and C-40 at PCM for damage.

Q: Are the harness connectors in good condition?

YES : Go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





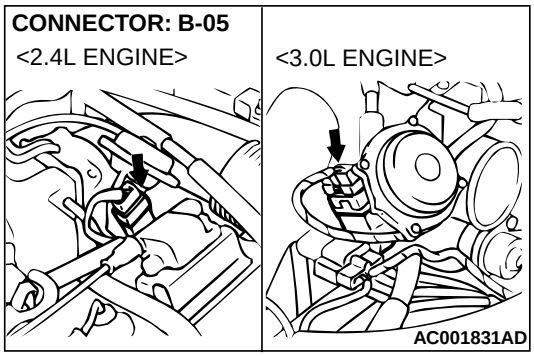
STEP 11. Check harness for short circuit to ground between throttle position sensor connector B-05 terminal 4 and PCM connector C-40 terminal 46.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair it.

TSB Revision

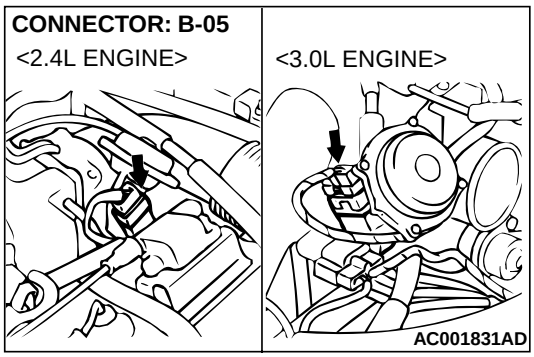


STEP 12. Check connector B-05 at throttle position sensor for damage.

Q: Is the connector in good condition?

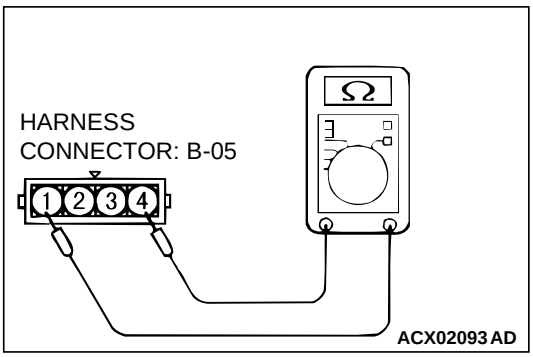
YES : Go to Step 13.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



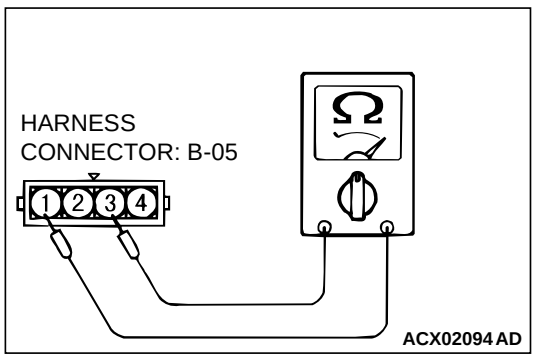
STEP 13. Check the throttle position sensor.

(1) Disconnect connector B-05 and measure at the sensor side.



(2) Measure the resistance between connector terminal 1 and 4.

Standard value: 3.5 – 6.5 kΩ



(3) Measure resistance between the throttle position sensor side connector terminal 1 and 3.

(4) Move the throttle valve from the idle position to full-open position.

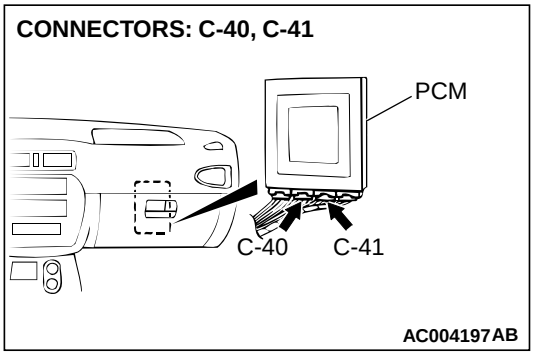
- Resistance should change smoothly in proportion to opening angle of the throttle valve.

Q: Is the resistance normal?

YES : Go to Step 14.

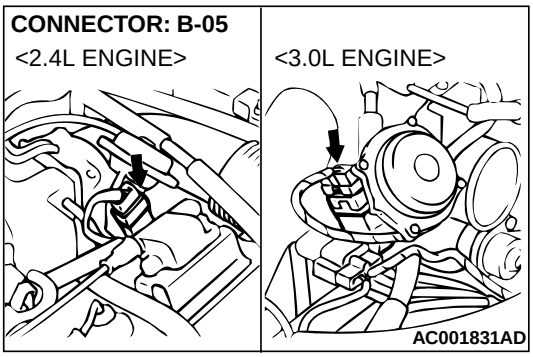
NO : Replace the throttle position sensor. Refer to GROUP 13A <2.4L Engine>, Throttle Body Assembly P.13A-451 or 13B <3.0L Engine>, Throttle Body Assembly P.13B-528.

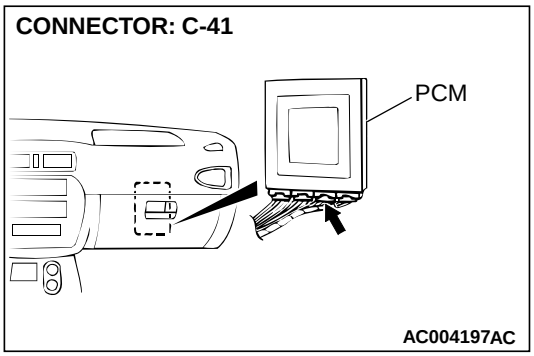
TSB Revision



STEP 14. Check connectors C-40, C-41 at PCM for damage.
Q: Are the connectors in good condition?

YES : Go to Step 15.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 15. Check harness for short circuit to ground or damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.
Q: Is the harness wire in good condition?

YES : Go to Step 16.
NO : Repair it.

STEP 16. Check the connector and the harness for short circuit to ground between the throttle position sensor connector and the auto-cruise control-ECU connector.

Q: Is the harness wire in good condition?

YES : Throttle position sensor adjustment. Refer to GROUP 13A <2.4L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13A-437 or 13B <3.0L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13B-519.
NO : Repair it.

TSB Revision

DTC 14: Throttle Position Sensor System (Maladjusted Sensor)

Throttle Position Sensor System Circuit
Refer to P.23A-39.

CIRCUIT OPERATION
Refer to P.23A-39.

DTC SET CONDITIONS
If TPS output voltage is 0.2 volts or lower or if it is 1.2 volts or higher when the engine is idling, the TPS adjustment is judged to be incorrect and diagnostic trouble code number "14" is output.

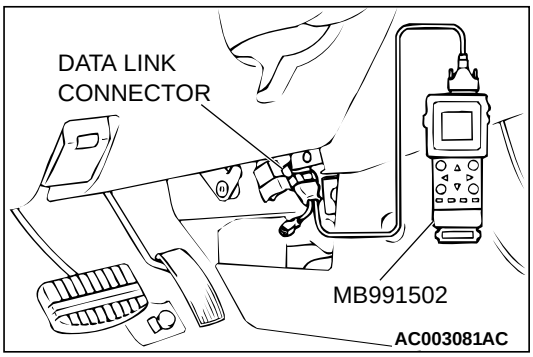
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of the throttle position sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

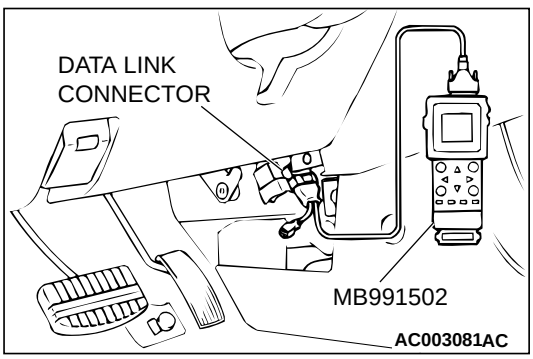
⚠ CAUTION
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "11" or "12" output?
YES : Refer to P.23A-39, code number 11: Throttle Position Sensor System (Short Circuit), P.23A-48 code number 12: Throttle Position Sensor System (Open Circuit).
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

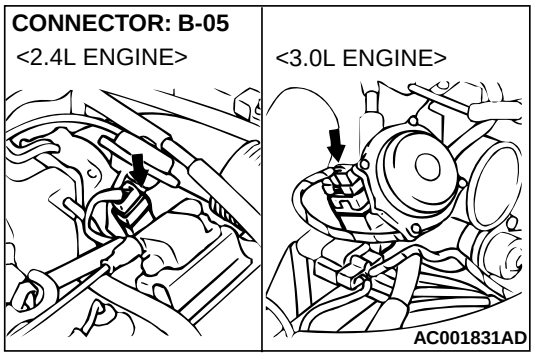


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

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

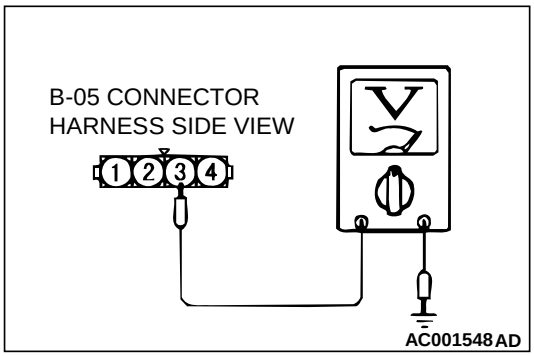
Q: Is the sensor operating properly?
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

TSB Revision



STEP 3. Check the sensor output voltage at throttle position sensor connector B-05 by backprobing.

(1) Do not disconnect connector B-05.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 3 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

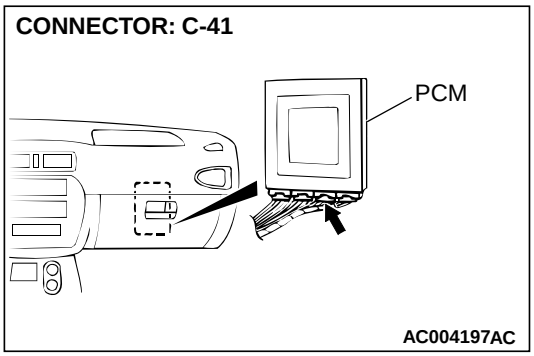
(4) Turn the ignition switch to "LOCK" (OFF) position.

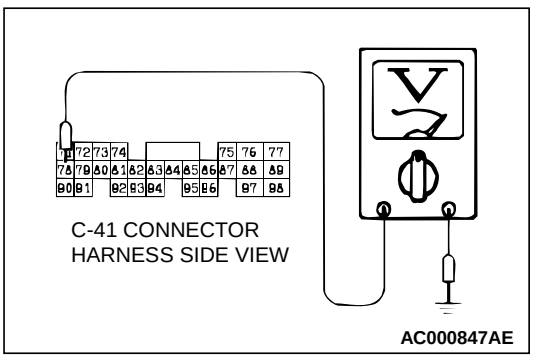
Q: Is the voltage normal?

YES : Go to Step 4.
NO : Go to Step 8.

STEP 4. Check the sensor output voltage at PCM connector C-41 by backprobing.

(1) Do not disconnect connector C-41.
(2) Turn the ignition switch to "ON" position.





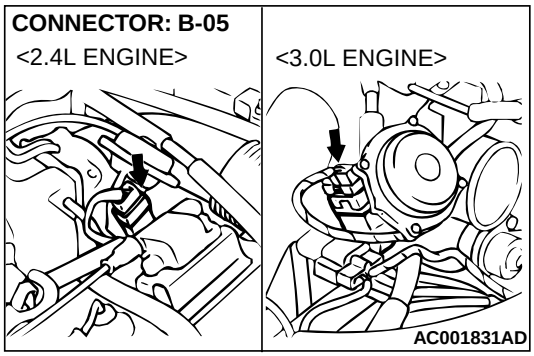
(3) Measure the voltage between terminal 78 and ground by backprobing.
- With the throttle valve in idle position, voltage should be between 0.535 and 0.735 volts.
- With the throttle valve in full-open position, voltage should be between 4.5 and 5.5 volts.

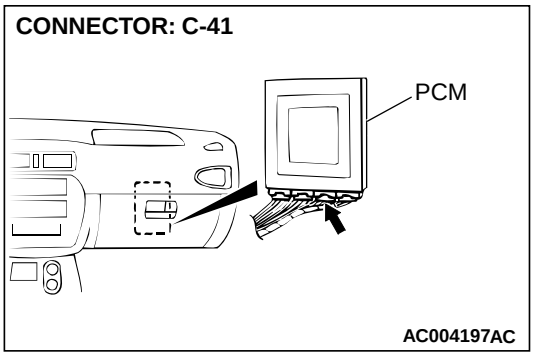
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

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

TSB Revision



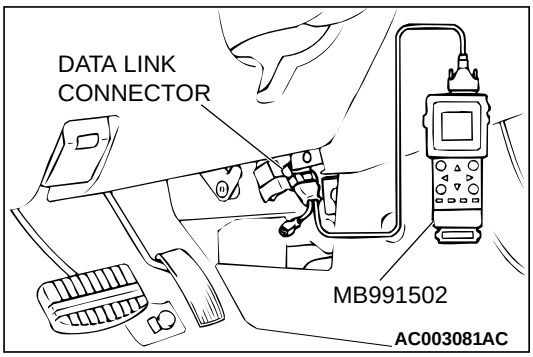


STEP 5. Check connectors B-05 at throttle position sensor and C-41 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 6.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 6. Using scan tool MB991502, check data list item 11: Throttle Position Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in the full-open position, voltage should be between 4,500 and 5,500 mV.

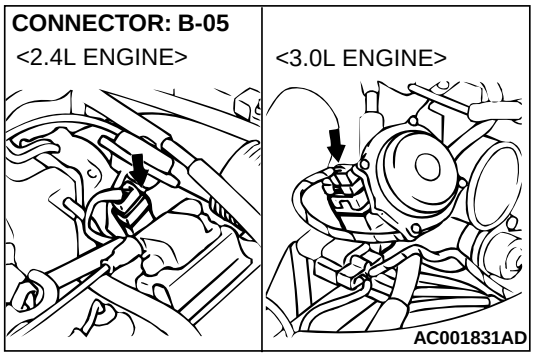
(4) Turn the ignition switch to "LOCK" (OFF) position.

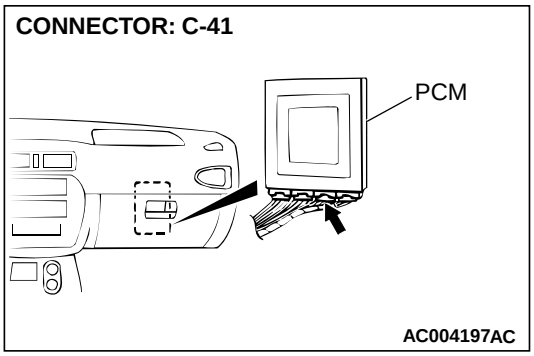
Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision



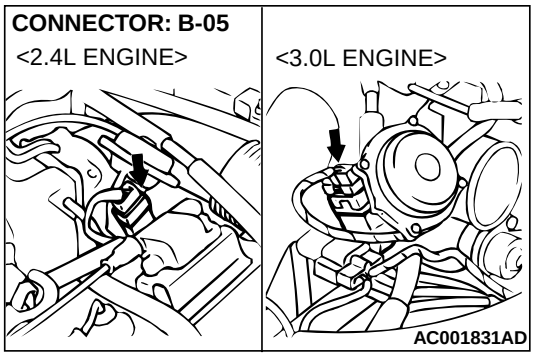


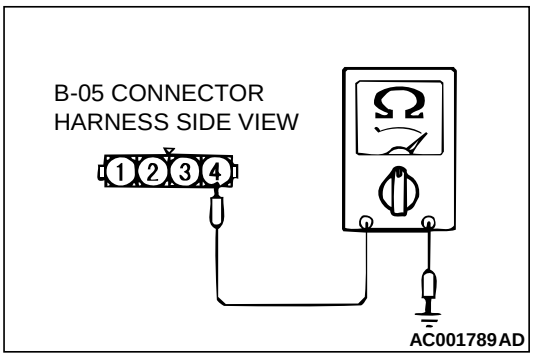
STEP 7. Check connectors B-05 at throttle position sensor and C-41 at PCM for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 8. Check the power supply voltage at throttle position sensor connector B-05 by backprobing.

(1) Do not disconnect connector B-05.

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

(3) Measure the voltage between terminal 4 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

Q: Is the voltage normal?

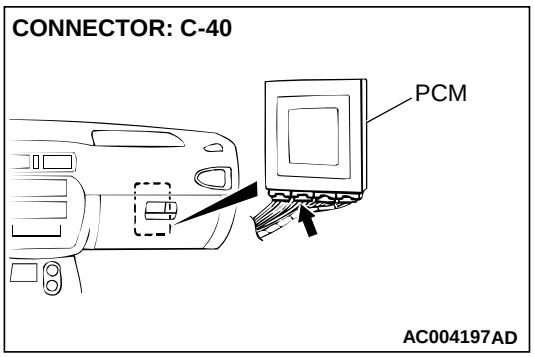
YES : Go to Step 13.

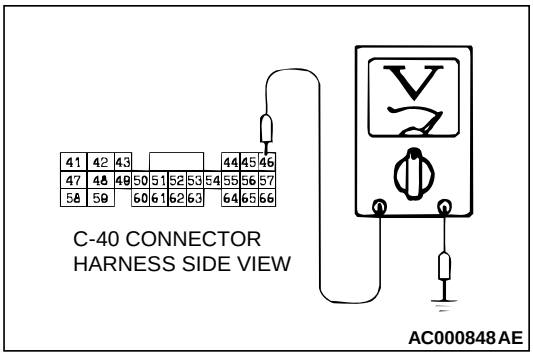
NO : Go to Step 9.

TSB Revision

STEP 9. Check the power supply voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 46 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

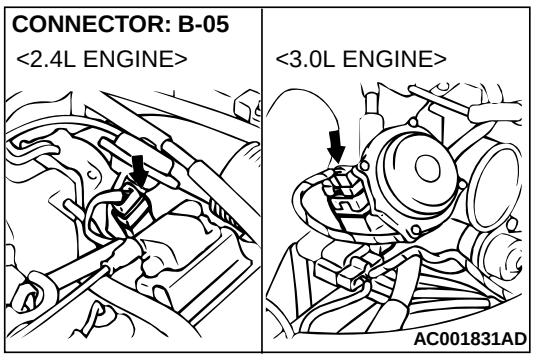
Q: Is the voltage normal?

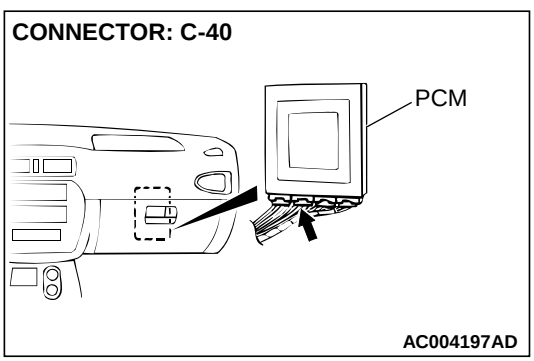
YES : Go to Step 10.
NO : Go to Step 11.

STEP 10. Check connectors B-05 at throttle position sensor and C-40 at PCM for damage.

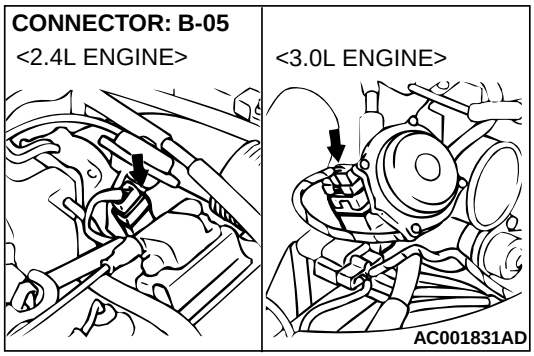
Q: Are the connectors in good condition?

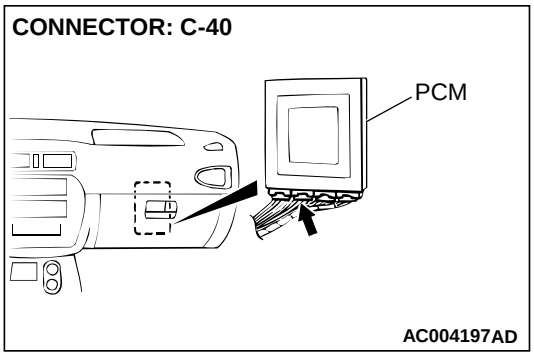
YES : Repair it because of harness open circuit or damage between throttle position sensor connector B-05 terminal 4 and PCM connector C-40 terminal 46.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



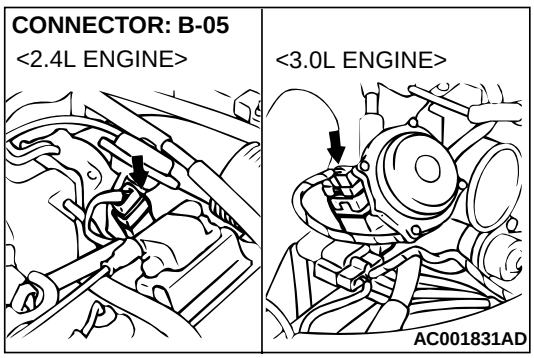


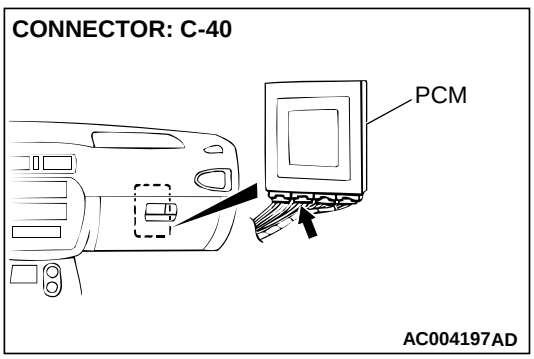
STEP 11. Check connectors B-05 at throttle position sensor and C-40 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





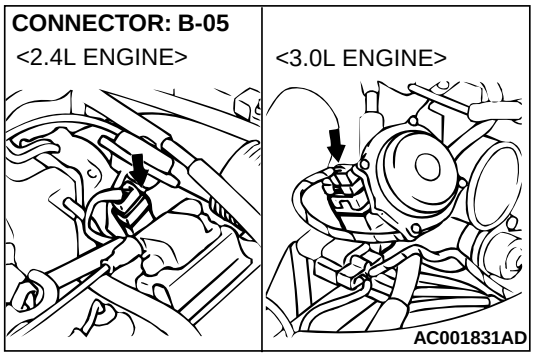
STEP 12. Check harness for short circuit to ground between throttle position sensor connector B-05 terminal 4 and PCM connector C-40 terminal 46.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

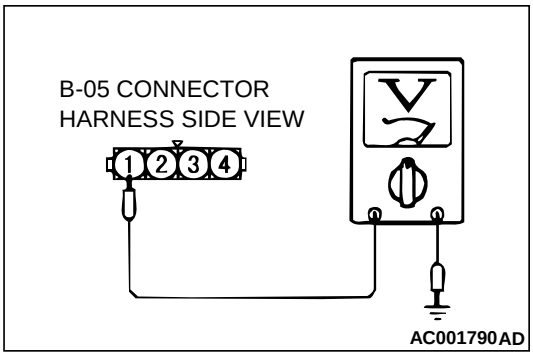
NO : Repair it.

TSB Revision



STEP 13. Check the ground voltage at throttle position sensor connector B-05 by backprobing.

(1) Do not disconnect connector B-05.
(2) Turn the ignition switch to "ON" position.

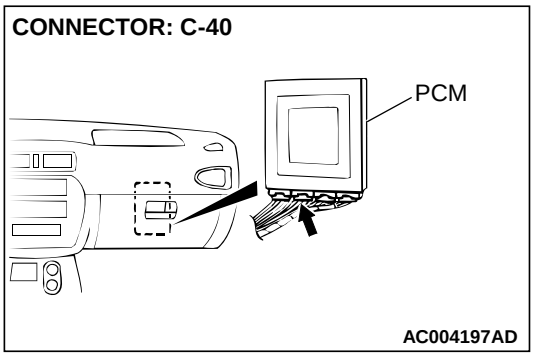


(3) Measure the voltage between terminal 1 and ground by backprobing.
- Voltage should be 0.5 volt or less.

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

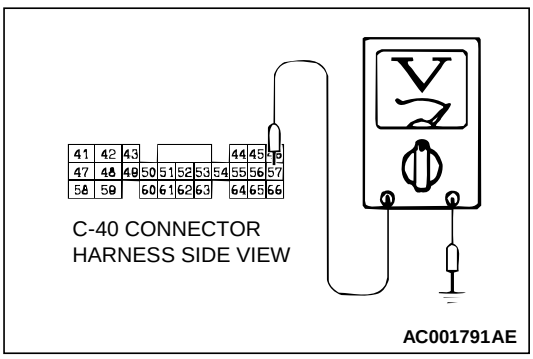
Q: Is the voltage normal?

YES : Go to Step 17.
NO : Go to Step 14.



STEP 14. Check the ground voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.



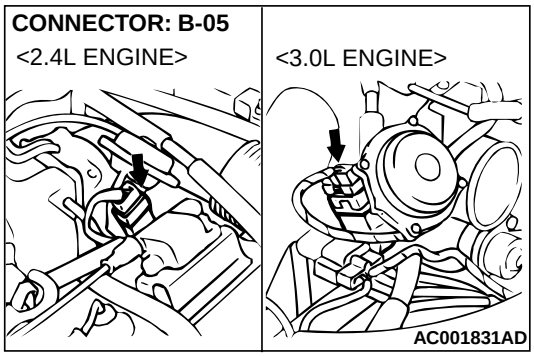
(3) Measure the voltage between terminal 57 and ground by backprobing.
- Voltage should be 0.5 volt or less.

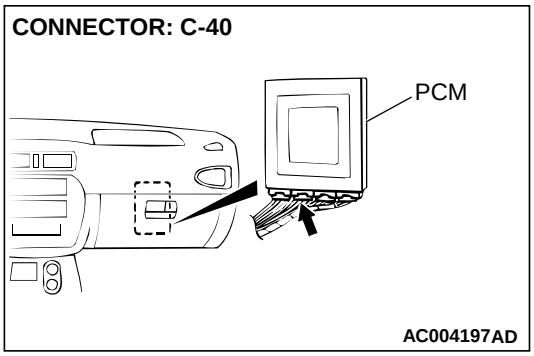
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 15.
NO : Go to Step 16.

TSB Revision



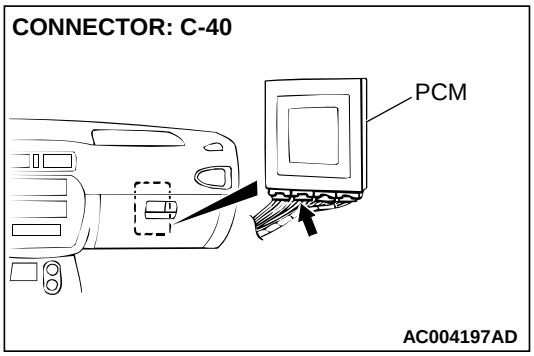


STEP 15. Check connectors B-05 at throttle position sensor and C-40 at PCM for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or damage between throttle position sensor connector B-05 terminal 1 and PCM connector C-40 terminal 57.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

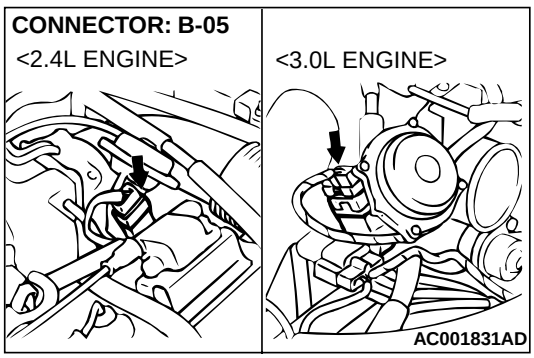


STEP 16. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 6.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



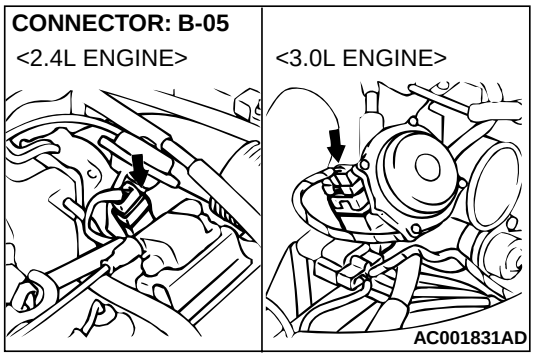
STEP 17. Check connector B-05 at throttle position sensor for damage.

Q: Is the connector in good condition?

YES : Go to Step 18.

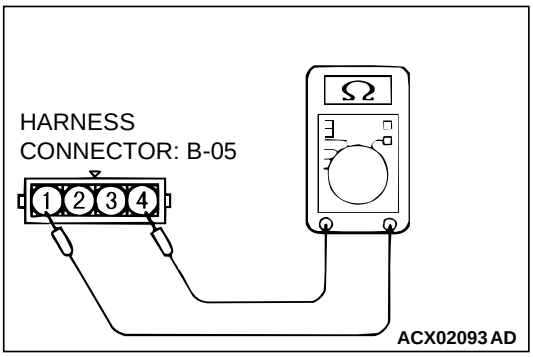
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



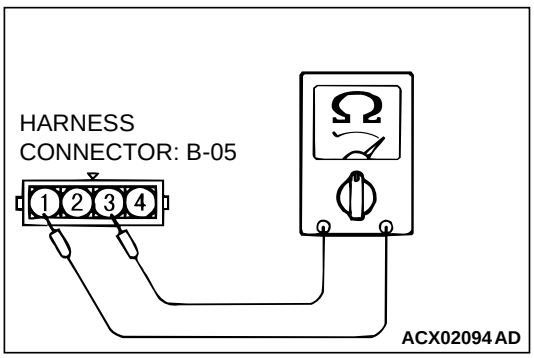
STEP 18. Check the throttle position sensor.

(1) Disconnect connector B-05 and measure at the sensor side.



(2) Measure the resistance between terminal 1 and 4.

Standard value: 3.5 – 6.5 kΩ



(3) Measure resistance between the throttle position sensor side connector terminal 1 and 3.

(4) Move the throttle valve from idle position to full-open position.

- Resistance should change smoothly in proportion to opening angle of the throttle valve.

Q: Is the resistance normal?

YES : Go to Step 19.

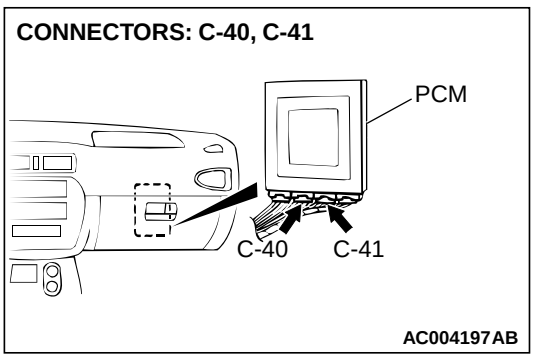
NO : Replace the throttle position sensor. Refer to GROUP 13A <2.4L Engine>, Throttle Body Assembly P.13A-451 or 13B <3.0L Engine>, Throttle Body Assembly P.13B-528.

STEP 19. Check connectors C-40, C-41 at PCM for damage.

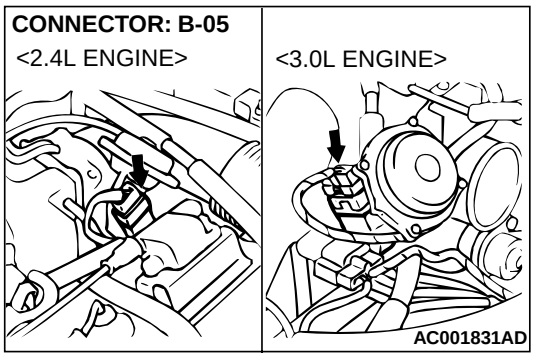
Q: Are the connectors in good condition?

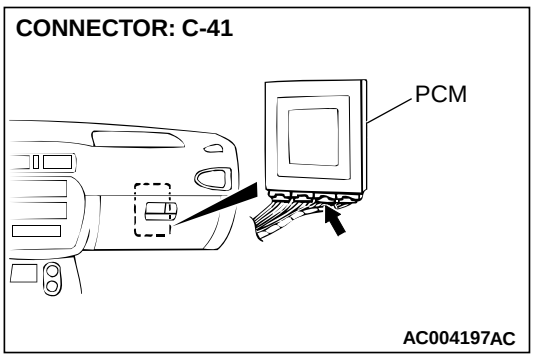
YES : Go to Step 20.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision





STEP 20. Check harness for short circuit to ground or damage between throttle position sensor connector B-05 terminal 3 and PCM connector C-41 terminal 78.

Q: Is the harness wire in good condition?

YES : Go to Step 21.

NO : Repair it.

STEP 21. Check the connector and the harness for short circuit to ground between the throttle position sensor connector and the auto-cruise control-ECU connector.

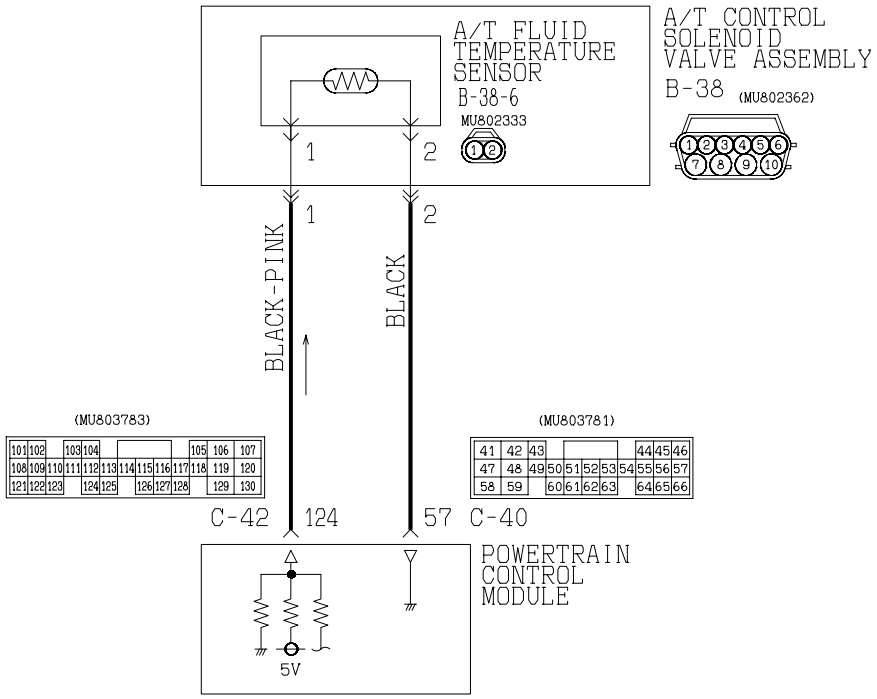
Q: Is the harness wire in good condition?

YES : Throttle position sensor adjustment. Refer to GROUP 13A <2.4L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13A-437 or 13B <3.0L Engine>, On-vehicle Service – Throttle Position Sensor Adjustment P.13B-519.

NO : Repair it.

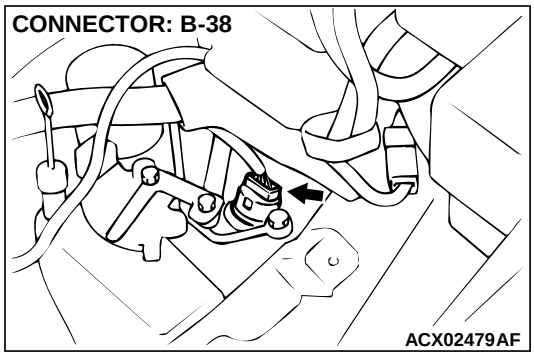
DTC 15: A/T Fluid Tempeature Sensor System (Open Circuit)

A/T Fluid Temperature Sensor System Circuit



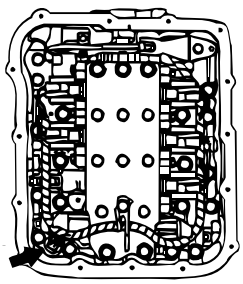
W1S15M01AA
AC004611AB

CONNECTOR: B-38



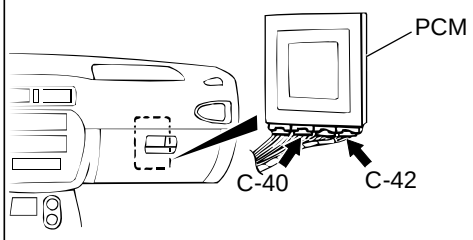
ACX02479AF

CONNECTOR: B-38-6



AC002219AG

CONNECTORS: C-40, C-42



AC004197AE

CIRCUIT OPERATION

- The PCM (terminal 124) applies 5 volts to the A/T fluid temperature sensor output terminal (terminal 1).
- Ground terminal (terminal 2) is grounded to the PCM (terminal 57).

TSB Revision

- The A/T fluid temperature sensor is an NTC (negative temperature coefficient) type of resistor. When the A/T fluid temperature rises, the resistance decreases.
- The A/T fluid temperature sensor output voltage rises when the resistance increases, and drops when the resistance decreases.

DTC SET CONDITIONS

If the A/T fluid temperature sensor output voltage is 4.5 volts or more after driving for 10 minutes or more (if the A/T fluid temperature does not increase), there is an open circuit in the A/T fluid temperature sensor and diagnostic trouble code number "15" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

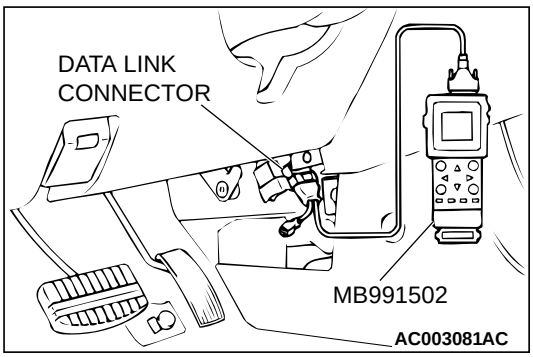
- Malfunction of the A/T fluid temperature sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 15: A/T Fluid Temperature Sensor.

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



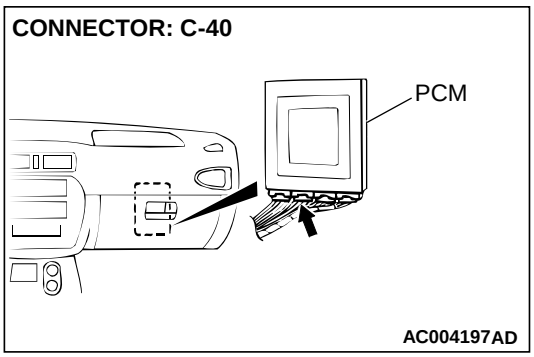
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15: A/T Fluid Temperature Sensor.
  - At cool condition: Almost equal to the ambient temperature (atmospheric temperature)
  - At warm condition: 70 to 80°C (158 to 176°F)
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

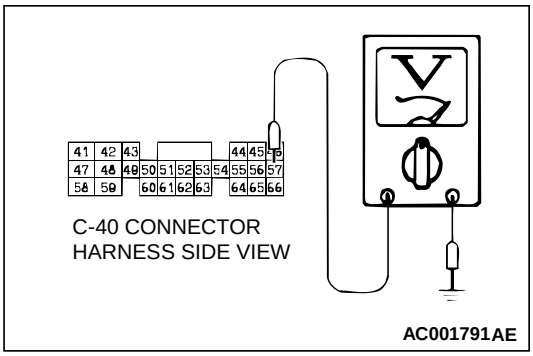
NO : Go to Step 2.

TSB Revision



STEP 2. Check the ground voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.

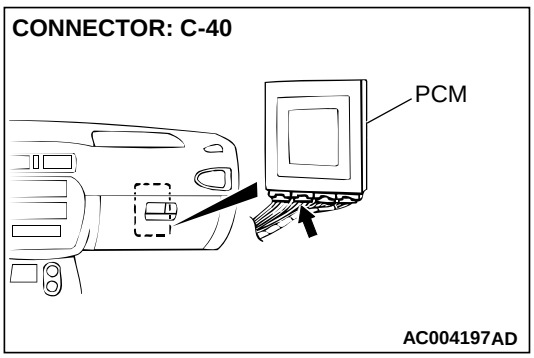


(3) Measure the voltage between terminal 57 and ground by backprobing.
- Voltage should be 0.5 volt or less.

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

Q: Is the voltage normal?

YES : Go to Step 5.
NO : Go to Step 3.



STEP 3. Check connector C-40 at PCM for damage.

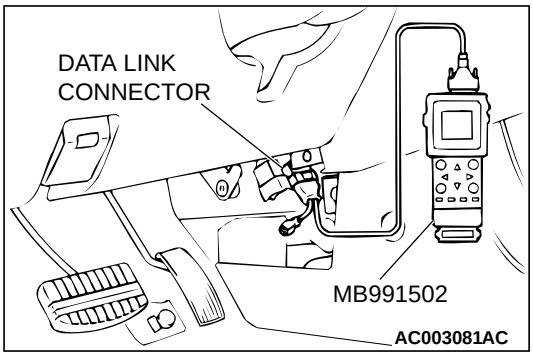
Q: Is the connector in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Using scan tool MB991502, check data list item 15: A/T Fluid Temperature Sensor.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to the data reading mode for item 15: A/T Fluid Temperature Sensor.
- At cool condition: Almost equal to the ambient temperature (atmospheric temperature)
- At warm condition: 70 to 80°C (158 to 176°F)

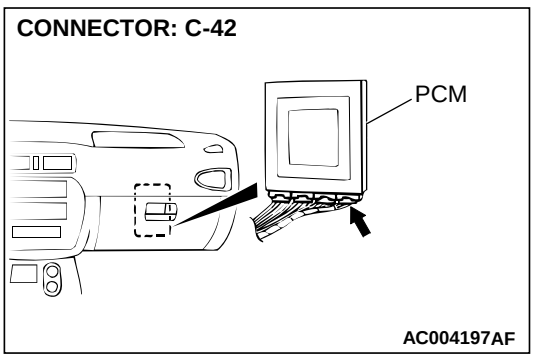
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

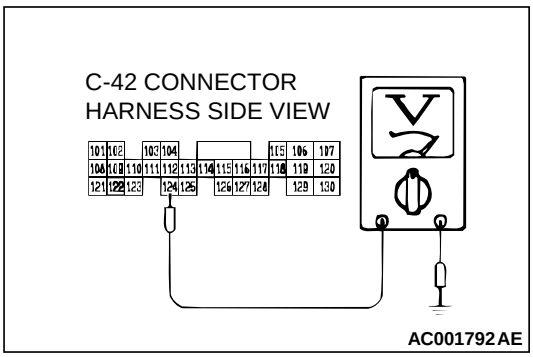
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

STEP 5. Check the sensor output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 124 and ground by backprobing.
- When A/T fluid temperature is 20°C (68°F), voltage should be between 3.8 and 4.0 volts.
- When A/T fluid temperature is 40°C (104°F), voltage should be between 3.2 and 3.4 volts.
- When A/T fluid temperature is 80°C (176°F), voltage should be between 1.7 and 1.9 volts.

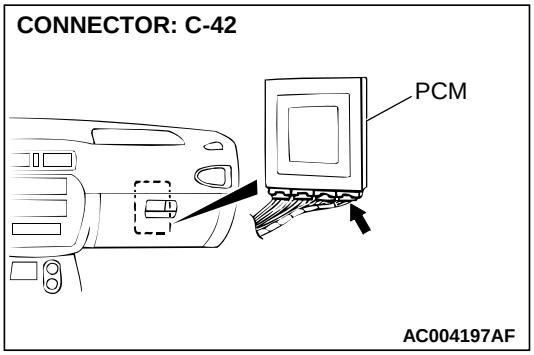
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 6.

NO : Go to Step 7.

TSB Revision

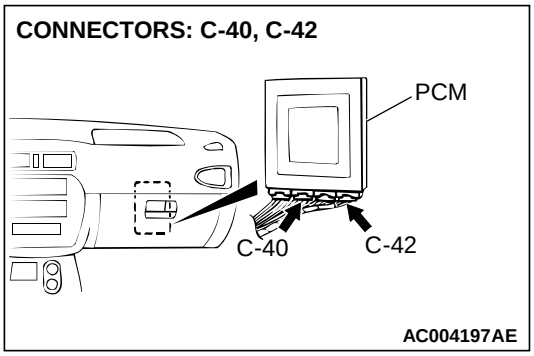


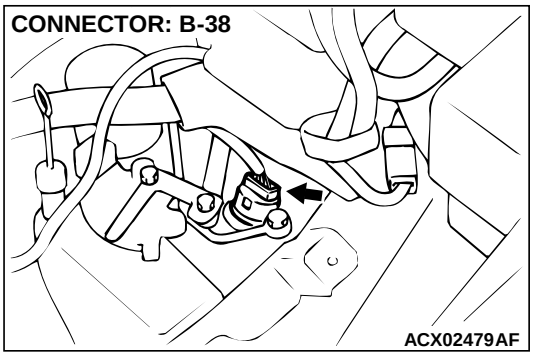
STEP 6. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





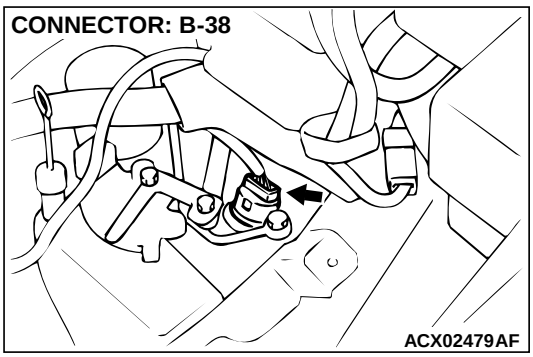
STEP 7. Check connectors C-40 and C-42 at PCM and B-38 at A/T control solenoid valve assembly for damage.

Q: Are the harness connectors in good condition?

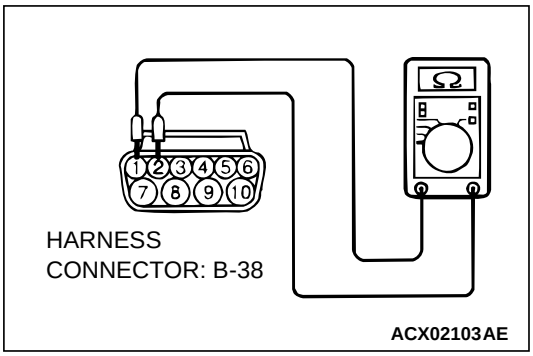
YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 8. Check the A/T fluid temperature sensor at A/T control solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the sensor side.

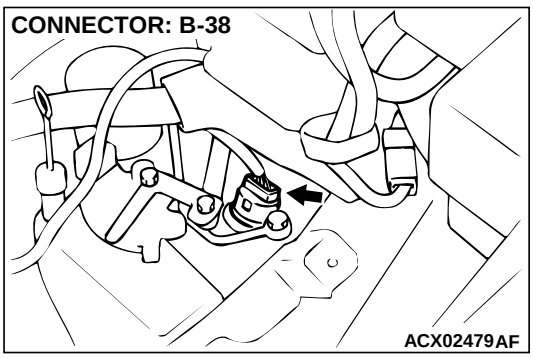


(2) Measure the resistance between terminal 1 and 2.
- When A/T fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 ohm.
- When A/T fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 ohm.
- When A/T fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 ohm.
- When A/T fluid temperature is 80°C (176°F), resistance should be between 1.9 and 2.2 ohm.
- When A/T fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 ohm.

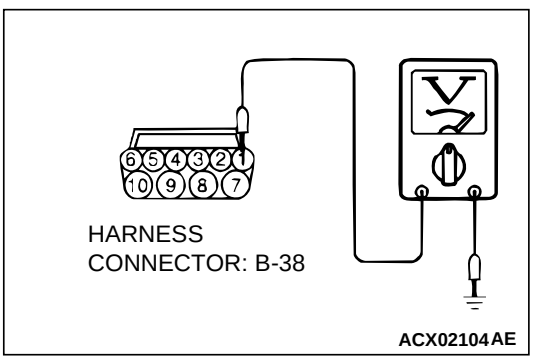
Q: Is the resistance normal?

YES : Go to Step 9.
NO : Replace the A/T fluid temperature sensor. Refer to GROUP 23B, Transaxle P.23B-10.

STEP 9. Check the power supply voltage at A/T control solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 1 and ground.
- Voltage should be between 4.5 and 4.9 volts.

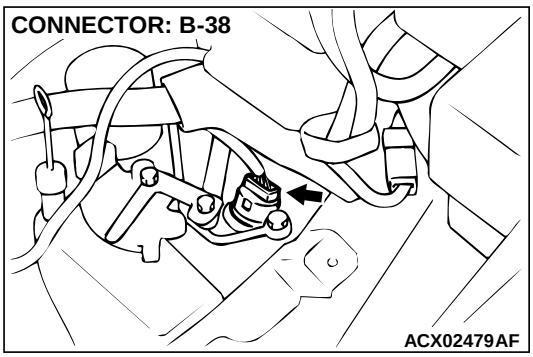
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

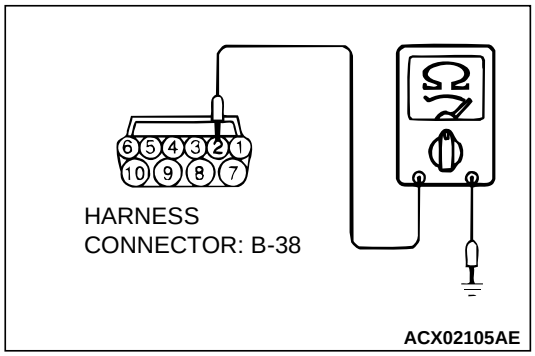
YES : Go to Step 10.
NO : Repair it because of harness open circuit between A/T control solenoid valve assembly connector B-38 terminal 1 and PCM connector C-42 terminal 124.

TSB Revision

STEP 10. Check the continuity at A/T control solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.



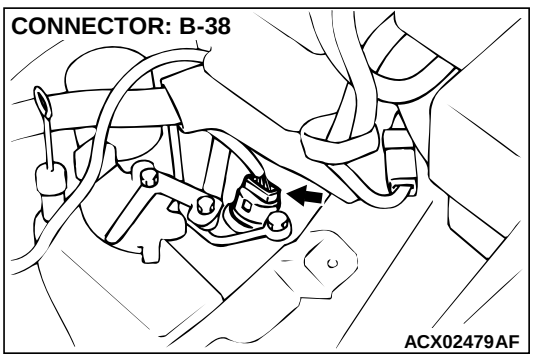
(2) Check for the continuity between terminal 2 and ground.
- Should be less than 2 ohm.

Q: Is the continuity normal?

YES : Go to Step 11.

NO : Repair it because of harness open circuit or damage between A/T control solenoid valve assembly connector B-38 terminal 2 and PCM connector C-40 terminal 57.

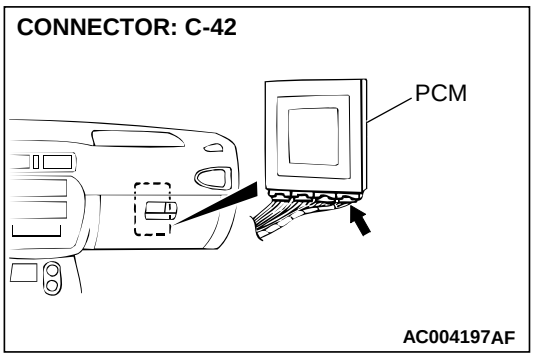
STEP 11. Check harness for damage between A/T control solenoid valve assembly connector B-38 terminal 1 and PCM connector C-42 terminal 124.



Q: Is the harness wire in good condition?

YES : Repair it because of harness damage between A/T control solenoid valve assembly connector B-38 terminal 2 and PCM connector C-40 terminal 57.

NO : Repair it.



TSB Revision

DTC 16: A/T Fluid Tenperature Sensor System (Short Circuit)

A/T Fluid Temperature Sensor System Circuit
Refer to P.23A-66.

CIRCUIT OPERATION
Refer to P.23A-66.

DTC SET CONDITIONS
If the A/T fluid temperature sensor output detects the voltage which corresponds to 200°C (392°F) or more than one second, there is an short circuit in the A/T fluid temperature sensor and diagnostic trouble code number "16" is output.

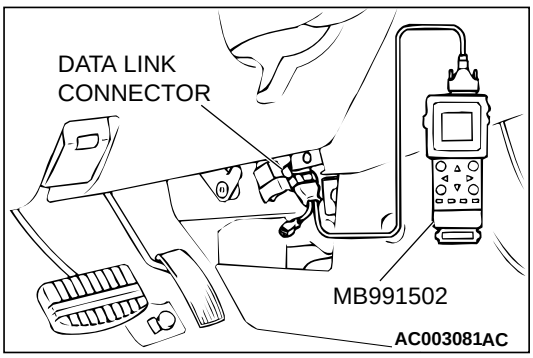
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of the A/T fluid temperature sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 15: A/T Fluid Temperature Sensor.

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



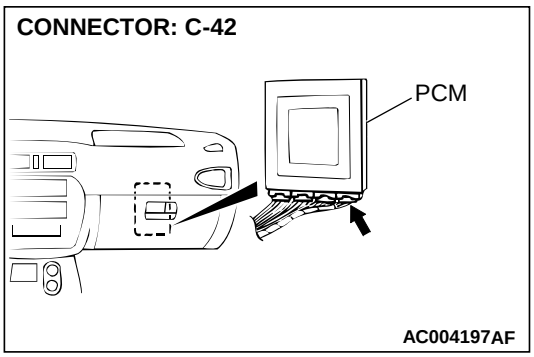
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15: A/T Fluid Temperature Sensor.
- At cool condition: Almost equal to the ambient temperature (atmospheric temperature)
- At warm condition: 70 to 80°C (158° to 176°F)

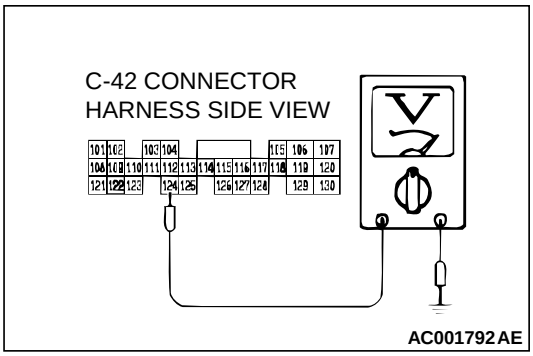
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 2.

STEP 2. Check the sensor output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 124 and ground by backprobing.
- When A/T fluid temperature is 20°C (68°F), voltage should be between 3.8 and 4.0 volts.
- When A/T fluid temperature is 40°C (104°F), voltage should be between 3.2 and 3.4 volts.
- When A/T fluid temperature is 80°C (176°F), voltage should be between 1.7 and 1.9 volts.

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

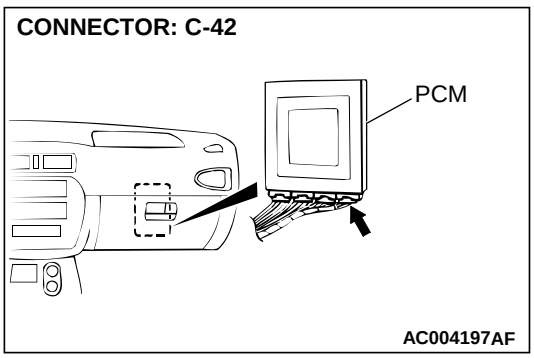
Q: Is the voltage normal?

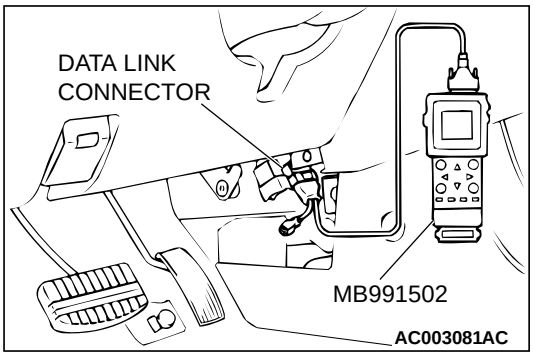
YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 4. Using scan tool MB991502, check data list item 15: A/T Fluid Temperature Sensor.

⚠ CAUTION

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

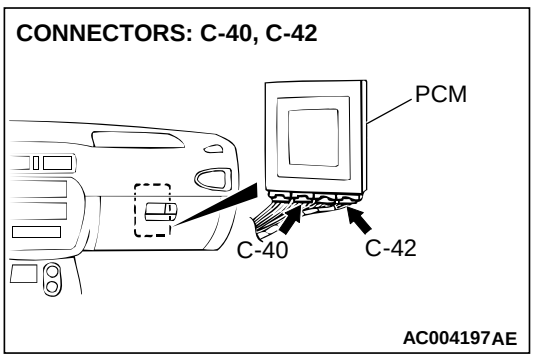
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15: A/T Fluid Temperature Sensor.
- At cool condition: Almost equal to the ambient temperature (atmospheric temperature)
- At warm condition: 70 to 80°C (158 to 176°F)

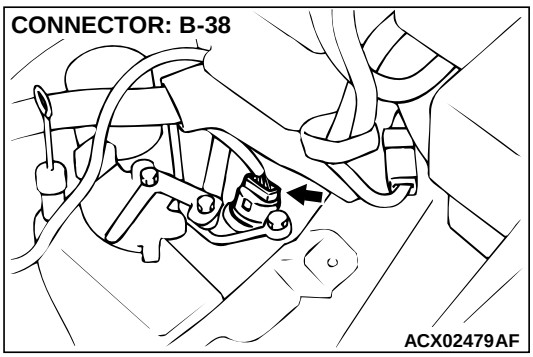
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.





STEP 5. Check connectors C-40, C-42 at PCM and B-38 at A/T control solenoid valve assembly for damage.

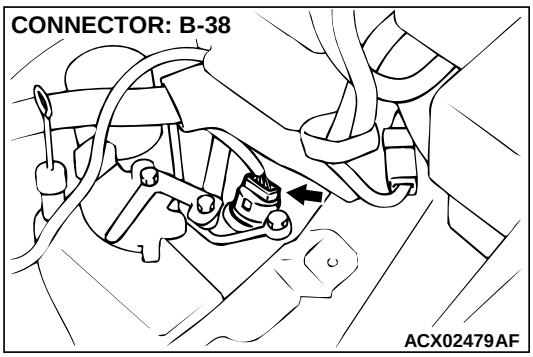
Q: Are the harness connectors in good condition?

YES : Go to Step 6.

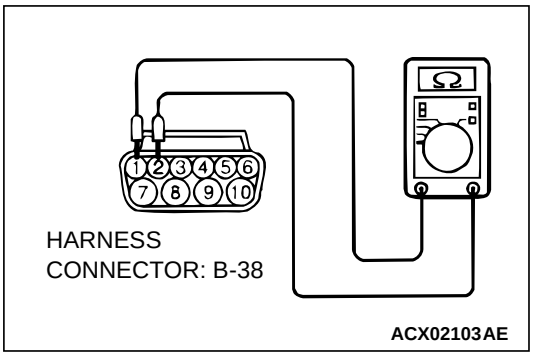
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 6. Check the A/T fluid temperature sensor at A/T control solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the sensor side.

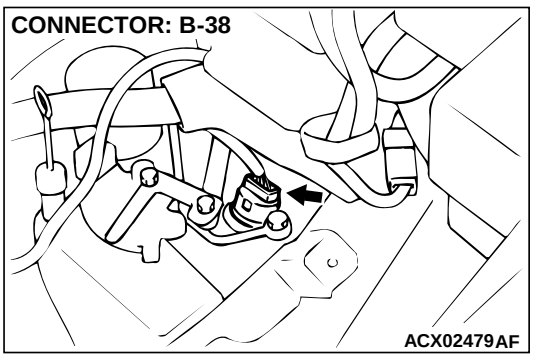


(2) Measure the resistance between terminal 1 and 2.
- When A/T fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 ohm.
- When A/T fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 ohm.
- When A/T fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 ohm.
- When A/T fluid temperature is 80°C (176°F), resistance should be between 1.9 and 2.2 ohm.
- When A/T fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 ohm.

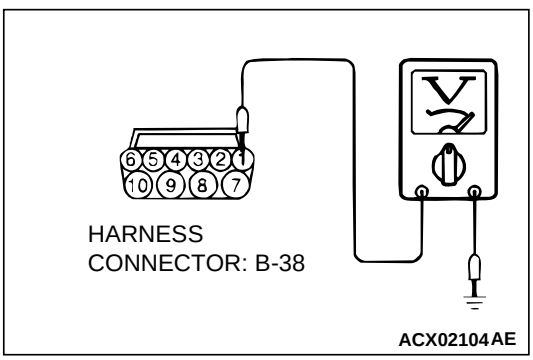
Q: Is the resistance normal?

YES : Go to Step 7.
NO : Replace the A/T fluid temperature sensor. Refer to GROUP 23B, Transaxle P.23B-10.

STEP 7. Check the power supply voltage at A/T control solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



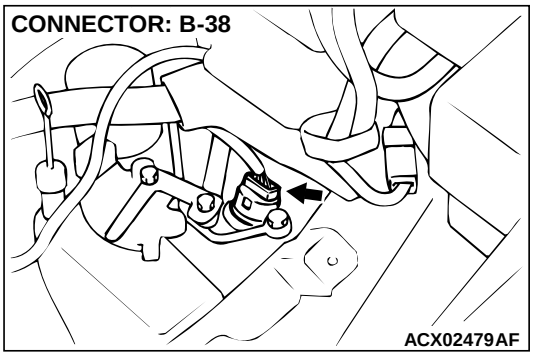
(3) Measure the voltage between terminal 1 and ground.
- Voltage should be between 4.5 and 4.9 volts.

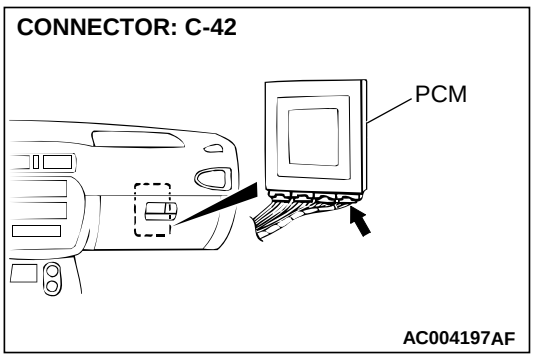
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 8.
NO : Repair it because of harness short circuit to ground between A/T control solenoid valve assembly connector B-38 terminal 1 and PCM connector C-42 terminal 124.

TSB Revision





STEP 8. Check harness for damage between A/T control solenoid valve assembly connector B-38 terminal 1 and PCM connector C-42 terminal 124.

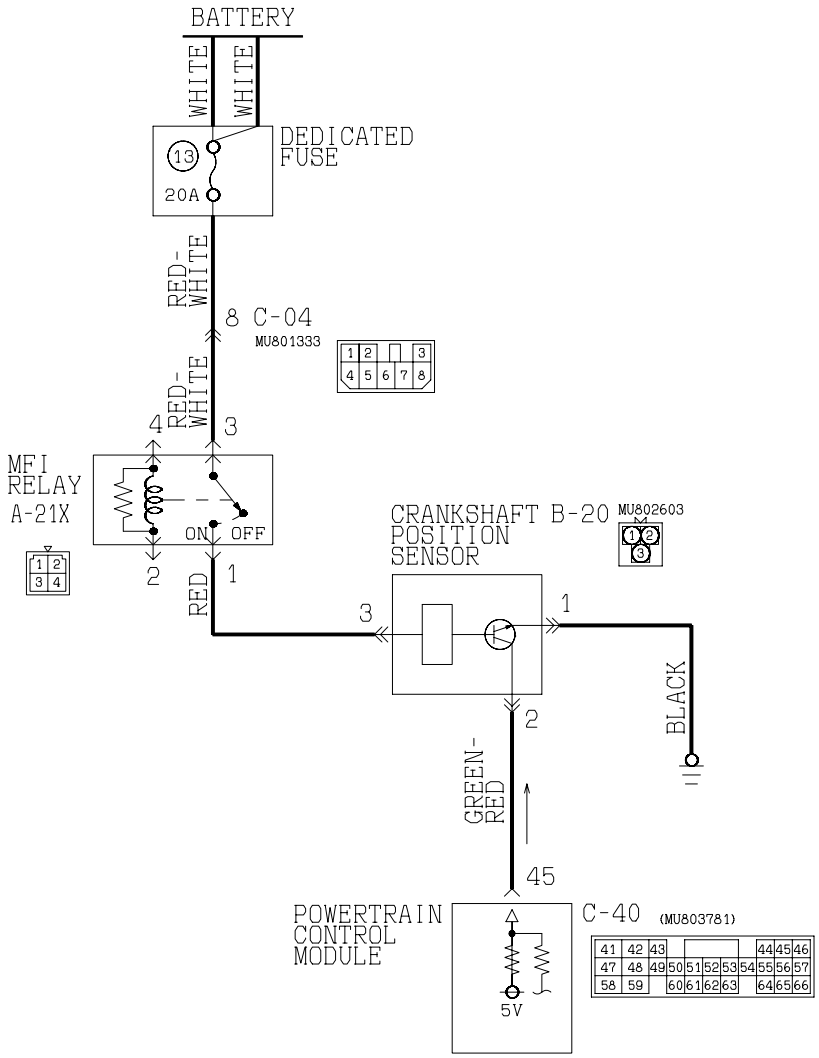
Q: Is the harness wire in good condition?

YES : Repair it because of harness damage between solenoid valve Assy connector B-38 terminal 2 and PCM connector C-42 terminal 57.

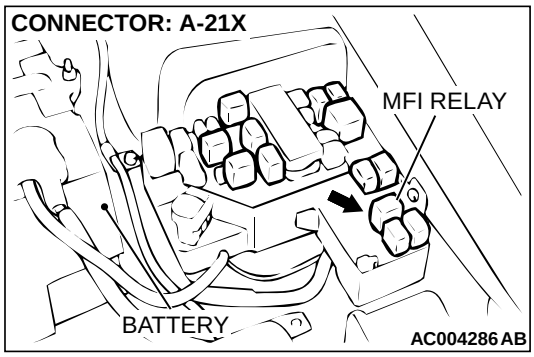
NO : Repair it.

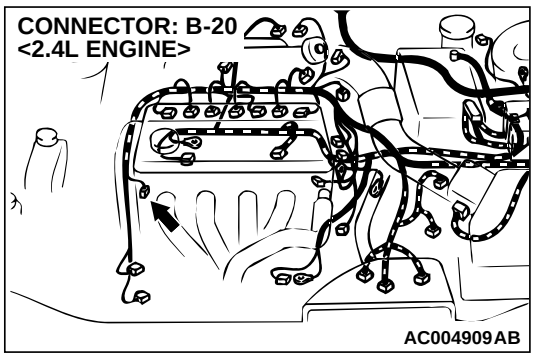
DTC 21: Crankshaft Position Sensor System

Crankshaft Position Sensor System Circuit

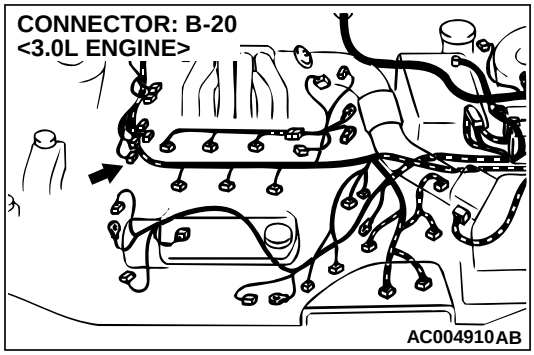


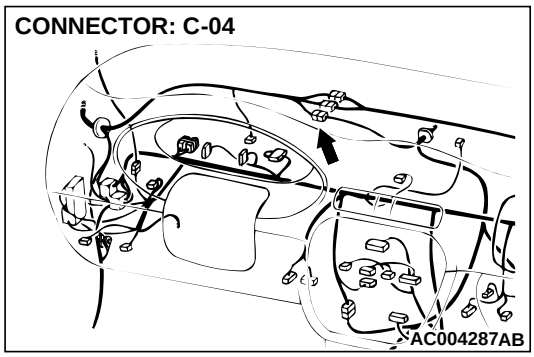
W1S15M02AA
AC004612AB

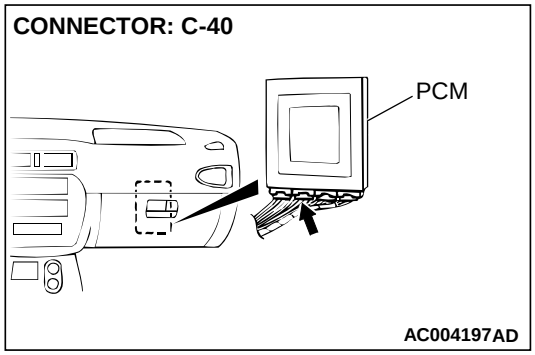




TSB Revision







CIRCUIT OPERATION

The crankshaft position sensor power is supplied from the MFI relay (terminal 3), and the ground (terminal 1) is provided on the vehicle body. The PCM supplies a five-volts voltage to crankshaft position sensor output terminal (terminal 2). The crankshaft position sensor generates a pulse signal when the output terminal is opened and grounded. The sensor is opened and closed as the flat on the crankshaft passes by.

DTC SET CONDITIONS

If no output pulse is detected from the crankshaft position sensor for five seconds or more while driving at 25 km/h (16 mph) or more, it is judged that there is an open circuit in the crankshaft position sensor and diagnostic trouble code number "21" is sent.

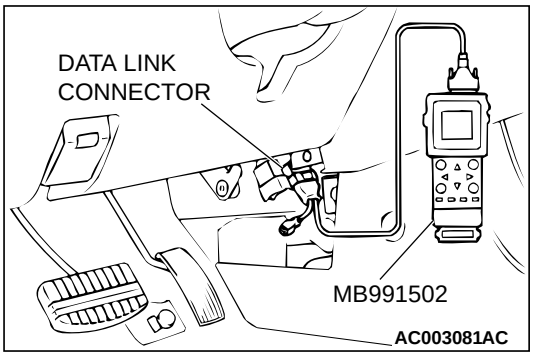
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the crankshaft position sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check data list item 21: Crankshaft Position Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) With the gear selector lever in the "P" position, start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item 21: Crankshaft Position Sensor.
- When the accelerator pedal is not depressed (throttle valve is fully closed) the display should be "600 to 900 r/min."
- With the accelerator pedal depressed, the engine speed should increase according to engine speed.

Q: Is the sensor operating properly?

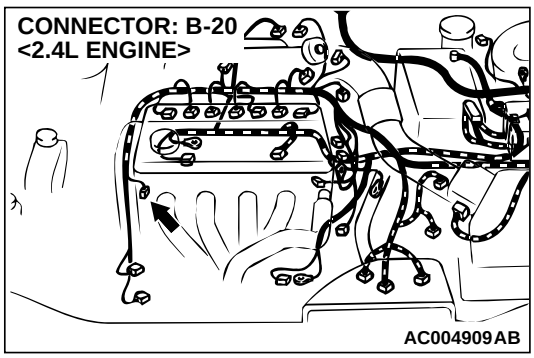
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

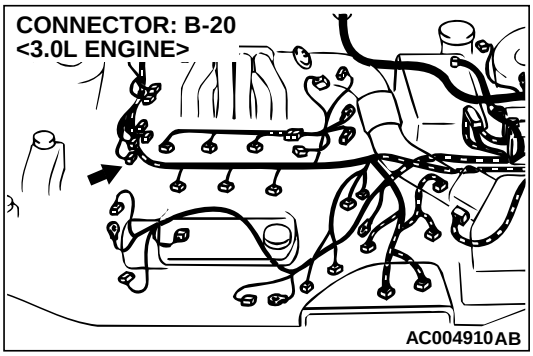
NO : Go to Step 2.

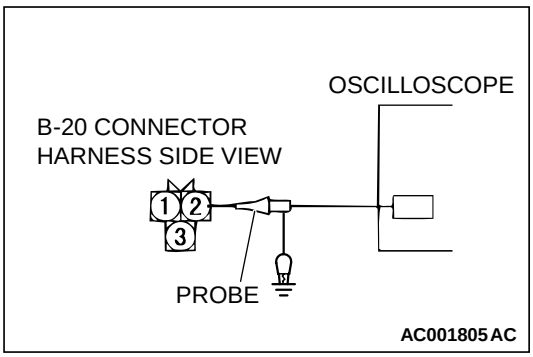
TSB Revision

STEP 2. Using the oscilloscope, check the waveform at crankshaft position sensor connector B-20.

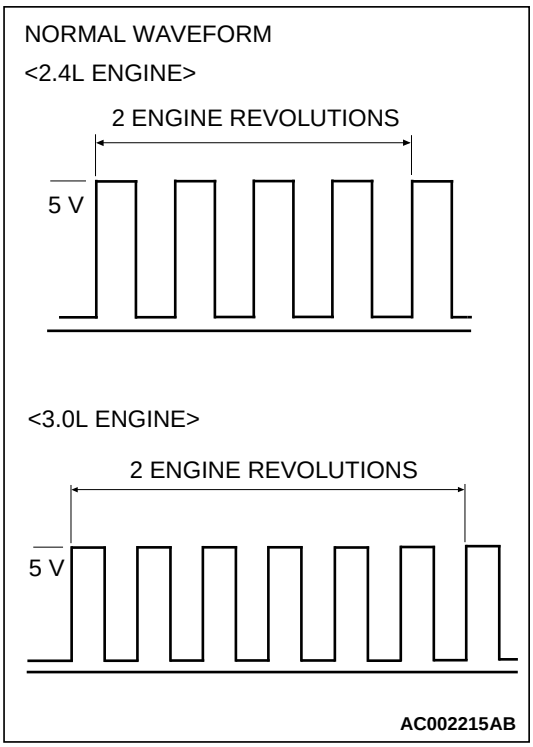
(1) Do not disconnect connector B-20.







(2) Connect an oscilloscope probe to crankshaft position sensor connector B-20 terminal 2 by backprobing.
(3) With the gear selector lever in the "P" position, start the engine and run at idle.



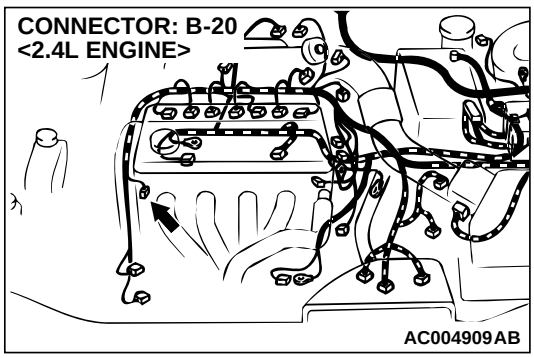
(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.6 volts and less.

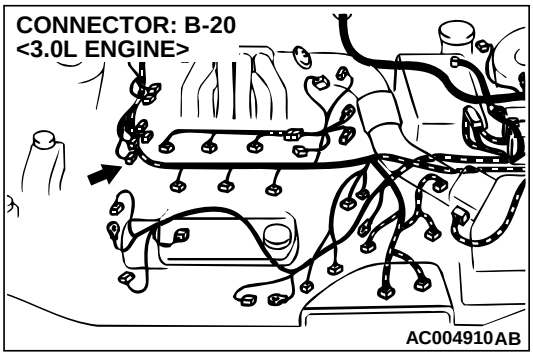
(5) Turn the ignition switch to "LOCK" (OFF) position.

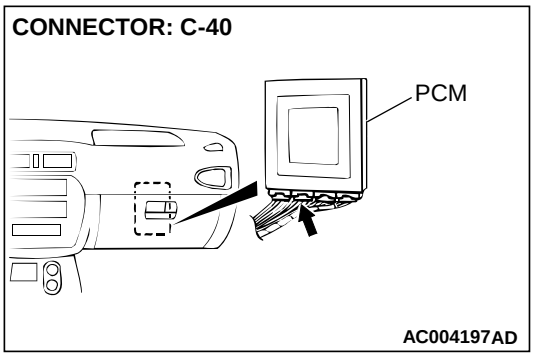
Q: Is the waveform normal?

YES : Go to Step 3.
NO : Go to Step 5.

TSB Revision





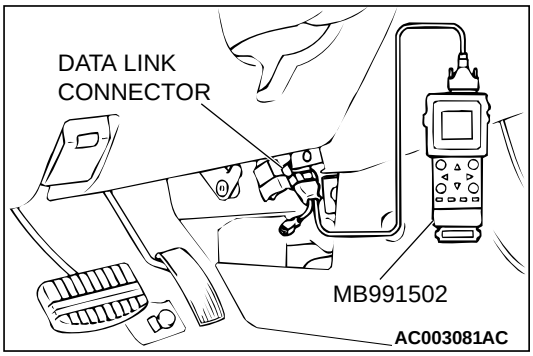


STEP 3. Check connectors B-20 at crankshaft position sensor and C-40 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Using scan tool MB991502, check data list item 21: Crankshaft Position Sensor.

⚠ CAUTION

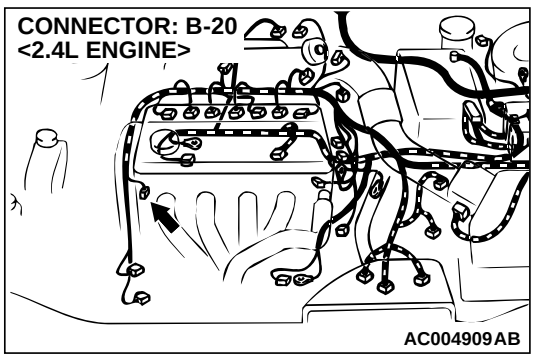
To prevent damage to scan tool MB991502, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

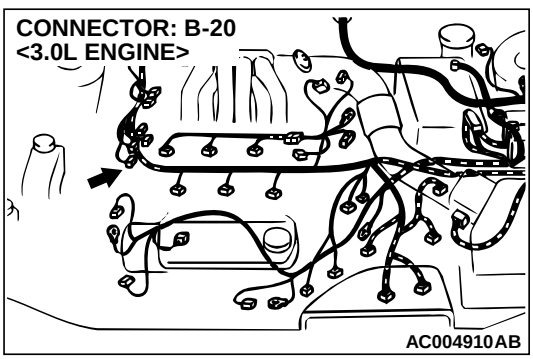
(1) Connect scan tool MB991502 to the data link connector.
(2) With the gear selector lever in the "P" position, start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item 21: Crankshaft Position Sensor.
- When the accelerator pedal is not depressed (throttle valve is fully closed) the display should be "600 to 900 r/min."
- With the accelerator pedal depressed, the engine speed should increase according to engine speed.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.





STEP 5. Check connector B-20 at crankshaft position sensor for damage.

Q: Is the connector in good condition?

YES : Go to Step 6.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

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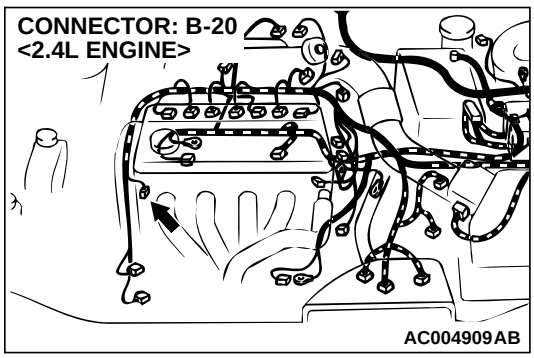
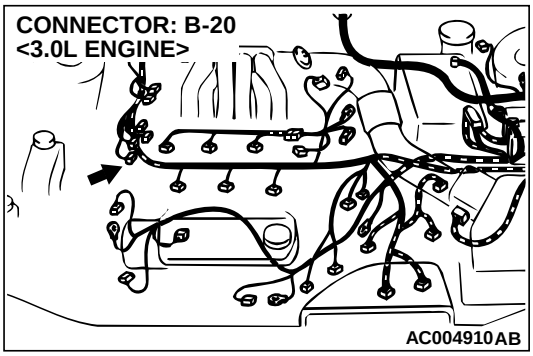
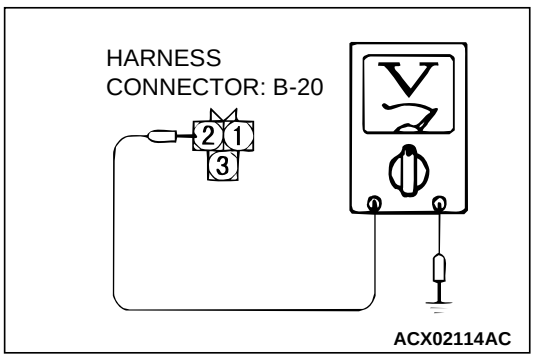
STEP 6. Check the sensor output voltage at crankshaft position sensor connector B-20.





(1) Disconnect connector B-20 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 2 and ground.
- Voltage should be between 4.8 and 5.2 volts.

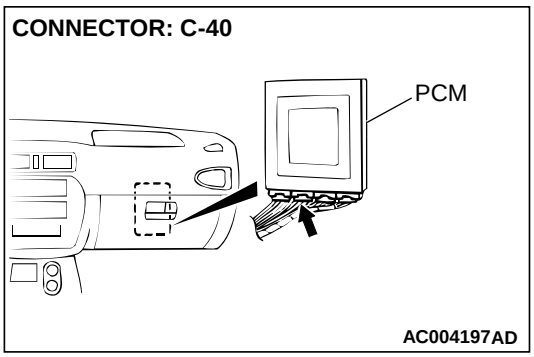
(4) Turn the ignition switch to "LOCK" (OFF) position.

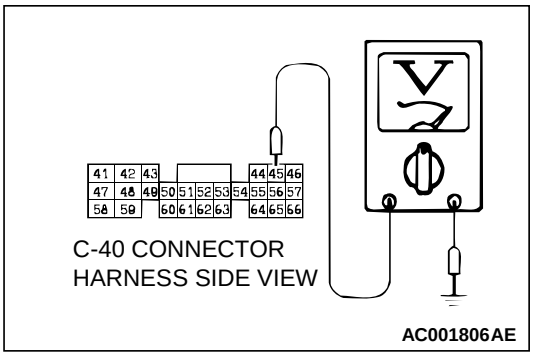
Q: Is the voltage normal?

YES : Go to Step 11.
NO : Go to Step 7.

STEP 7. Check the sensor output voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Disconnect connector B-20 at crankshaft position sensor.
(3) Turn the ignition switch to the "ON" position.





(4) Measure the voltage between terminal 45 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

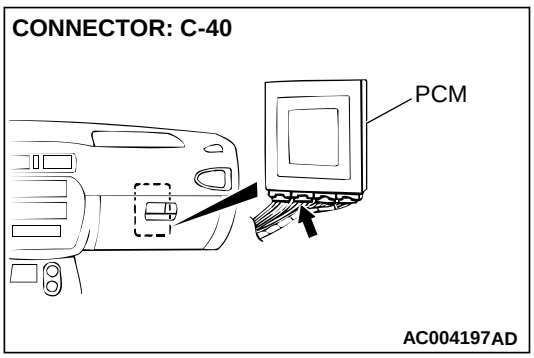
(5) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 8.
NO : Go to Step 9.

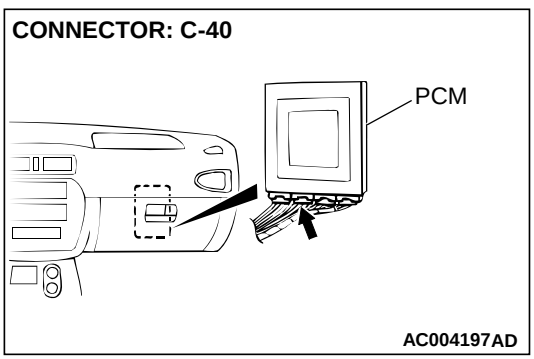
STEP 8. Check connector C-40 at PCM for damage.
Q: Is the connector in good condition?

YES : Repair it because of harness open circuit between crankshaft position sensor connector B-20 terminal 2 and PCM connector C-40 terminal 45.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

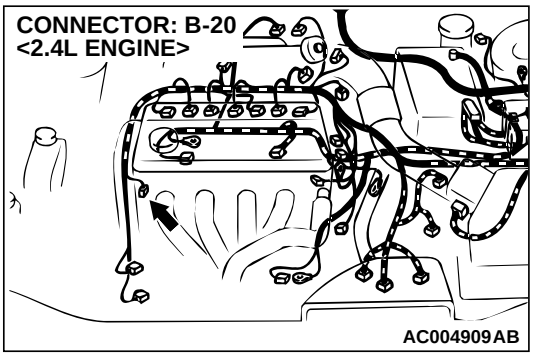


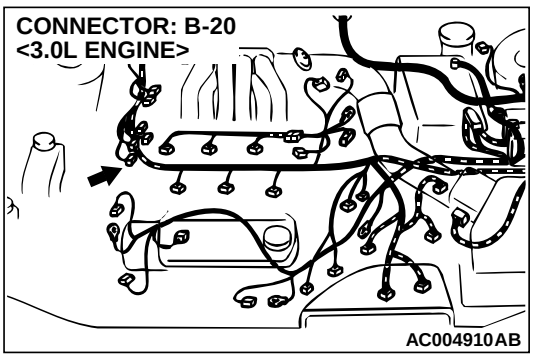
STEP 9. Check connector C-40 at PCM for damage.
Q: Is the connector in good condition?

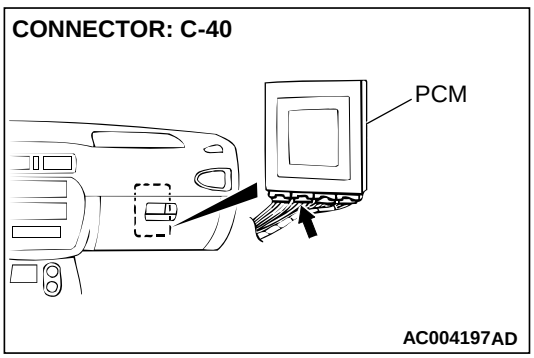
YES : Go to Step 10.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision





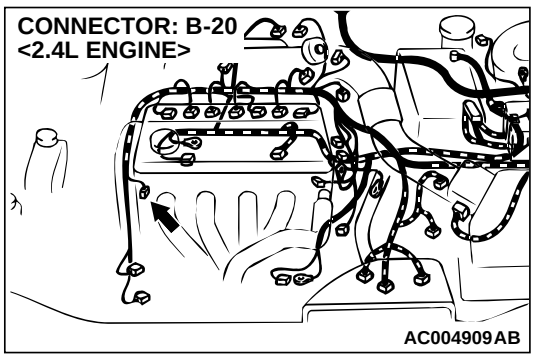


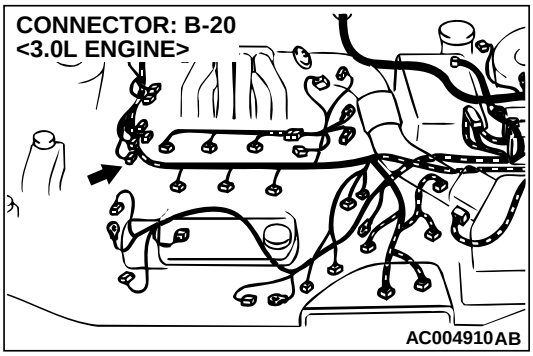
STEP 10. Check harness for short circuit to ground between crankshaft position sensor connector B-20 terminal 2 and PCM connector C-40 terminal 45.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

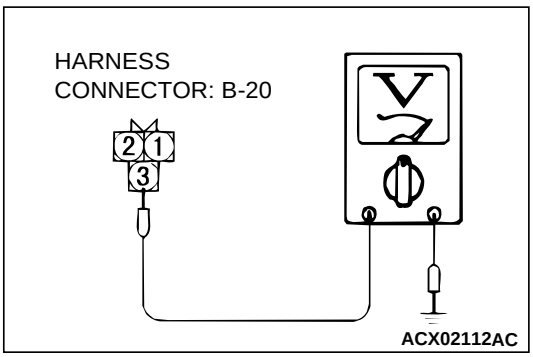
NO : Repair it.





STEP 11. Check the power supply voltage at crankshaft position sensor connector B-20.

(1) Disconnect connector B-20 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.

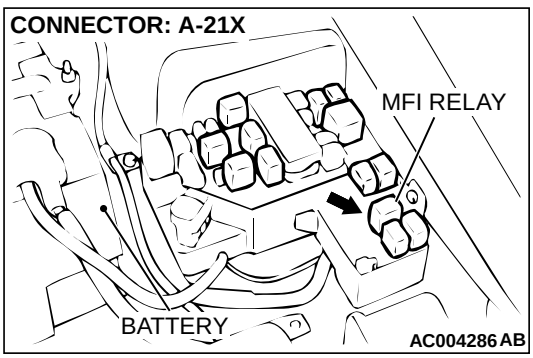


(3) Measure the voltage between terminal 3 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 13.
NO : Go to Step 12.



STEP 12. Check connector A-21X at MFI relay for damage.

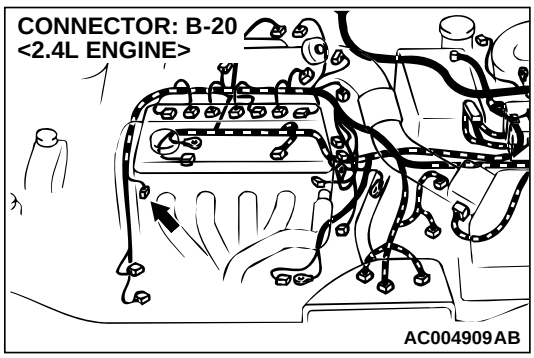
Q: Is the connector in good condition?

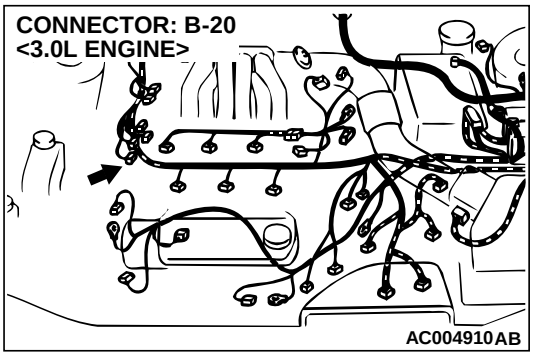
YES : Repair it because of harness open circuit or short circuit to ground between MFI relay connector A-21X terminal 1 and crankshaft position sensor connector B-20 terminal 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

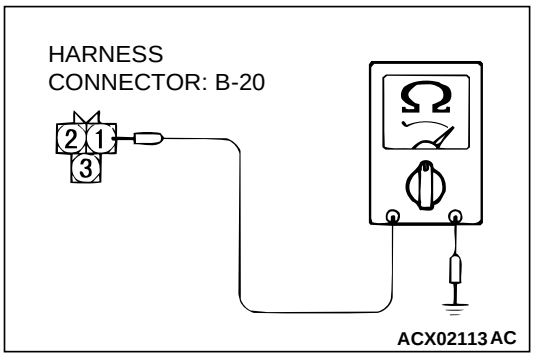
TSB Revision

STEP 13. Check the continuity at crankshaft position sensor connector B-20.

(1) Disconnect connector B-20 and measure at the harness side.





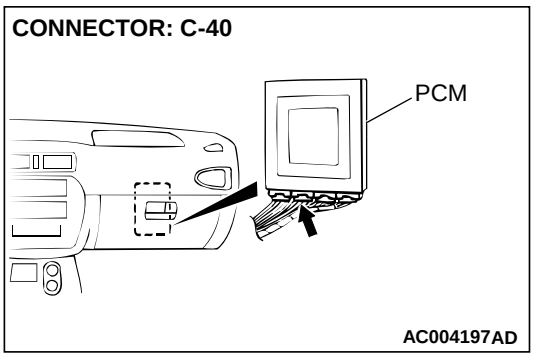


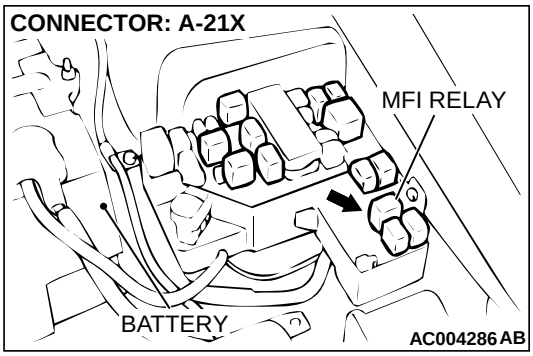
(2) Check for the continuity between terminal 1 and ground.
- Should be less than 2 ohm.

Q: Is the continuity normal?

YES : Go to Step 14.

NO : Repair it because of harness open circuit or damage between crankshaft position sensor connector B-20 terminal 1 and ground.





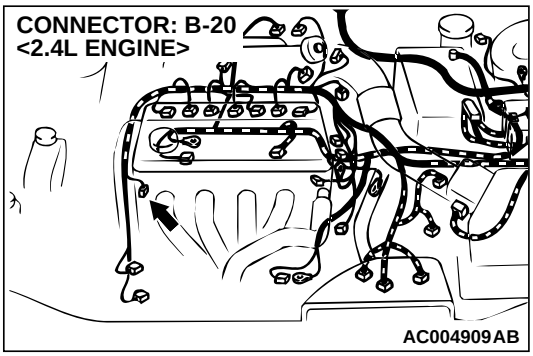
STEP 14. Check connectors C-40 at PCM and A-21X at the MFI relay for damage.

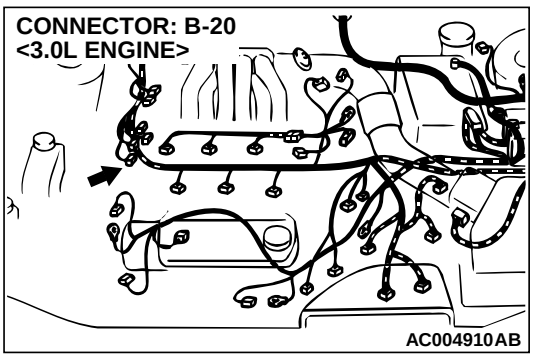
Q: Are the harness connectors in good condition?

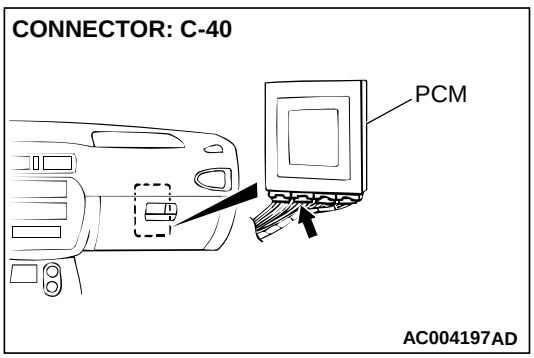
YES : Go to Step 15.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





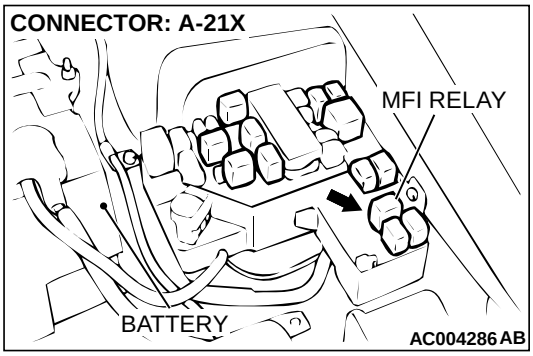


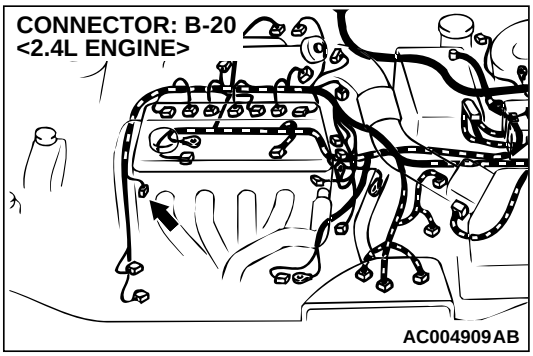
STEP 15. Check harness for damage between crankshaft position sensor connector B-20 terminal 2 and PCM connector C-40 terminal 45.

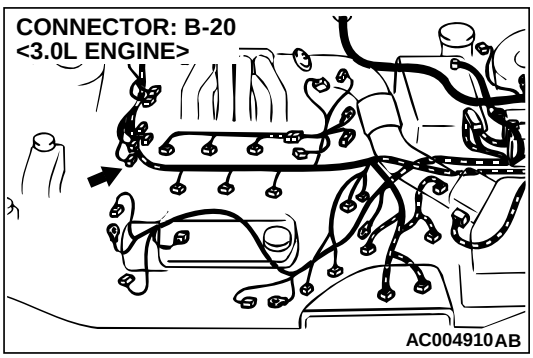
Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair it.





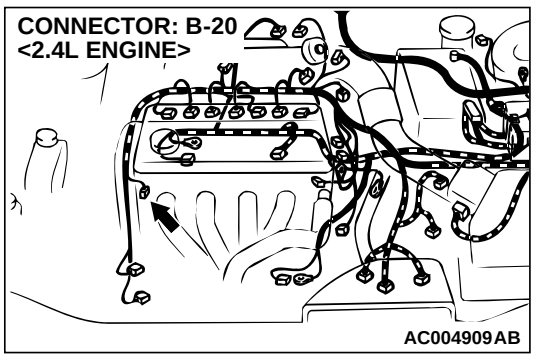


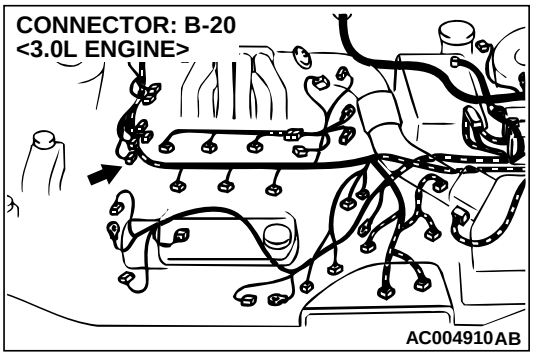
STEP 16. Check harness for damage between MFI relay connector A-21X terminal 1 and crankshaft position sensor connector B-20 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 17.

NO : Repair it.





STEP 17. Check harness for damage between crankshaft position sensor connector B-20 terminal 1 and ground.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair it.

STEP 18. Check the crankshaft position sensor vane.

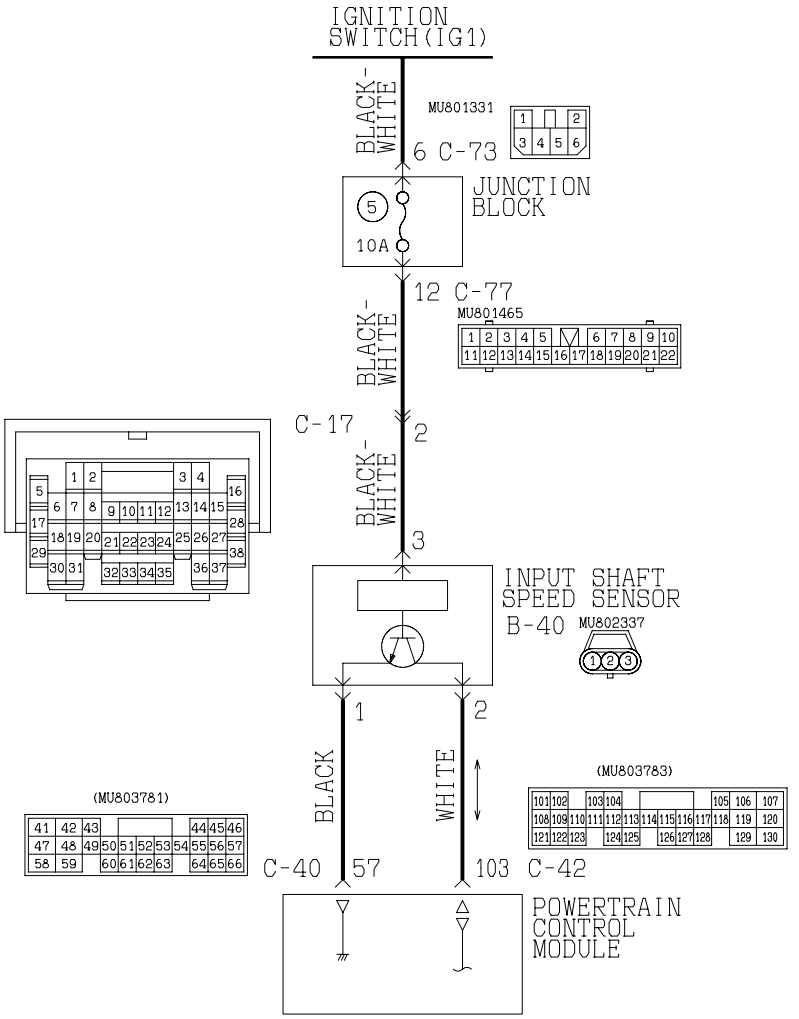
Q: Is the vane in good condition?

YES : Replace the crankshaft position sensor. Refer to GROUP 16, Ignition System – Crankshaft Position Sensor Removal and Installation <2.4L Engine> P.16-50 or <3.0L Engine> P.16-51.

NO : Repair it.

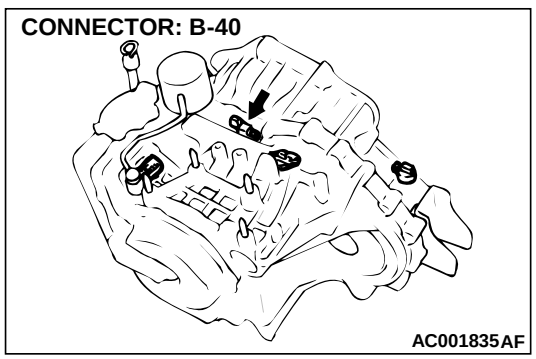
DTC 22: Input Shaft Speed Sensor System

Input Shaft Speed Sensor System Circuit



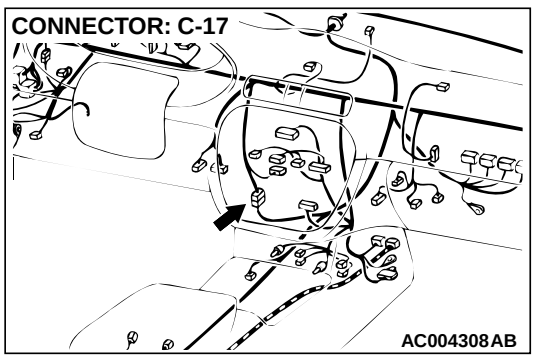
W1S15M03AA
AC004613AB

CONNECTOR: B-40



AC001835AF

CONNECTOR: C-17



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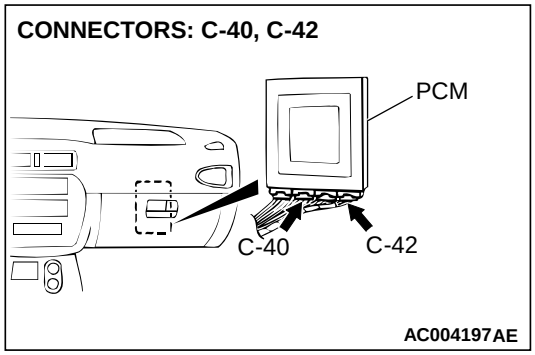
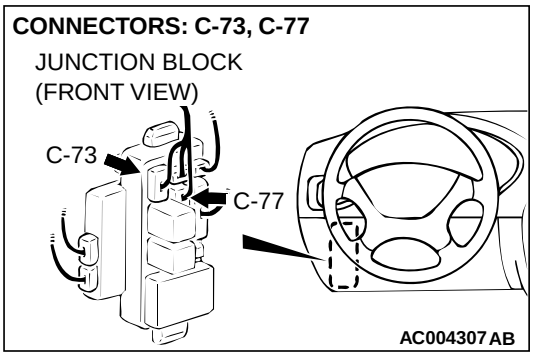
TSB Revision





CIRCUIT OPERATION

- A coil built into the input shaft speed sensor generates 0 ⇔ 5 volts pulse signal at both ends of this coil when the input shaft rotates. The pulse signal frequency increases with a rise in input shaft speed.
- Both ends of the coil are connected to the PCM (terminals 57 and 103) via the input shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the input shaft speed by the signal input to terminal 103.
- The input shaft speed sensor generates the pulse signal as the teeth of the underdrive clutch retainer pass the magnetic tip of the sensor.

DTC SET CONDITIONS

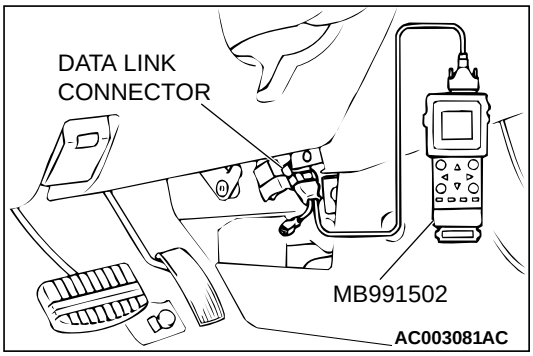
If no output pulse is detected from the input shaft speed sensor for one second or more while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, it is judged to be an open circuit or short circuit in the input shaft speed sensor and diagnostic trouble code number "22" is output four times, the transmission is locked into 3rd gear or 2nd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the input shaft speed sensor
- Malfunction of the underdrive clutch retainer
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check data list item 22: Input Shaft Speed Sensor.

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 22: Input Shaft Speed Sensor.
  - When driving at constant speed of 50km/h (31mph), the display should be "1,600 – 1,900 r/min." <2.4L Engine>, "1,300 – 1,600 r/min." <3.0L Engine> (Gear range: 3rd gear)

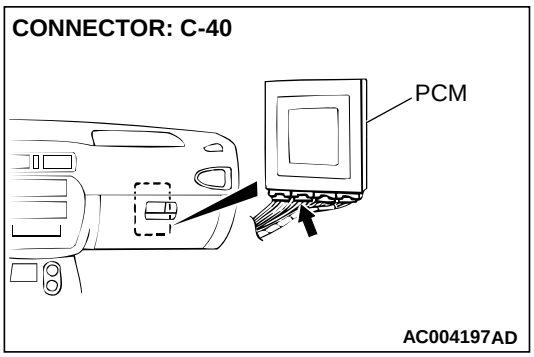
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

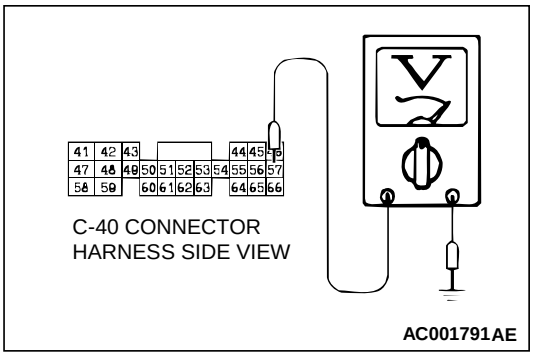
NO : Go to Step 2.

TSB Revision



STEP 2. Check the ground voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.

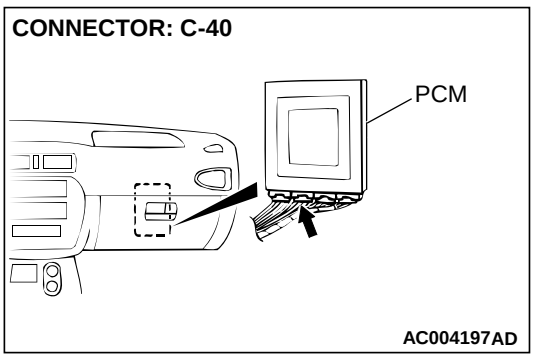


(3) Measure the voltage between terminal 57 and ground by backprobing.
- Voltage should be 0.5 volt or less.

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

Q: Is the voltage normal?

YES : Go to Step 5.
NO : Go to Step 3.



STEP 3. Check connector C-40 at PCM for damage.

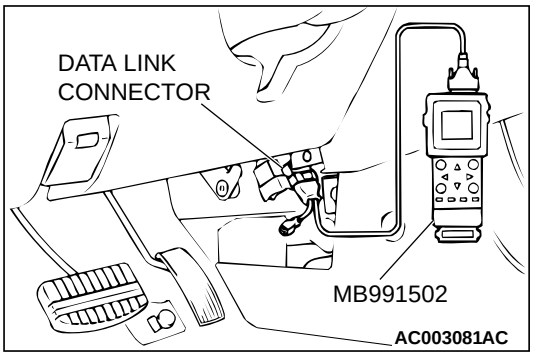
Q: Is the connector in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Using scan tool MB991502, check data list item 22: Input Shaft Speed Sensor.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 22: Input Shaft Speed Sensor.
- When driving at constant speed of 50km/h (31mph), the display should be "1,600 – 1,900 r/min." <2.4L Engine>, "1,300 – 1,600 r/min." <3.0L Engine> (Gear range: 3rd gear)

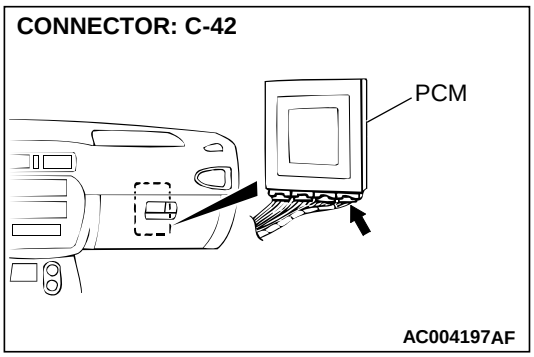
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

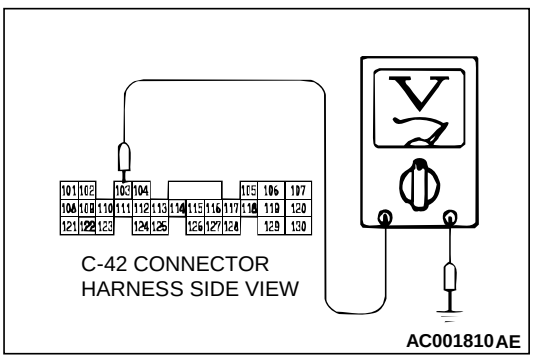
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

STEP 5. Check the sensor output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Disconnect connector C-16 at the input shaft speed sensor.
(3) Turn the ignition switch to "ON" position.



(4) Measure the voltage between terminal 103 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

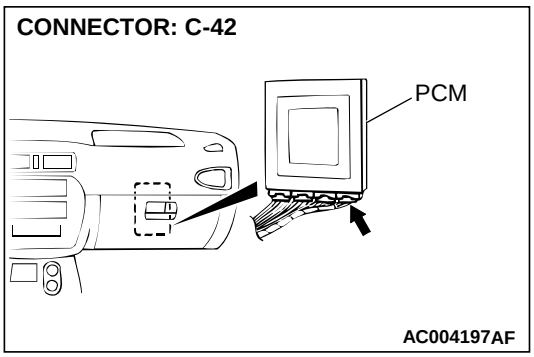
(5) Turn the ignition switch to "LOCK" (OFF) position.

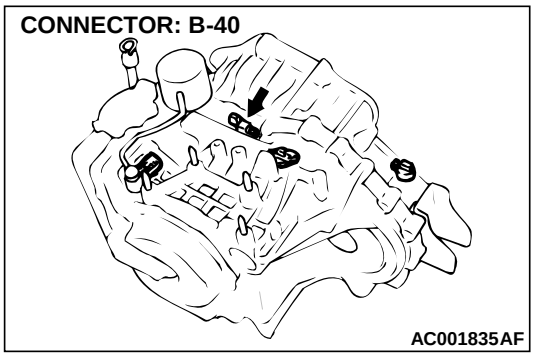
Q: Is the voltage normal?

YES : Go to Step 8.

NO : Go to Step 6.

TSB Revision



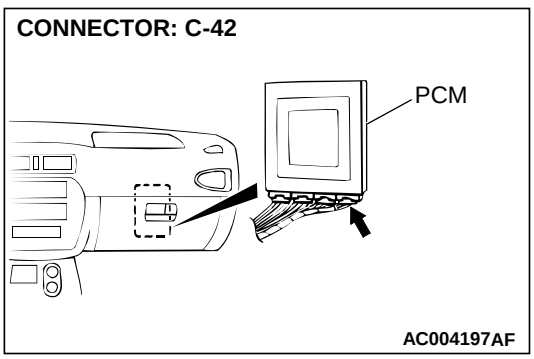


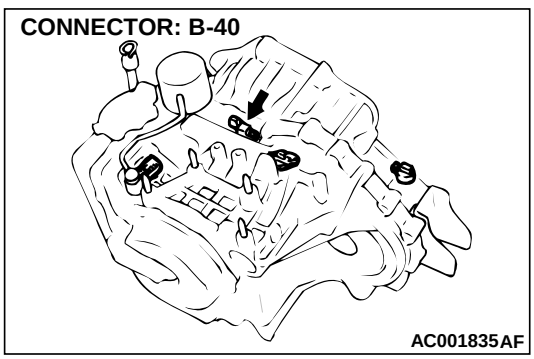
STEP 6. Check connectors C-42 at PCM and B-40 at input shaft speed sensor for damage.

Q: Are the connectors in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 7. Check harness for short circuit to ground between PCM connector C-42 terminal 103 and input shaft speed sensor connector B-40 terminal 2.

Q: Is the harness wire in good condition?

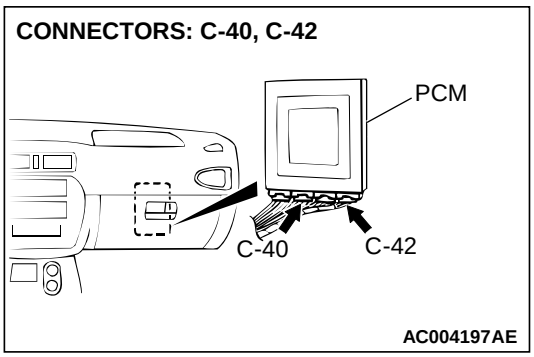
YES : Go to Step 4.

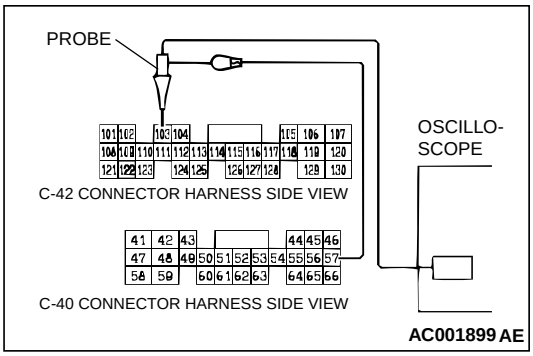
NO : Repair it.

TSB Revision

STEP 8. Using the oscilloscope, check the waveform at PCM connectors C-40 and C-42 by backprobing.

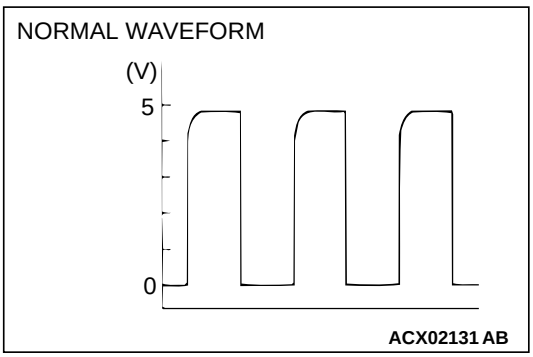
(1) Do not disconnect connectors C-40 and C-42.





(2) Connect an oscilloscope probe to PCM connector C-40 terminal 57 and to PCM connector C-42 terminal 103 by backprobing.

(3) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)



(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volts and less. The output waveform should not contain the noise.

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

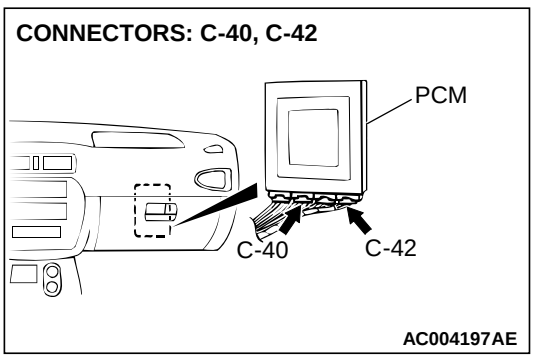
Q: Is the waveform normal?

YES : Go to Step 9.
NO : Go to Step 10.

STEP 9. Check connectors C-40 and C-42 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



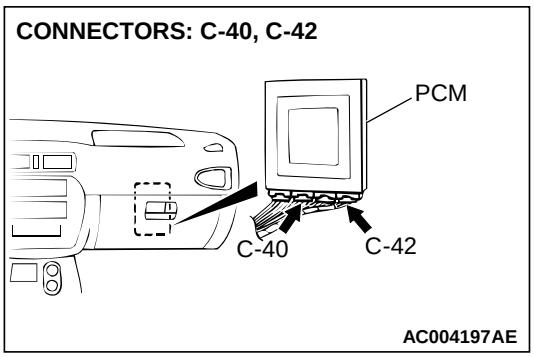
TSB Revision

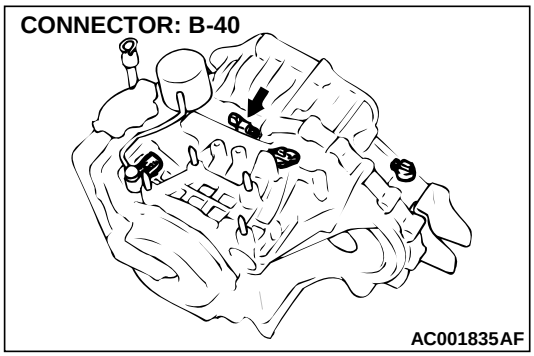
STEP 10. Check connectors C-40 and C-42 at PCM and B-40 at input shaft speed sensor for damage.

Q: Are the connectors in good condition?

YES : Go to Step 11.

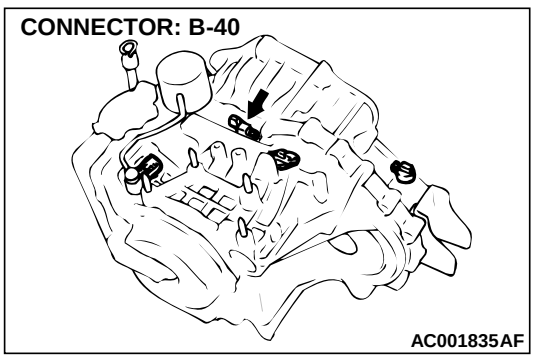
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





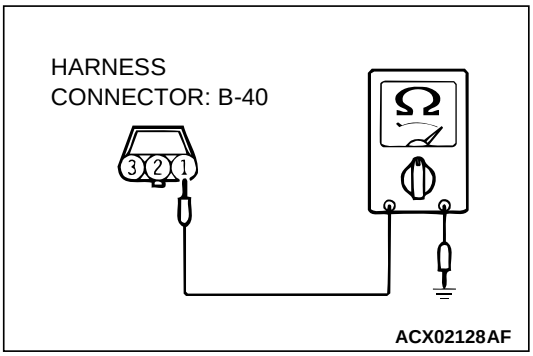
STEP 11. Check the continuity at input shaft speed sensor connector B-40.

(1) Disconnect connector B-40 and measure at the harness side.



(2) Check for the continuity between terminal 1 and ground.

- Should be less than 2 ohm.



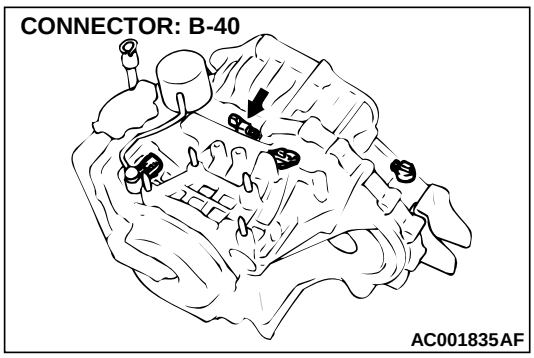
Q: Is the continuity normal?

YES : Go to Step 12.

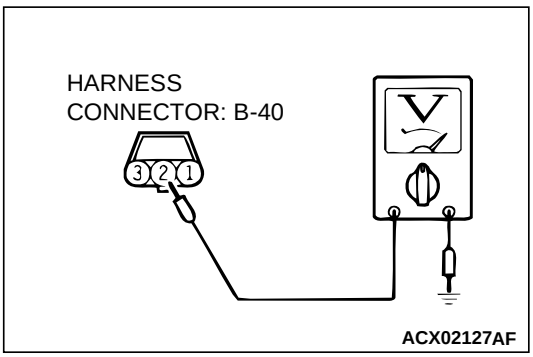
NO : Repair it because of harness open circuit or damage between input shaft speed sensor connector B-40 terminal 1 and PCM connector C-40 terminal 57.

TSB Revision

STEP 12. Check the sensor output voltage at input shaft speed sensor connector B-40.



(1) Disconnect connector B-40 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



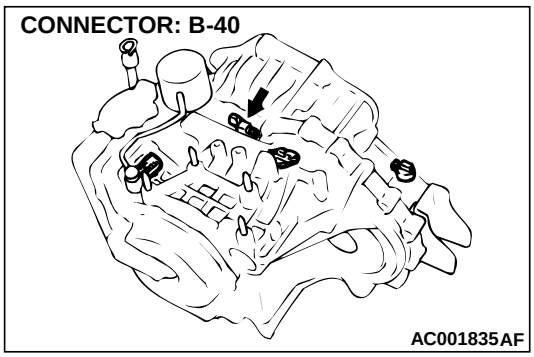
(3) Measure the voltage between terminal 2 and ground.
- Voltage should be between 4.8 and 5.2 volts.

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

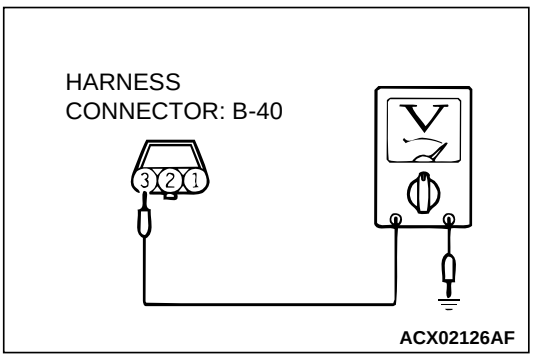
Q: Is the voltage normal?

YES : Go to Step 13.
NO : Repair it because of harness open circuit or damage between input shaft speed sensor connector B-40 terminal 2 and PCM connector C-42 terminal 103.

STEP 13. Check the power supply voltage at input shaft speed sensor connector B-40.



(1) Disconnect connector B-40 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



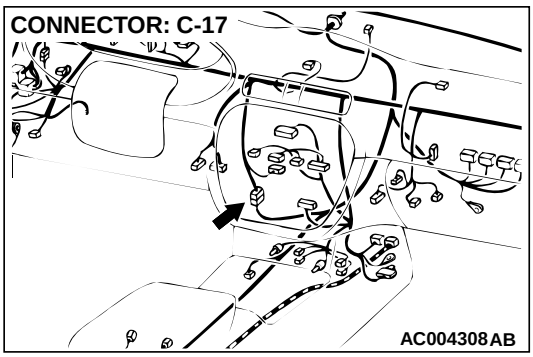
(3) Measure the voltage between terminal 3 and ground.
- Voltage should be battery positive voltage.

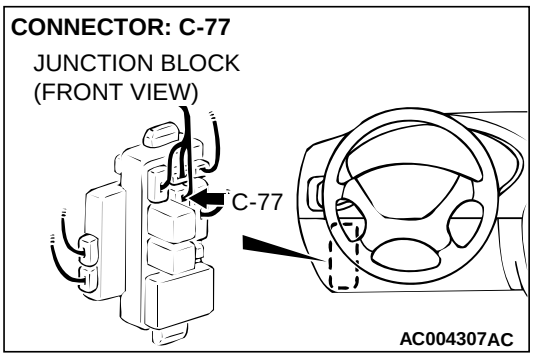
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 15.
NO : Go to Step 14.

TSB Revision



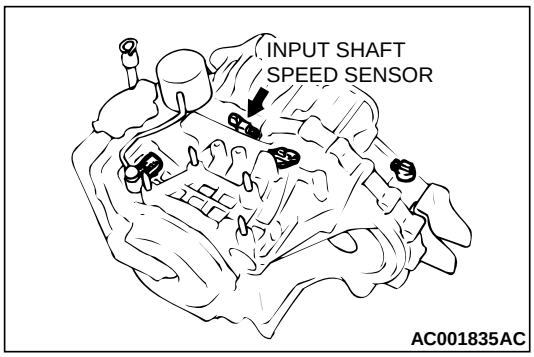


STEP 14. Check connectors C-17 at intermediate connector and C-77 at junction block for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between input shaft speed sensor connector B-40 terminal 3 and junction block connector C-77 terminal 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 15. Replace the input shaft speed sensor.

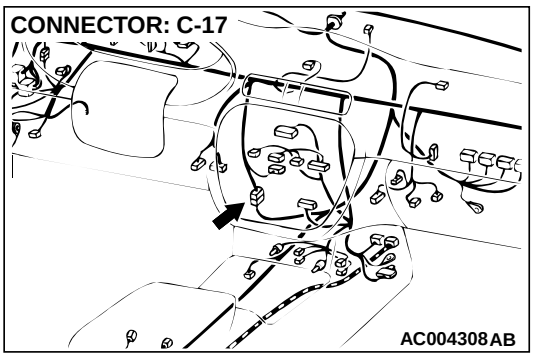
(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the diagnostic trouble code.

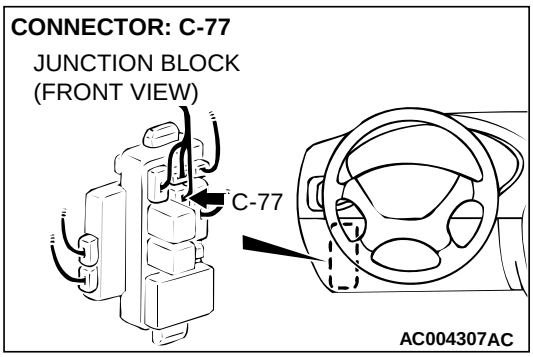
Q: Is the A/T diagnostic trouble code number "22" output?

YES : Go to Step 16.

NO : The inspection is complete.

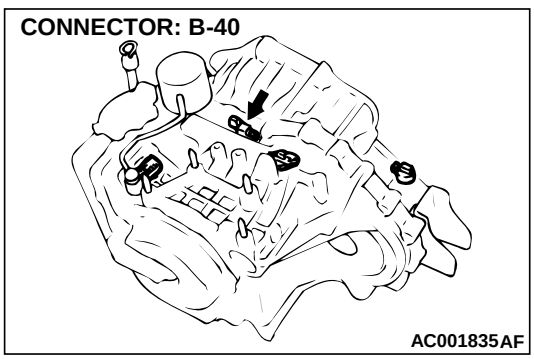
TSB Revision

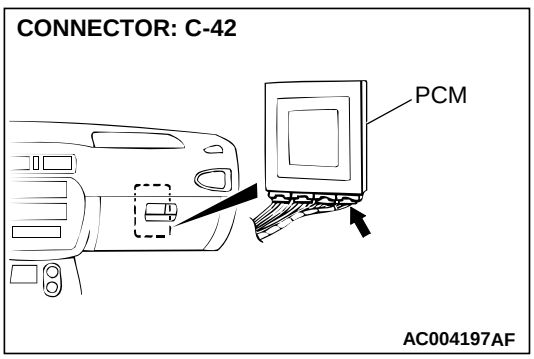




STEP 16. Check connectors C-17 at intermediate connector and C-77 at junction block for damage.
Q: Are the connectors in good condition?

YES : Go to Step 17.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 17. Check harness for damage between input shaft speed sensor harness side connector B-40 terminal 2 and PCM connector C-42 terminal 103.
Q: Is the harness wire in good condition?

YES : Go to Step 18.
NO : Repair it.

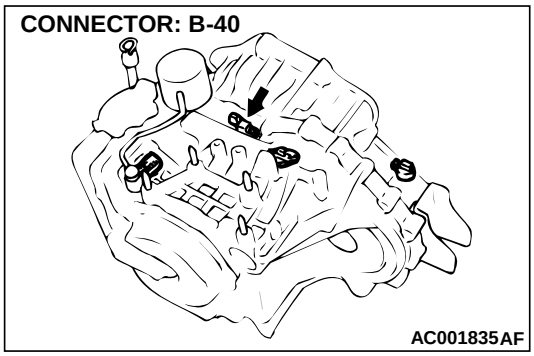
TSB Revision

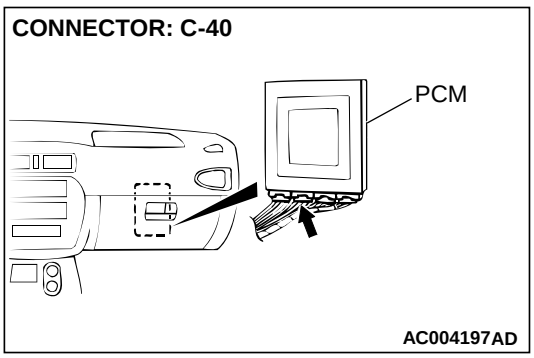
STEP 18. Check harness for damage between input shaft speed sensor harness side connector B-40 terminal 1 and PCM connector C-40 terminal 57.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair it.



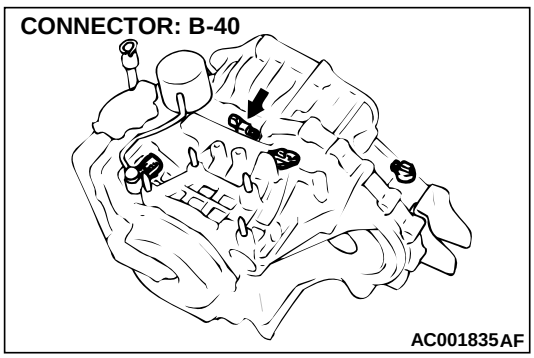


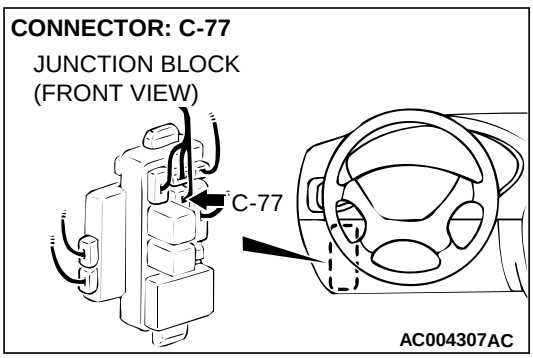
STEP 19. Check harness for damage between input shaft speed sensor harness side connector B-40 terminal 3 and junction block connector C-77 terminal 12.

Q: Is the harness wire in good condition?

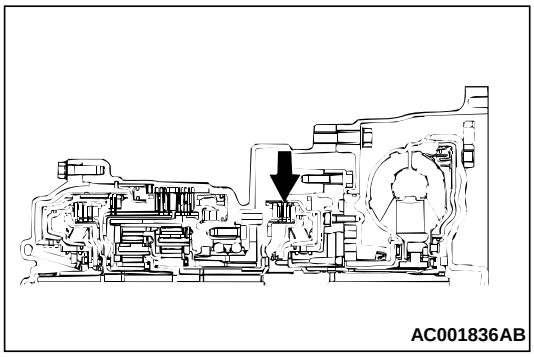
YES : Go to Step 20.

NO : Repair it.





TSB Revision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STEP 20. Replace the underdrive clutch retainer.

(1) Replace the underdrive clutch retainer. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-51.
(2) Carry out a test drive.
(3) Read in the diagnostic trouble code.

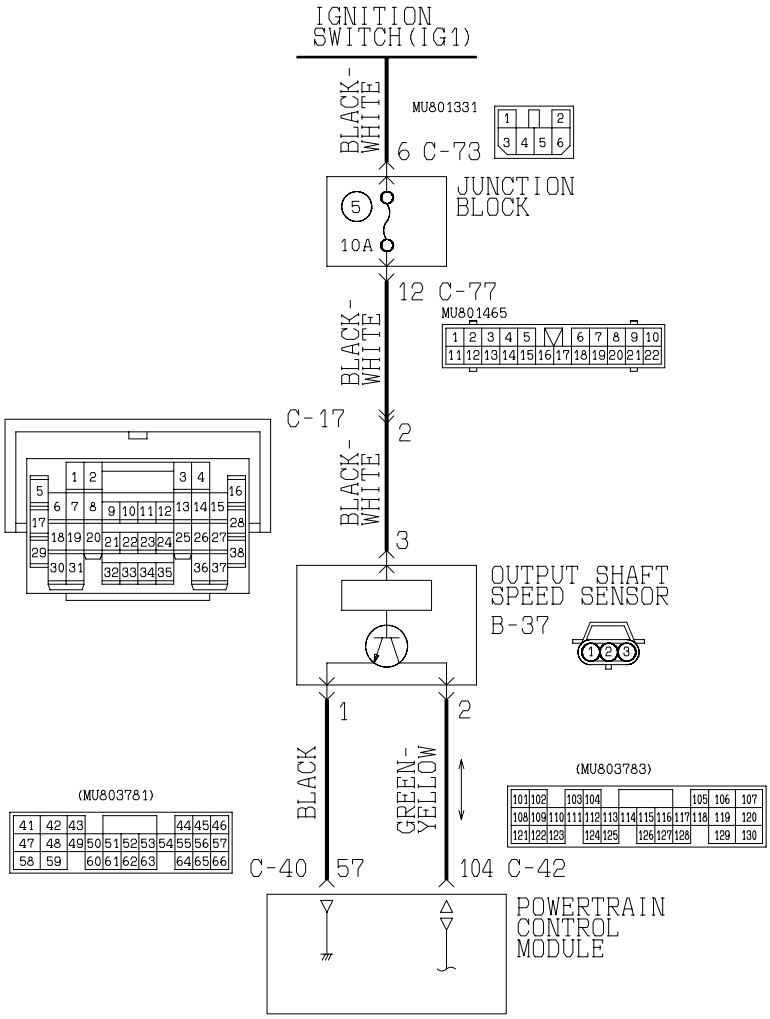
Q: Is the A/T diagnostic trouble code number "22" output?

YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.

NO : The inspection is complete.

DTC 23: Output Shaft Speed Sensor System

Output Shaft Speed Sensor System Circuit



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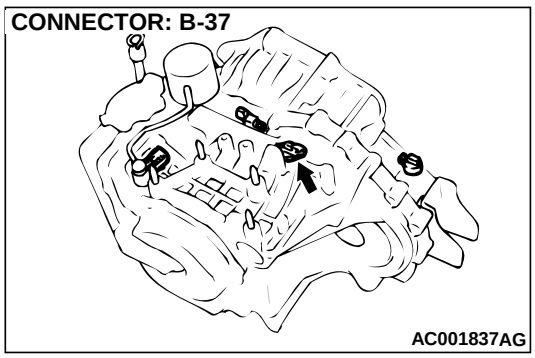
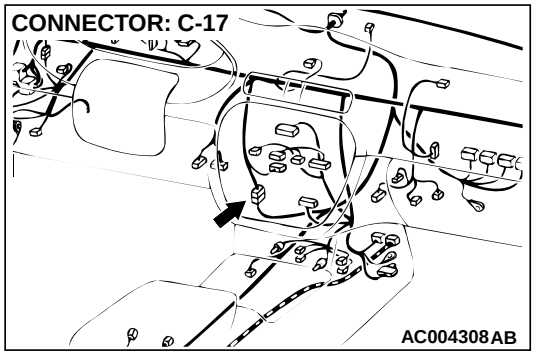
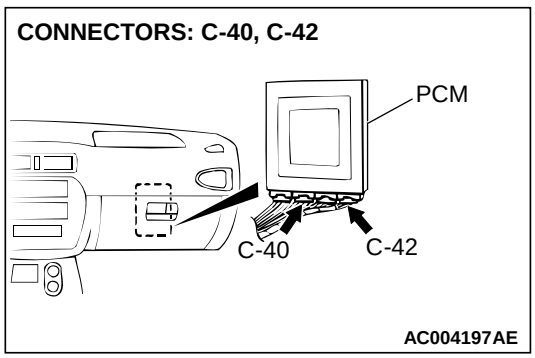
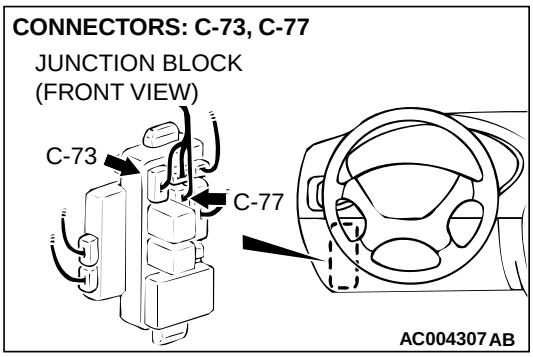
TSB Revision









CIRCUIT OPERATION

- A coil built into the output shaft speed sensor generates 0 ⇔ 5 volts pulse signal at both ends of this coil when the output shaft rotates. The pulse signal frequency increases with a rise in output shaft speed.
- Both ends of the coil are connected to the PCM (terminals 57 and 104) via the output shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the output shaft speed by the signal input to terminal 104.
- The output shaft speed sensor generates the pulse signal as the teeth of the transfer drive gear pass the magnetic tip of the sensor.

DTC SET CONDITIONS

If the output from the output shaft speed sensor is continuously 50 percent lower than the vehicle speed for one second or more while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, it is judged to be an open circuit or short-circuit in the output shaft speed sensor and diagnostic trouble code number "23" is output. If diagnostic trouble code number "23" is output four times, the transmission is locked into 3rd gear or 2nd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the output shaft speed sensor
- Malfunction of the transfer drive gear or driven gear
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

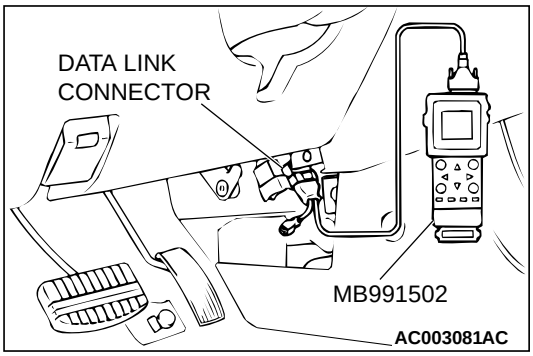
Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision

STEP 1. Using scan tool MB991502, check data list item 23: Output Shaft Speed Sensor.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 23: Output Shaft Speed Sensor.
- When driving at constant speed of 50km/h (31mph), the display should be "1,600 – 1,900 r/min." <2.4L Engine>, "1,300 – 1,600 r/min." <3.0L Engine> (Gear range: 3rd gear)

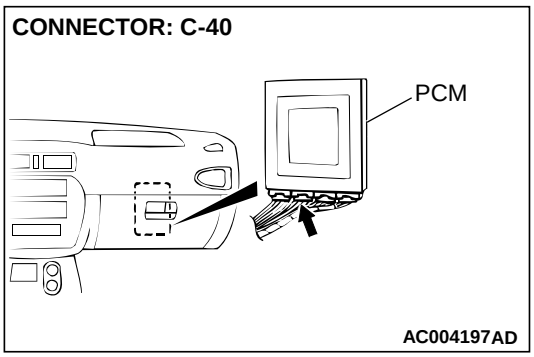
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the sensor operating properly?

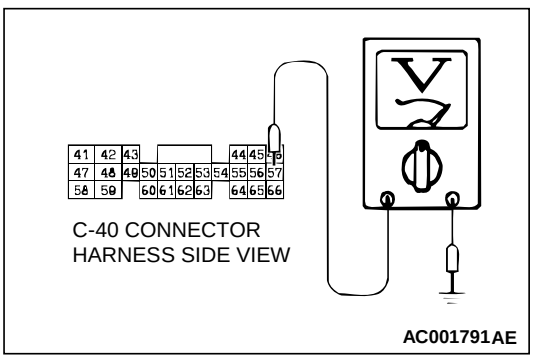
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 2.

STEP 2. Check the ground voltage at PCM connector C-40 by backprobing.



(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 57 and ground by backprobing.
- Voltage should be 0.5 volt or less.

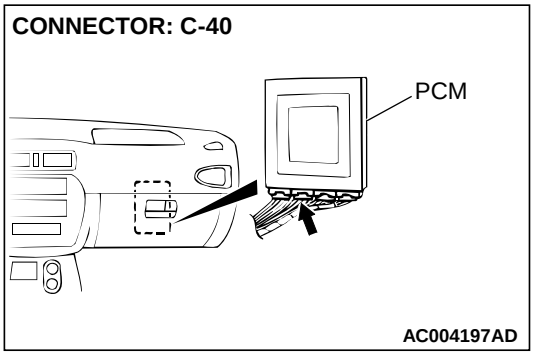
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 5.

NO : Go to Step 3.

TSB Revision

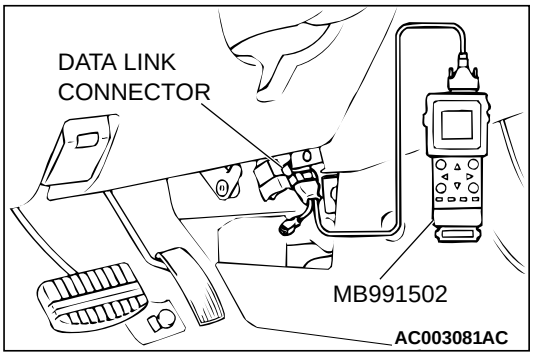


STEP 3. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Using scan tool MB991502, check data list item 23: Output Shaft Speed Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.

(2) Start the engine.

(3) Set scan tool MB991502 to the data reading mode for item 23, Output Shaft Speed Sensor.

- When driving at constant speed of 50km/h (31mph), the display should be "1,600 – 1,900 r/min." <2.4L Engine>, "1,300 – 1,600 r/min." <3.0L Engine> (Gear range: 3rd gear)

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

Q: Is the sensor operating properly?

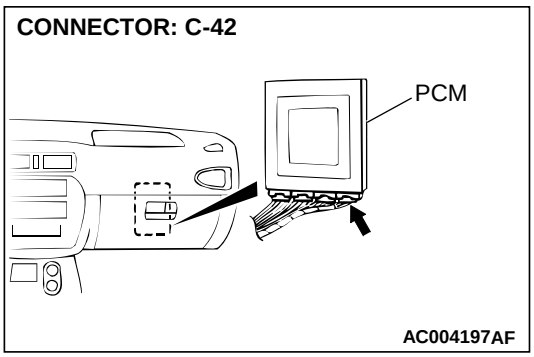
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

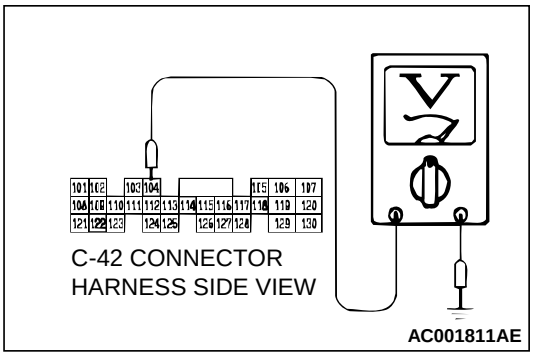
NO : Replace the PCM.

TSB Revision

STEP 5. Check the sensor output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Disconnect connector B-37 at the output shaft speed sensor.
(3) Turn the ignition switch to "ON" position.





(4) Measure the voltage between terminal 104 and ground by backprobing.
- Voltage should be between 4.8 and 5.2 volts.

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

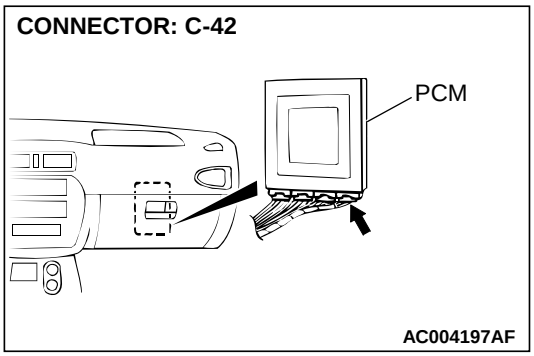
Q: Is the voltage normal?

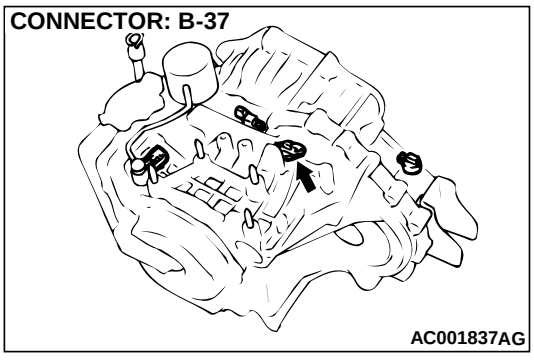
YES : Go to Step 8.
NO : Go to Step 6.

STEP 6. Check connectors C-42 at PCM and B-37 at output shaft speed sensor for damage.

Q: Are the connectors in good condition?

YES : Go to Step 7.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector InspectionP.00E-2.





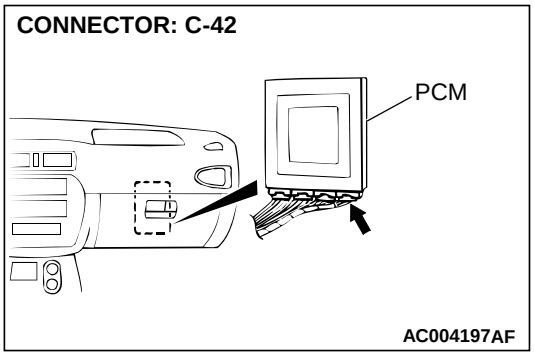
TSB Revision

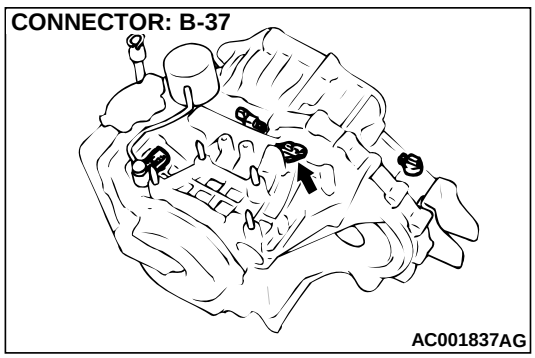
STEP 7. Check harness for short circuit to ground between PCM connector C-42 terminal 104 and output shaft speed sensor connector B-37 terminal 2.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

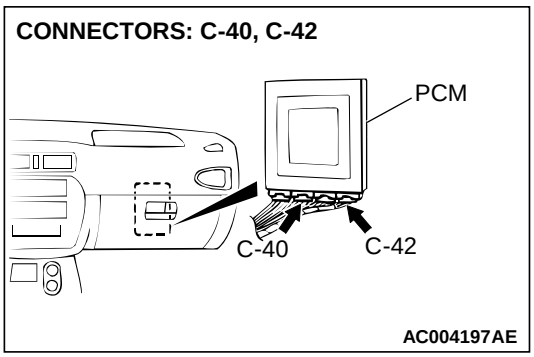
NO : Repair it.

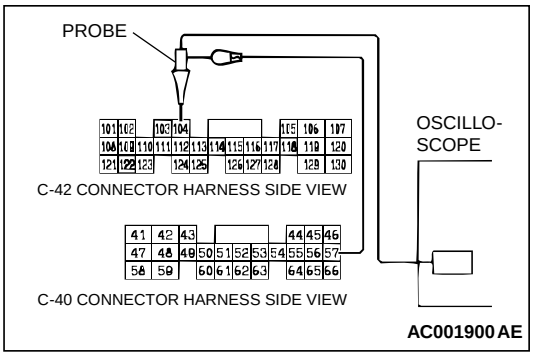




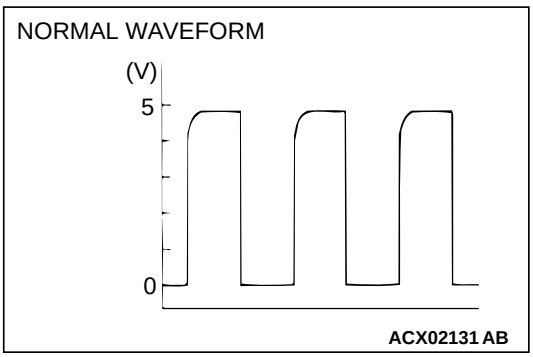
STEP 8. Using the oscilloscope, check the waveform at PCM connectors C-40 and C-42 by backprobing.

(1) Do not disconnect connectors C-40 and C-42.





(2) Connect an oscilloscope probe to PCM connector C-40 terminal 57 and to PCM connector C-42 terminal 104 by backprobing.
(3) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)



(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volts and less. The output waveform should not contain the noise.

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

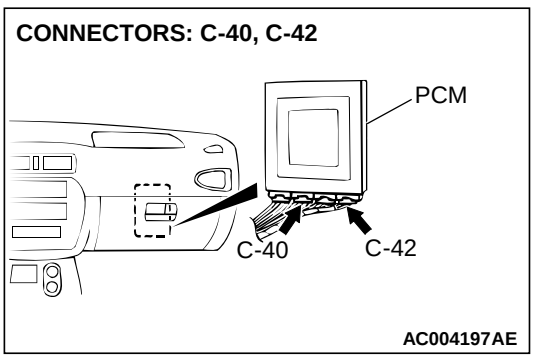
Q: Is the waveform normal?

YES : Go to Step 9.
NO : Go to Step 10.

STEP 9. Check connectors C-40 and C-42 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



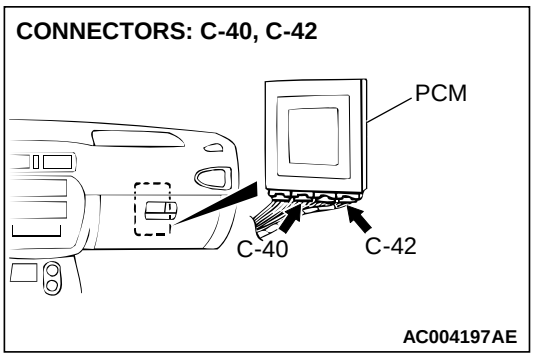
TSB Revision

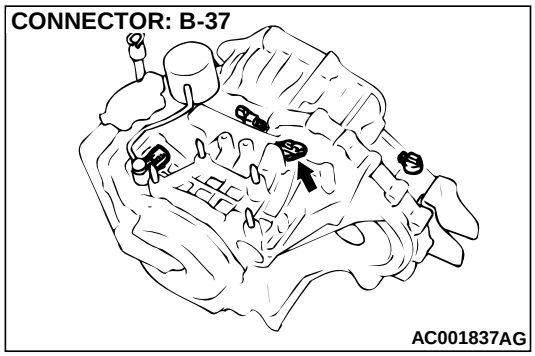
STEP 10. Check connectors C-40 and C-42 at PCM and B-37 at output shaft speed sensor for damage.

Q: Are the connectors in good condition?

YES : Go to Step 11.

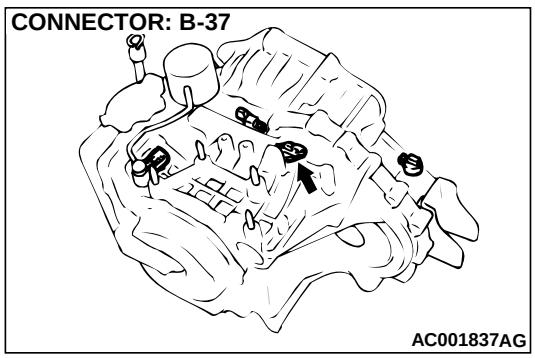
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



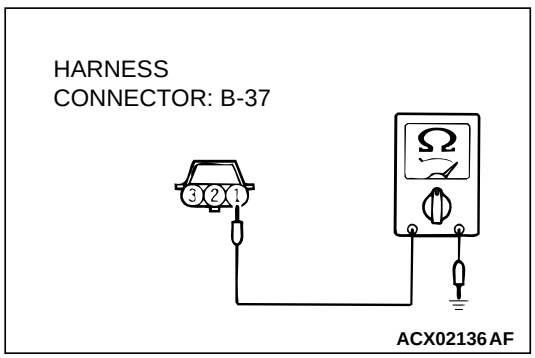


STEP 11. Check the continuity at output shaft speed sensor connector B-37.

(1) Disconnect connector B-37 and measure at the harness side.



(2) Check for the continuity between terminal 1 and ground.
- Should be less than 2 ohm.



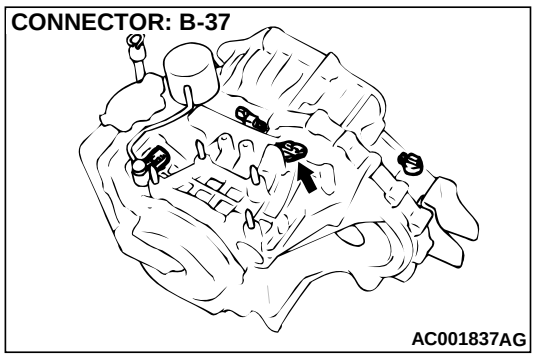
Q: Is the continuity normal?

YES : Go to Step 12.

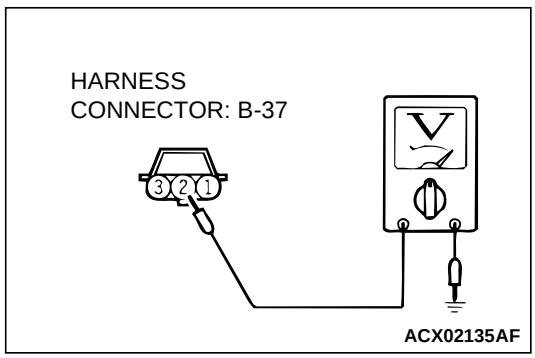
NO : Repair it because of harness open circuit or damage between output shaft speed sensor connector B-37 terminal 1 and PCM connector C-40 terminal 57.

TSB Revision

STEP 12. Check the sensor output voltage at output shaft speed sensor connector B-37.



(1) Disconnect connector B-37 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



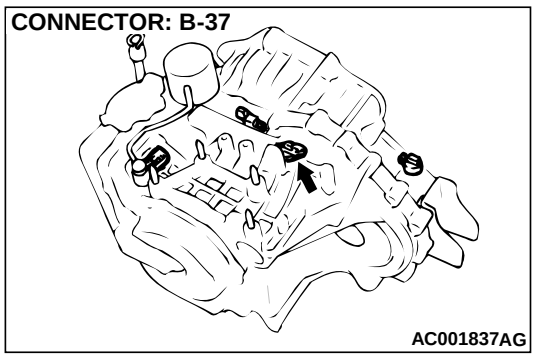
(3) Measure the voltage between terminal 2 and ground.
- Voltage should be between 4.8 and 5.2 volts.

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

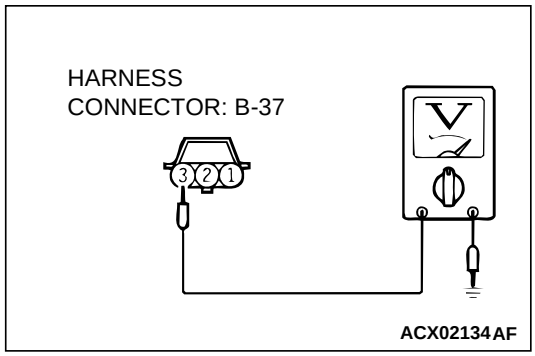
Q: Is the voltage normal?

YES : Go to Step 13.
NO : Repair it because of harness open circuit between output shaft speed sensor connector B-37 terminal 2 and PCM connector C-42 terminal 104.

STEP 13. Check the power supply voltage at output shaft speed sensor connector B-37.



(1) Disconnect connector B-37 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



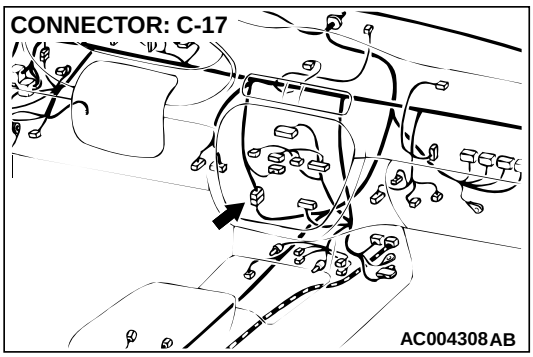
(3) Measure the voltage between terminal 3 and ground.
- Voltage should be battery positive voltage.

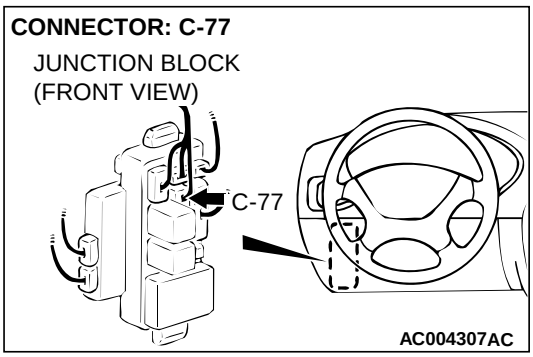
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 15.
NO : Go to Step 14.

TSB Revision



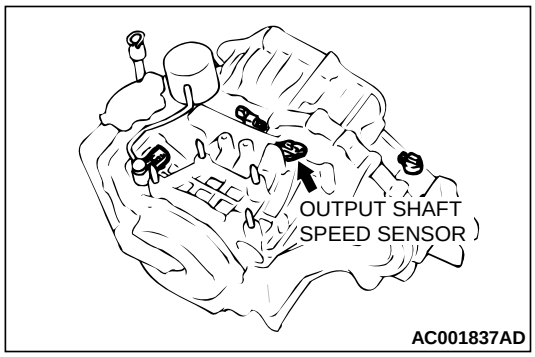


STEP 14. Check connectors C-17 at intermediate connector and C-77 at junction block for damage.

Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between output shaft speed sensor connector B-37 terminal 3 and junction block connector C-77 terminal 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 15. Replace the output shaft speed sensor.

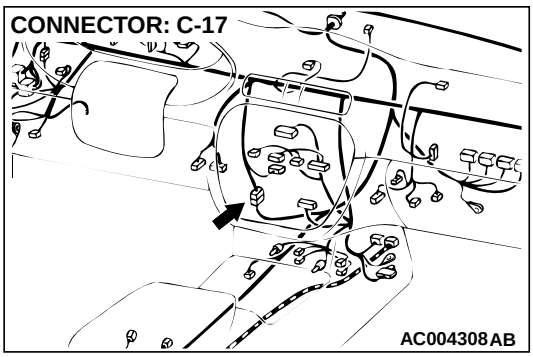
(1) Replace the output shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

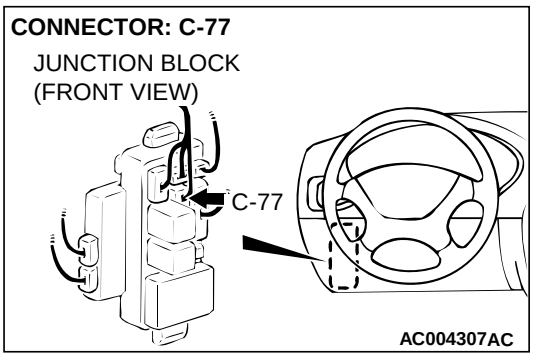
Q: Is the A/T diagnostic trouble code "23" output?

YES : Go to Step 18.

NO : The inspection is complete.

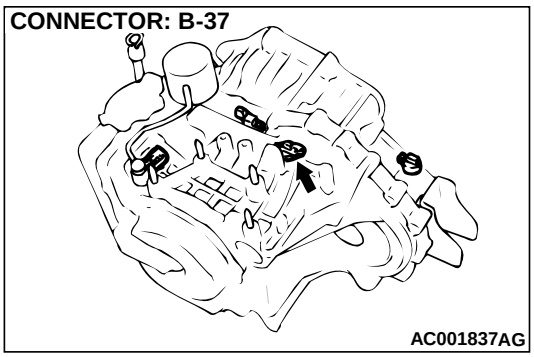
TSB Revision

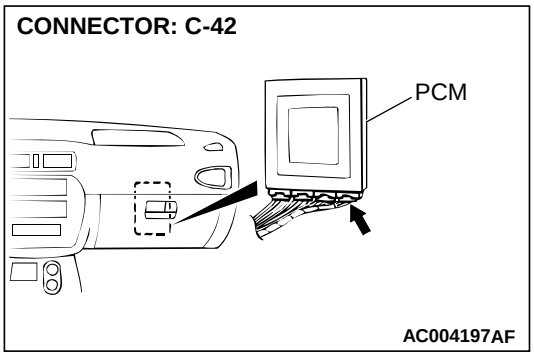




STEP 16. Check connectors C-17 at intermediate connector and C-77 at junction block for damage.
Q: Are the connectors in good condition?

YES : Go to Step 17.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 17. Check harness for damage between output shaft speed sensor harness side connector B-37 terminal 2 and PCM connector C-42 terminal 104.
Q: Is the harness wire in good condition?

YES : Go to Step 18.
NO : Repair it.

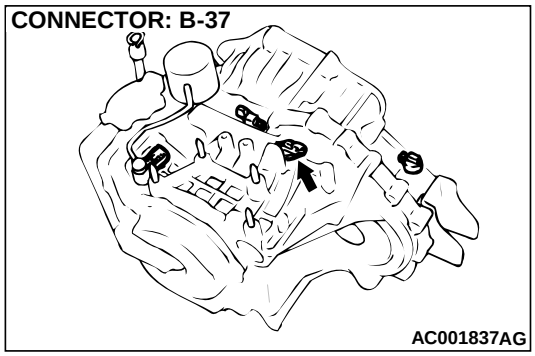
TSB Revision

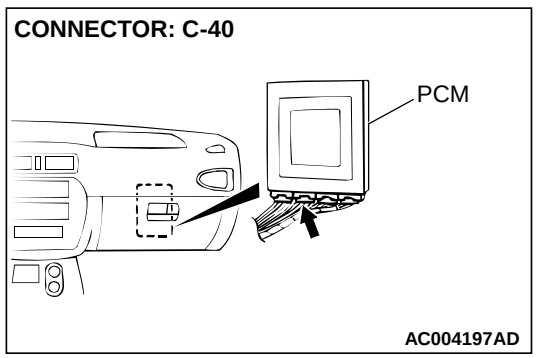
STEP 18. Check harness for damage between output shaft speed sensor harness side connector B-37 terminal 1 and PCM connector C-40 terminal 57.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair it.



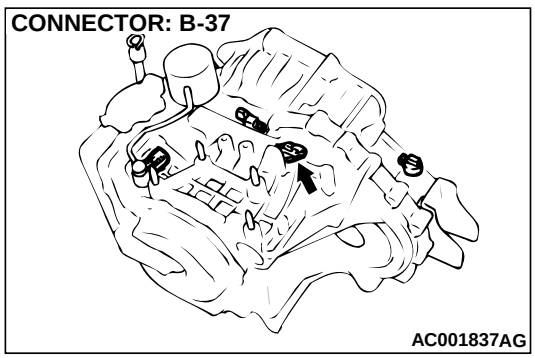


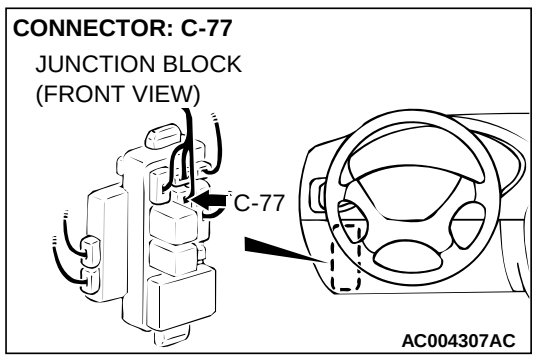
STEP 19. Check harness for damage between output shaft speed sensor harness side connector B-37 terminal 3 and junction block connector C-77 terminal 12.

Q: Is the harness wire in good condition?

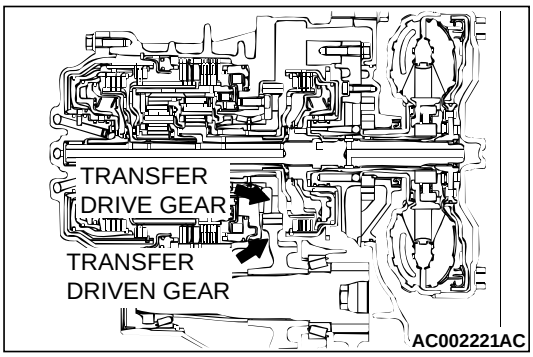
YES : Go to Step 20.

NO : Repair it.





TSB Revision



STEP 20. Replace the transfer drive gear or driven gear.

(1) Replace the transfer drive gear or driven gear. Refer to GROUP 23B, Transaxle P.23B-10, Output Shaft P.23B-62.
(2) Start the engine and run.
(3) Read in the A/T diagnostic trouble code.

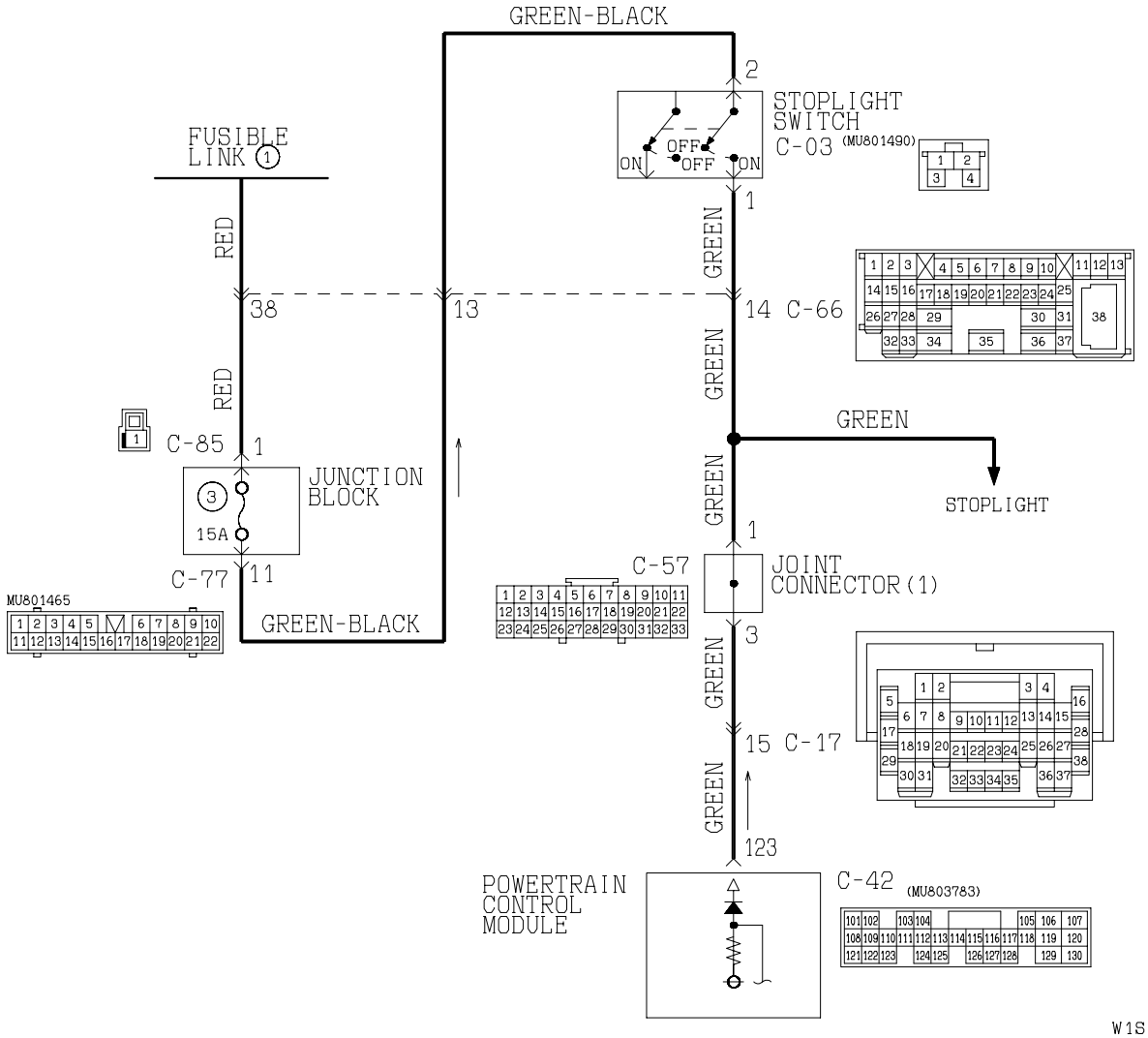
Q: Is the A/T diagnostic trouble code number "23" output?

YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.

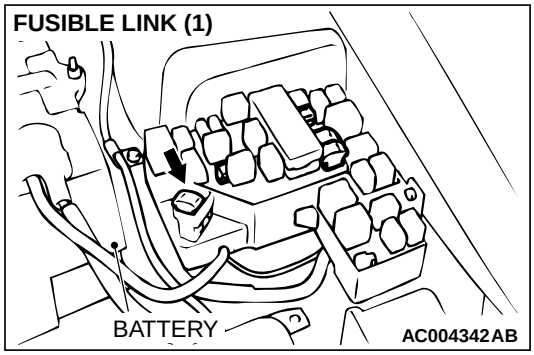
NO : The inspection is complete.

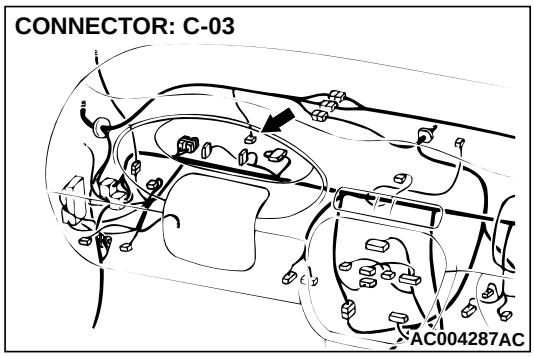
DTC 26: Stoplight Switch System

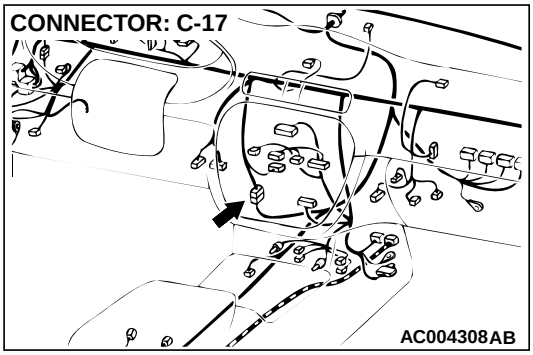
Stoplgiht Switch System Circuit

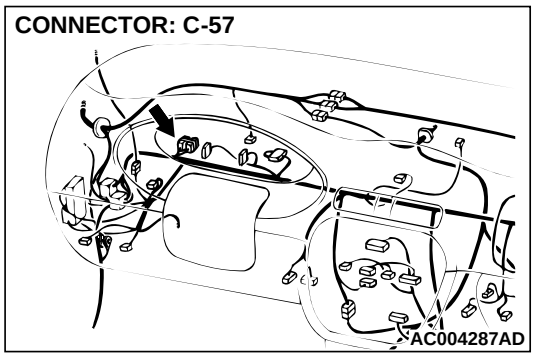


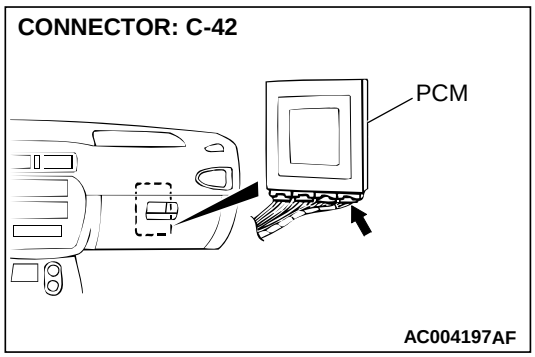
TSB Revision

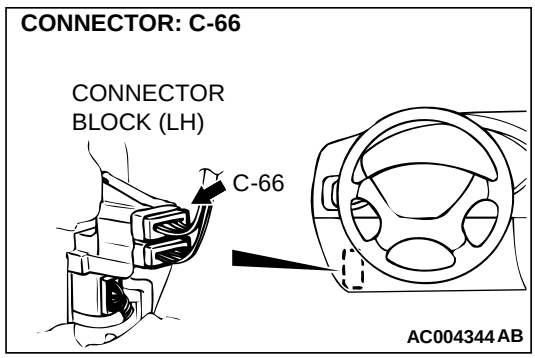


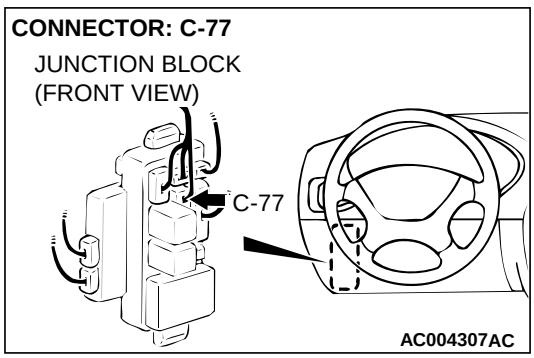


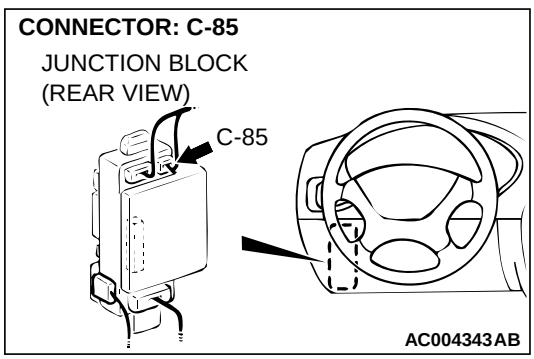












CIRCUIT OPERATION

- Battery positive voltage is supplied to the stoplight switch (terminal 2).
- When the brake pedal is depressed, battery positive voltage is applied to the PCM (terminal 123). The PCM judges that the brake pedal is depressed and the stoplight switch is on when battery positive voltage is sensed at the PCM (terminal 123).

DTC SET CONDITIONS

If the stoplight switch is on for five minutes or more while driving 50 km/h (31 mph), it is judged there is a short circuit in the stoplight switch and diagnostic trouble code number "26" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the stoplight switch circuit

TSB Revision

- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

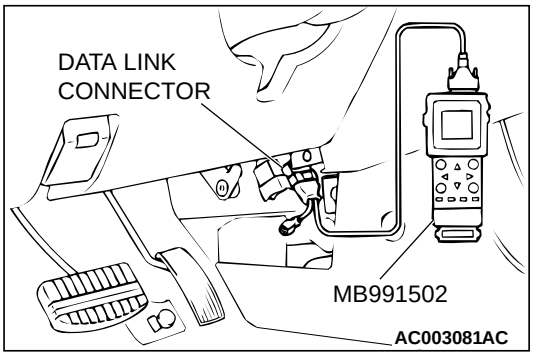
STEP 1. Check the brake pedal height.
Refer to GROUP 35A, On-vehicle Service – Brake Pedal Check and Adjustment P.35A-17.

Q: Is the height adjusted properly?

YES : Go to Step 2.
NO : Adjust it.

STEP 2. Using scan tool MB991502, check data list item 26: Stoplight Switch.

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



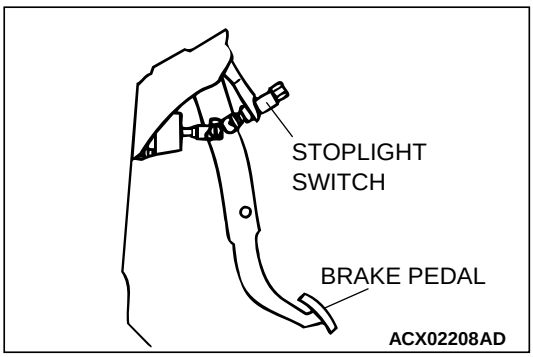
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 26, Stoplight Switch.
- When the brake pedal is depressed, the display should be "ON."
- When the brake pedal is not depressed, the display should be "OFF."

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

Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

STEP 3. Check the stoplight switch as single part.
Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check P.35A-18.



Q: Is the switch normal?

YES : Go to Step 4.
NO : Replace the stoplight switch.Refer to GROUP 35A, Brake Pedal P.35A-30.

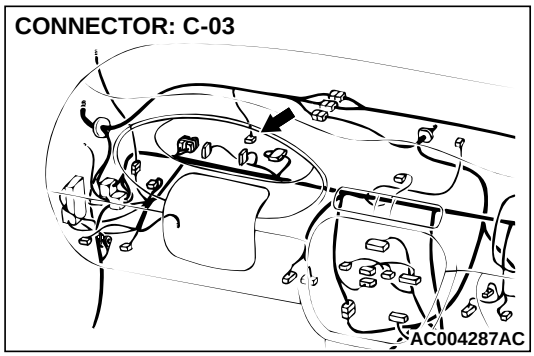
TSB Revision

STEP 4. Check connector C-03 at stoplight switch for damage.

Q: Is the connector in good condition?

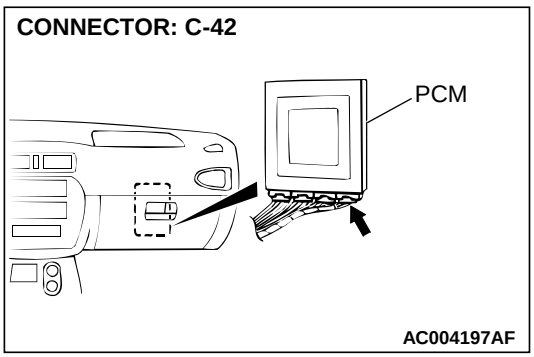
YES : Go to Step 5.

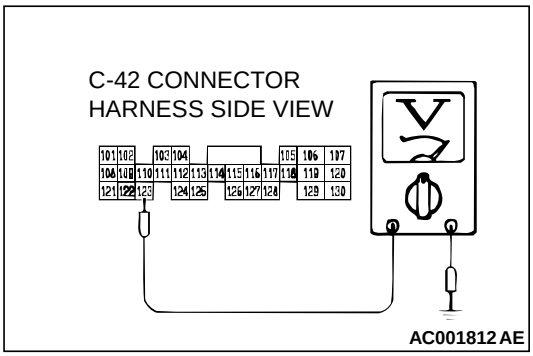
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 5. Check the switch output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.





(2) Measure the voltage between terminal 123 and ground by backprobing.

- When the brake pedal is depressed, voltage should be battery positive voltage.
- When the brake pedal is not depressed, voltage should be less than 1.0 volt.

Q: Is the voltage normal?

YES : Go to Step 8.

NO : Go to Step 6.

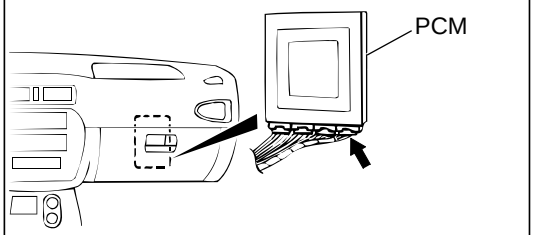
STEP 6. Check connectors C-42 at PCM, C-57 at joint connector and C-66, C-17 at intermediate connector for damage.

Q: Are the connectors in good condition?

YES : Go to Step 7.

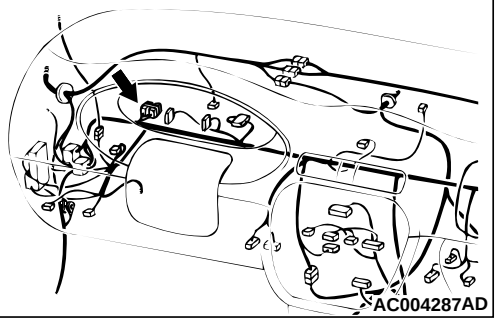
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR: C-42



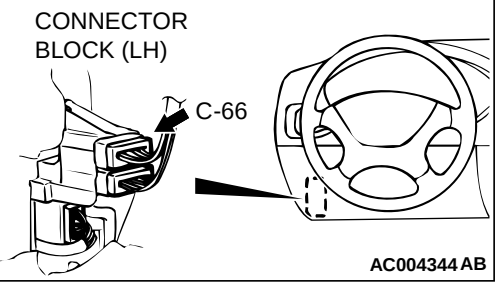
AC004197AF

CONNECTOR: C-57



AC004287AD

CONNECTOR: C-66



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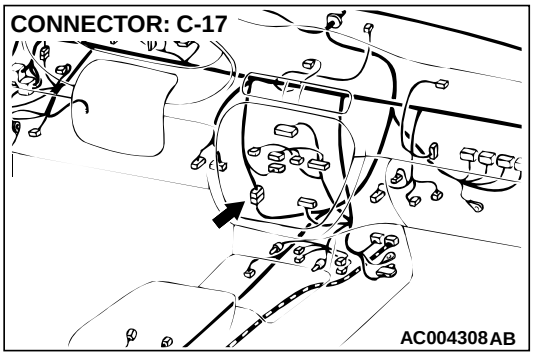
CONNECTOR: C-17



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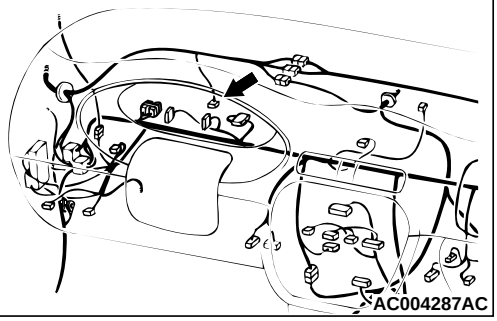
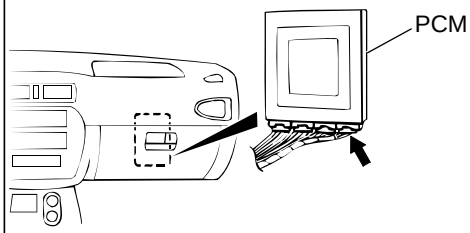
TSB Revision

CONNECTOR: C-03



CONNECTOR: C-42



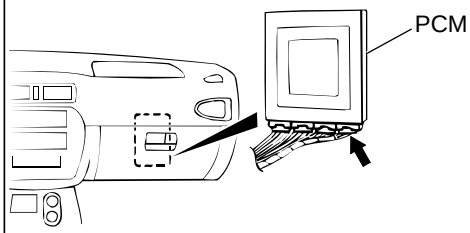
STEP 7. Check harness for damage between stoplight switch connector C-03 terminal 1 and PCM connector C-42 terminal 123.

Q: Is the harness wire in good condition?

YES : Repair it because of the connector and the harness damage between output signal line of the stoplight switch.

NO : Repair it.

CONNECTOR: C-42

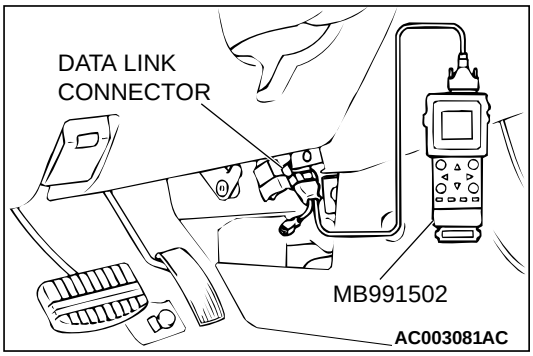


STEP 8. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 9. Using scan tool MB991502, check data list item 26: Stoplight Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 26: Stoplight Switch.
- When the brake pedal is depressed, the display should be "ON."
- When the brake pedal is not depressed, the display should be "OFF."

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

Q: Is the switch operating properly?

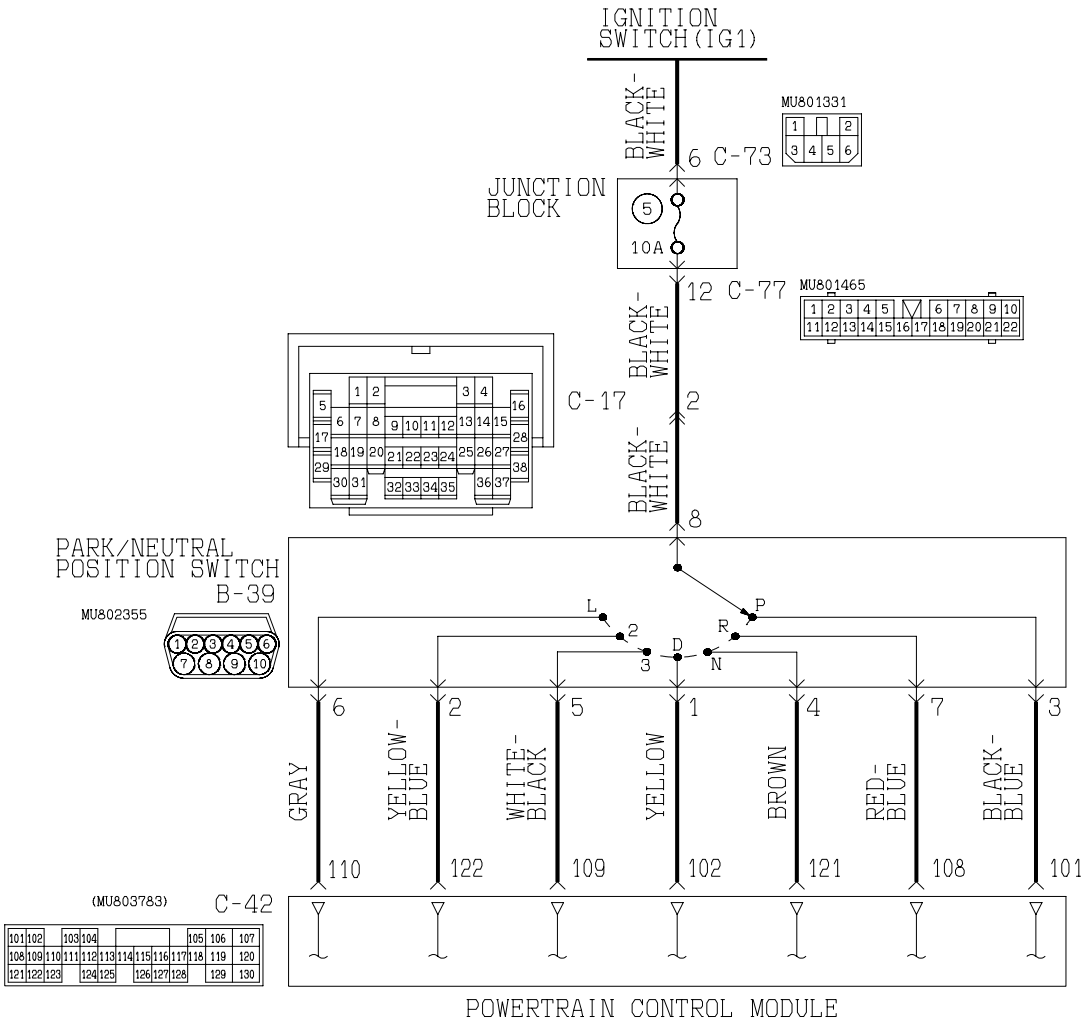
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

DTC 27: Park/Neutral Position Switch System (Open Circuit)

Park/Neutral Positon Switch System Circuit



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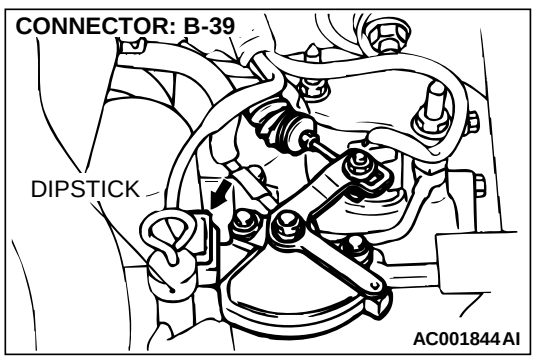

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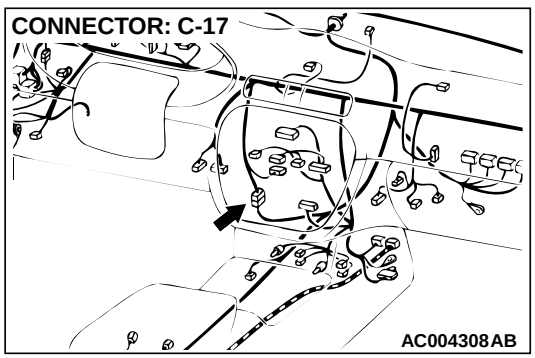

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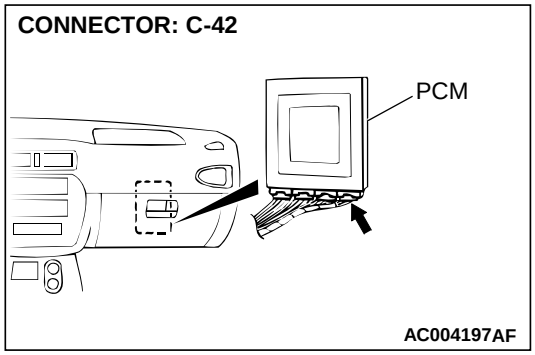
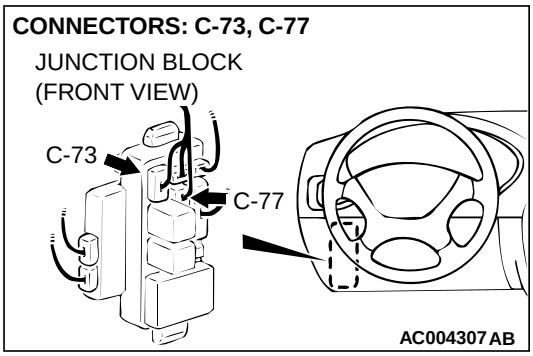
TSB Revision





CIRCUIT OPERATION

- Battery positive voltage is applied to the Park/ Neutral position switch (terminal 8) when the ignition switch is turned "ON."
- Battery positive voltage is applied to the PCM (terminal 101) when the selector lever is in the "P" range. The PCM judges that the selector lever is in the "P" range when the battery positive voltage is applied.
- Battery positive voltage is applied to the PCM [terminals 108, 121, 102, 109, 122 or 110] when the selector lever is in the "R" range ("N," "D," "3," "2" or "L" range). The PCM judges that the selector lever is in the "R" range ("N," "D," "3," "2" or "L" range) when the battery positive voltage is applied.

DTC SET CONDITIONS

If the PCM detects no Park/Neutral position switch input signal from any selector position for continuous period of thirty seconds, it is judged that there is an open circuit in the Park/Neutral position switch and diagnostic trouble code number "27" is output.

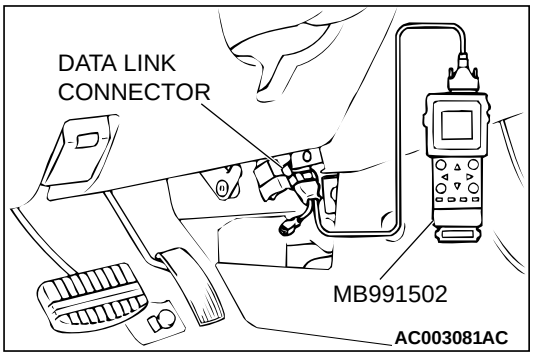
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the Park/Neutral position switch
- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check data list item 61: Park/Neutral Position Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 61: Park/Neutral Position Switch.
- Move the selector lever to "P," "R," "N," "D," "3," "2," "L" positions to confirm whether the MUT-II.

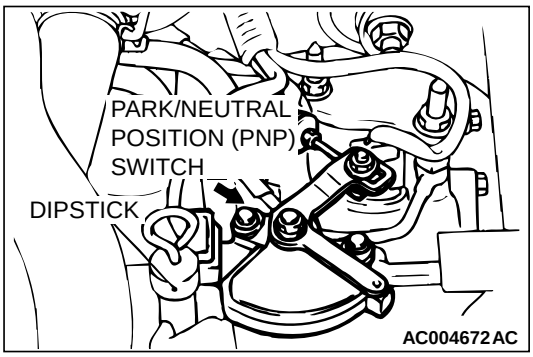
(4) Turn the ignition switch to "LOCK" (OFF) position.

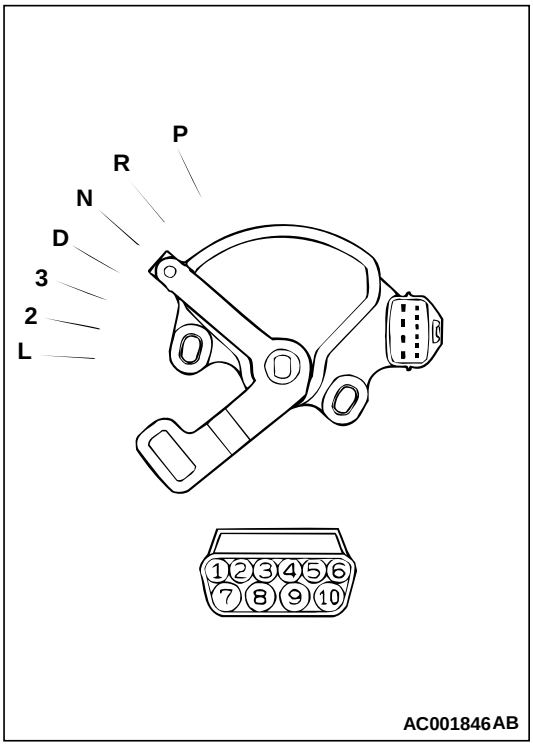
Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : When indication disagrees at all positions: Go to Step 2. When indication disagrees at "P" position: Go to Step 6. When indication disagrees at "R" position: Go to Step 11. When indication disagrees at "N" position: Go to Step 15. When indication disagrees at "D" position: Go to Step 19. When indication disagrees at "3" position: Go to Step 23 . When indication disagrees at "2" position: Go to Step 27. When indication disagrees at "L" position: Go to Step 31.

TSB Revision





STEP 2. Check the Park/Neutral position switch.

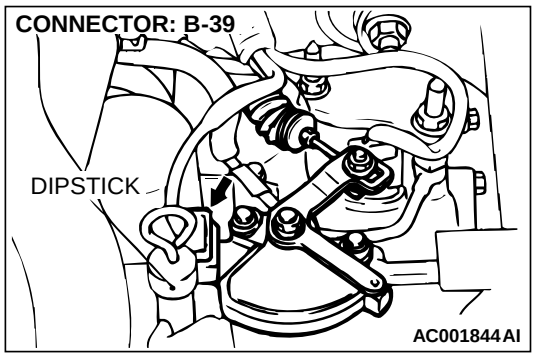
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

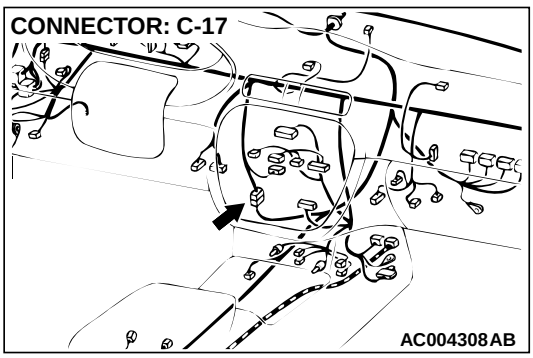
Check for continuity between terminals for each selector position.

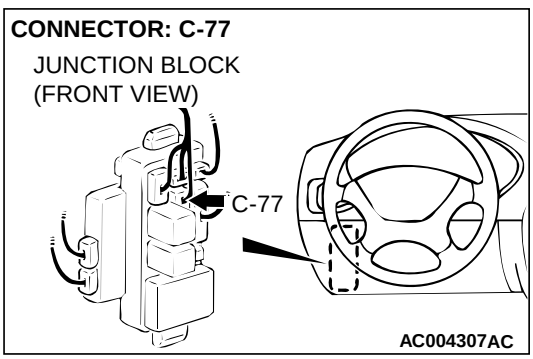
Q: Is the switch operating properly?

YES : Go to Step 3.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.







STEP 3. Check connectors B-39 at Park/Neutral position switch, C-17 at intermediate connector and C-77 at junction block for damage.

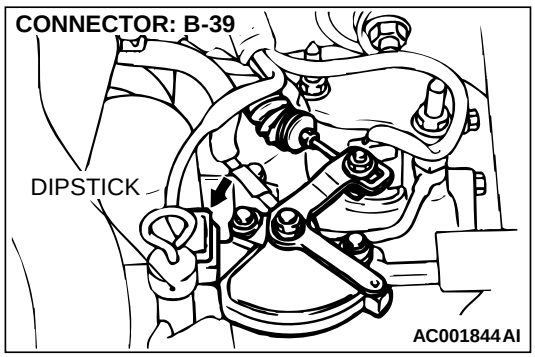
Q: Are the connectors in good condition?

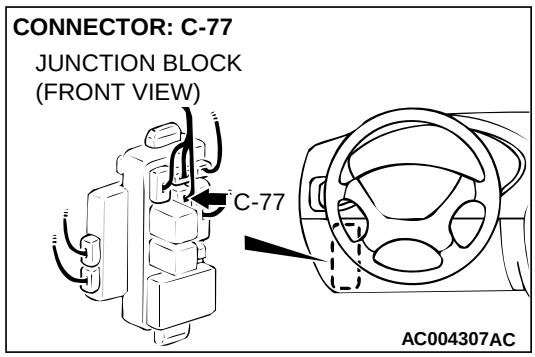
YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 4. Check harness for open circuit or short circuit to ground between Park/Neutral position switch connector B-39 terminal 8 and junction block connector C-77 terminal 12.



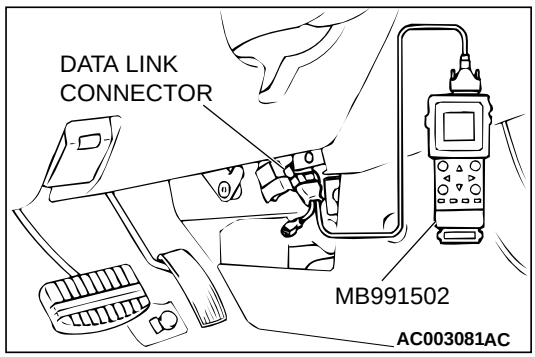


Q: Is the harness wire in good condition?

YES : Go to Step 5.
NO : Repair it.

STEP 5. Using scan tool MB991502, check data list item 61: Park/Neutral Position Switch.

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



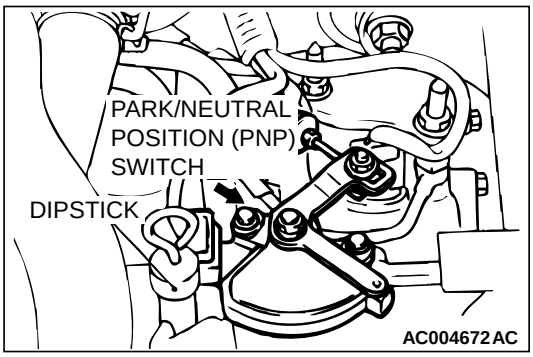
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 61: Park/Neutral Position Switch.
- Move the selector lever to "P," "R," "N," "D," "3," "2," "L" positions to confirm whether the MUT-II.

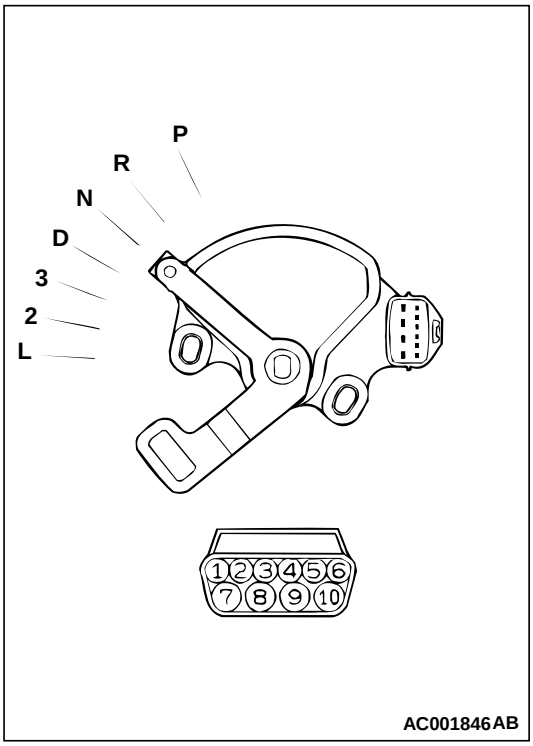
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Replace the PCM.

TSB Revision





STEP 6. Check the Park/Neutral position switch.

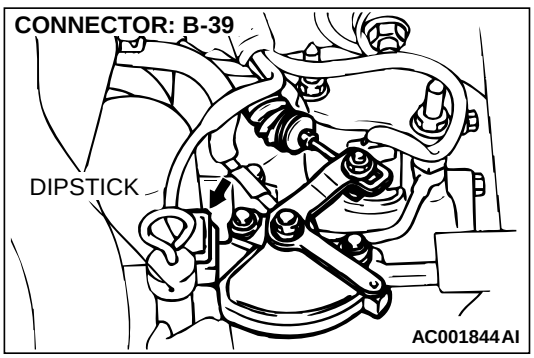
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 7.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



STEP 7. Check connector B-39 at the Park/Neutral position switch for damage.

Q: Is the connector in good condition?

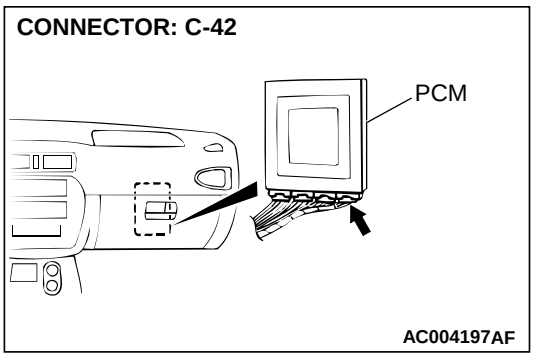
YES : Go to Step 8.

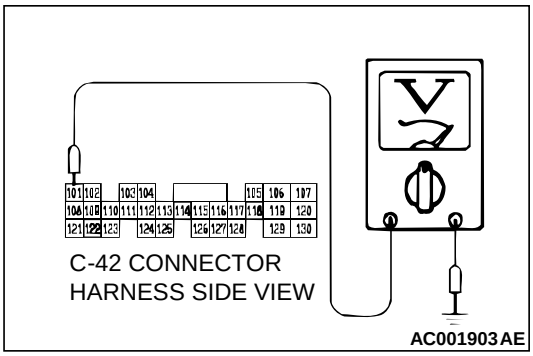
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 8. Check the switch output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "P" position.





(4) Measure the voltage between terminal 101 and ground by backprobing.
- Voltage should be battery positive voltage.

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

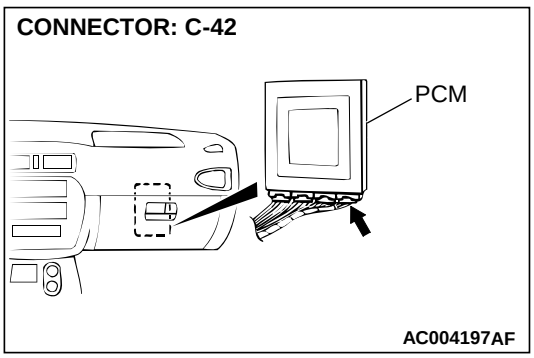
Q: Is the voltage normal?

YES : Go to Step 10.
NO : Go to Step 9.

STEP 9. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

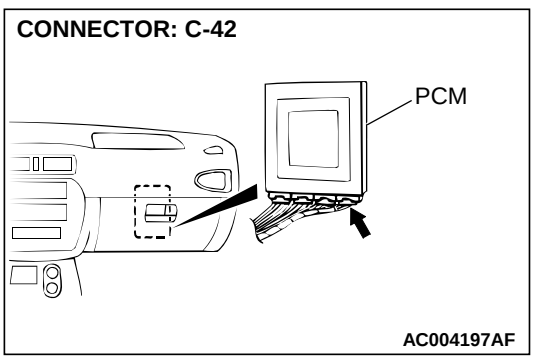
YES : Repair it because of the harness open circuit or short circuit to ground between Park/Neutral position switch connector B-39 terminal 3 and PCM connector C-42 terminal 101.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



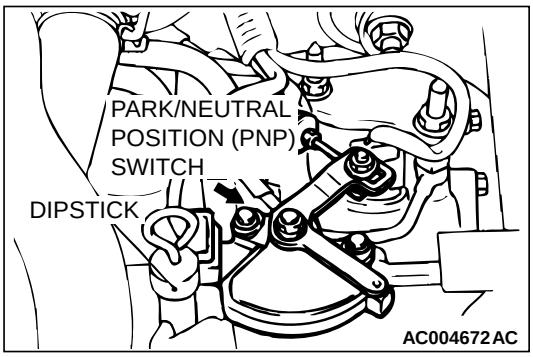
STEP 10. Check connector C-42 at PCM for damage.

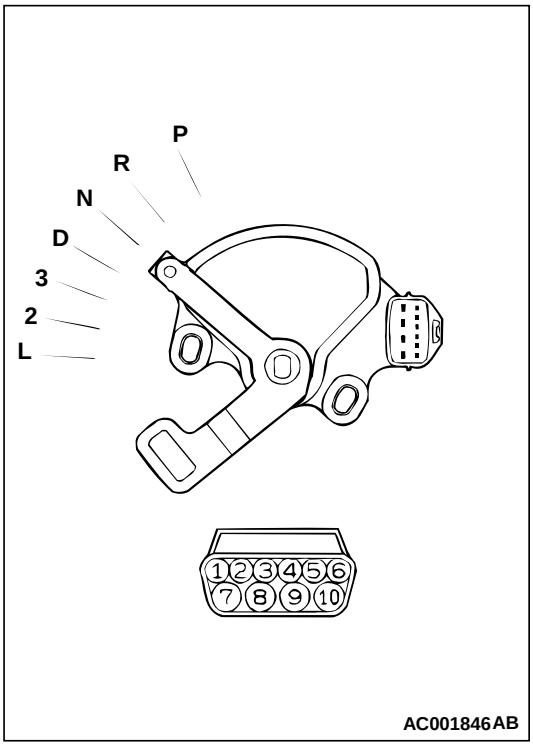
Q: Is the connector in good condition?

YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision





STEP 11. Check the Park/Neutral position switch.

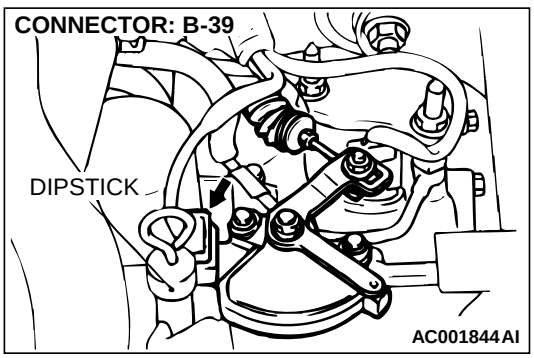
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 12.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



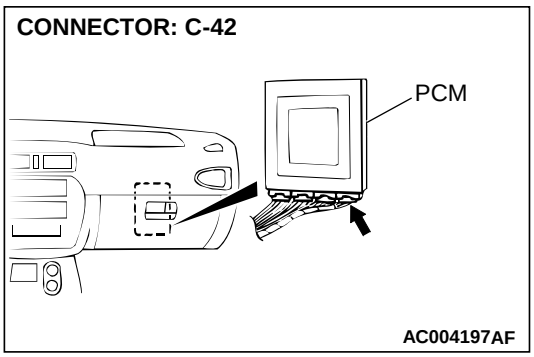
STEP 12. Check connector B-39 at the Park/Neutral position switch for damage.

Q: Is the connector in good condition?

YES : Go to Step 13.

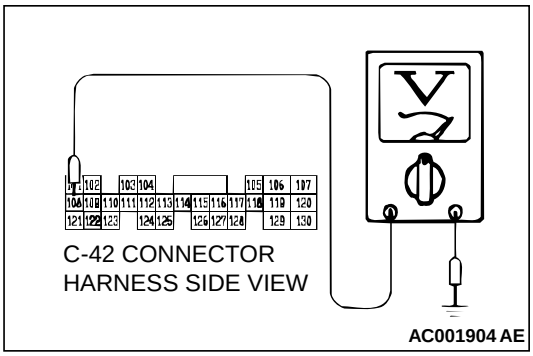
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



STEP 13. Check the switch output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "R" position.

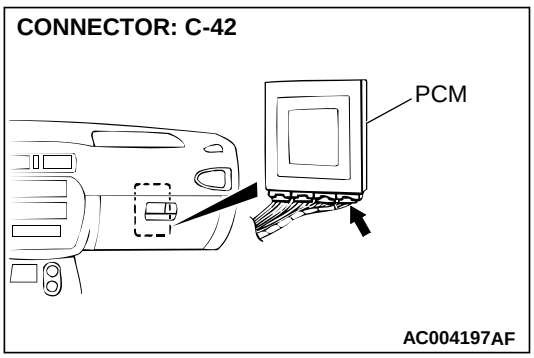


(4) Measure the voltage between terminal 108 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

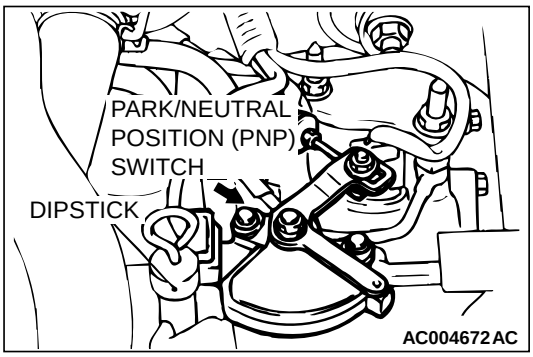
YES : Go to Step 10.
NO : Go to Step 14.

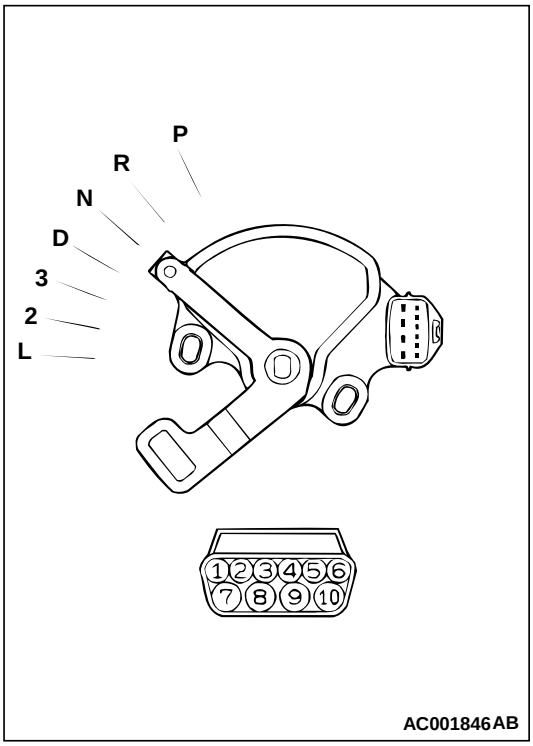


STEP 14. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between Park/Neutral position switch connector B-39 terminal 7 and PCM connector C-42 terminal 108.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 15. Check the Park/Neutral position switch.

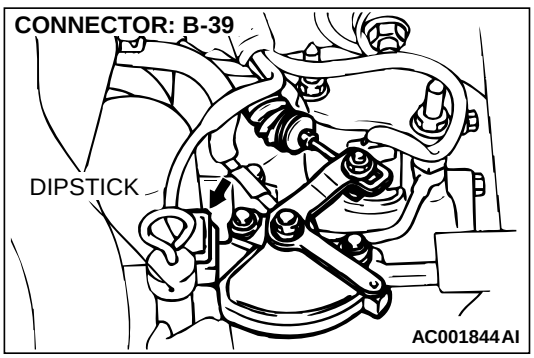
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 16.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



STEP 16. Check connector B-39 at the Park/Neutral position switch for damage.

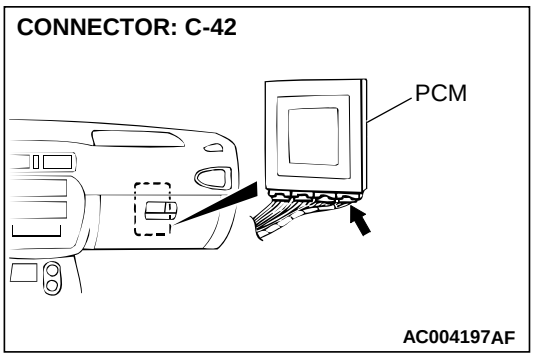
Q: Is the connector in good condition?

YES : Go to Step 17.

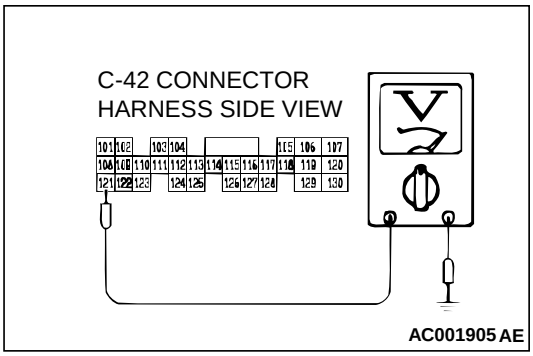
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 17. Check the switch output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "N" position.



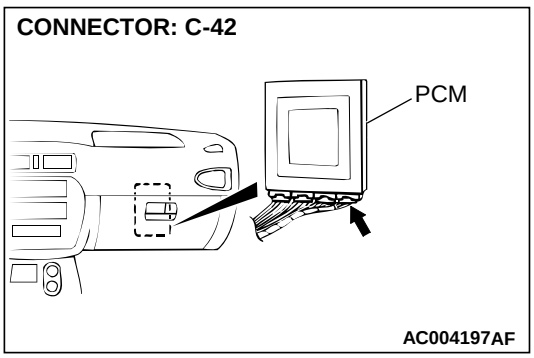
(4) Measure the voltage between terminal 121 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

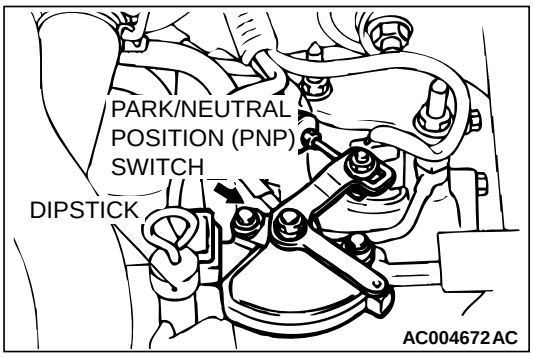
YES : Go to Step 10.
NO : Go to Step 18.

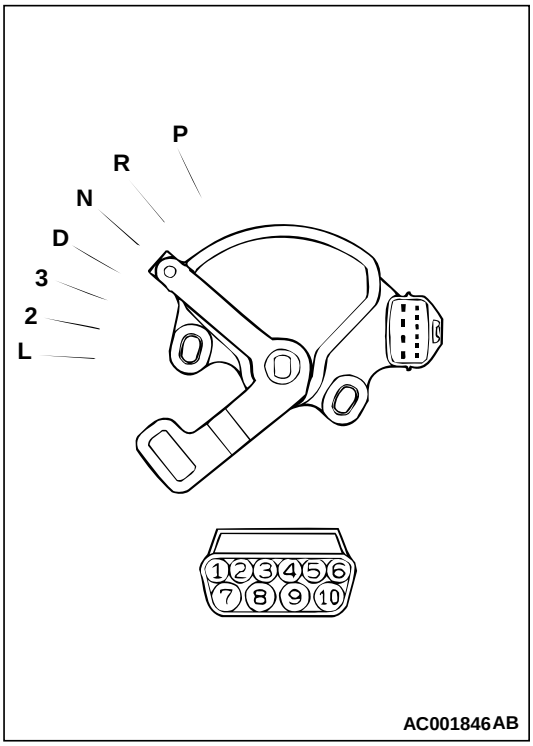
STEP 18. Check connector C-42 at PCM for damage.



Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between the Park/Neutral position switch connector B-39 terminal 4 and PCM connector C-42 terminal 121.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 19. Check the Park/Neutral position switch.

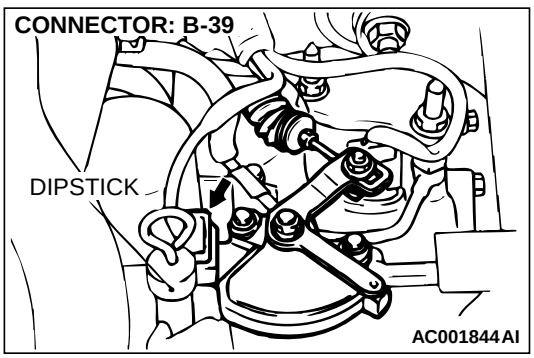
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 20.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



STEP 20. Check connector B-39 at the Park/Neutral position switch for damage.

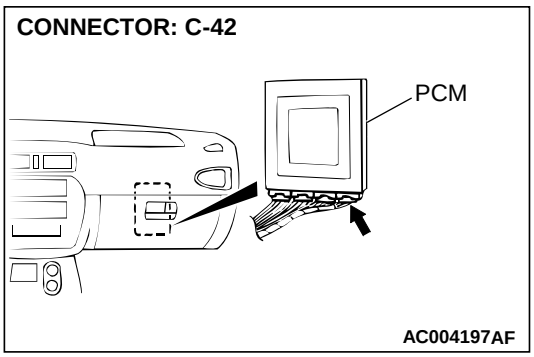
Q: Is the connector in good condition?

YES : Go to Step 21.

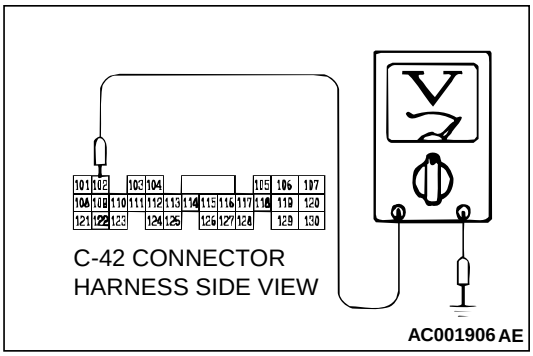
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 21. Check the switch output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "D" position.



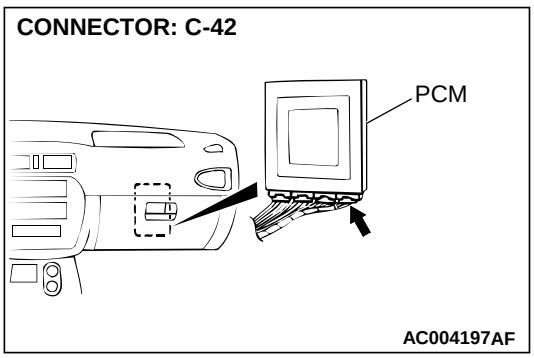
(4) Measure the voltage between terminal 102 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 10.
NO : Go to Step 22.

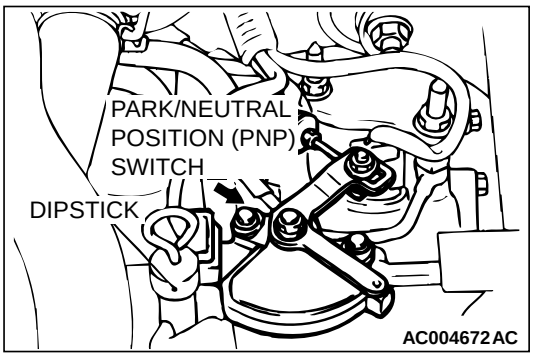
STEP 22. Check connector C-42 at PCM for damage.

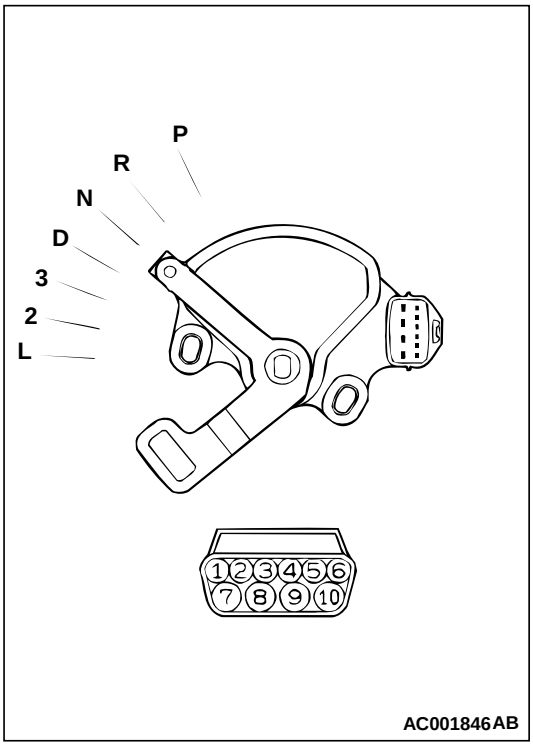


Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between the Park/Neutral position switch connector B-39 terminal 1 and PCM connector C-42 terminal 102.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 23. Check the Park/Neutral position switch.

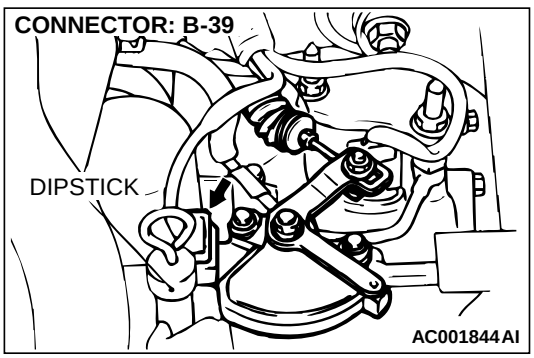
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 24.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



STEP 24. Check connector B-39 at the Park/Neutral position switch for damage.

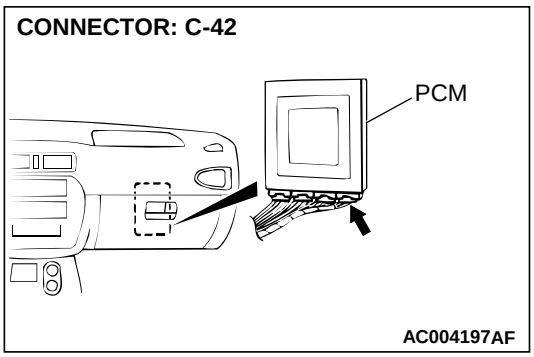
Q: Is the connector in good condition?

YES : Go to Step 25.

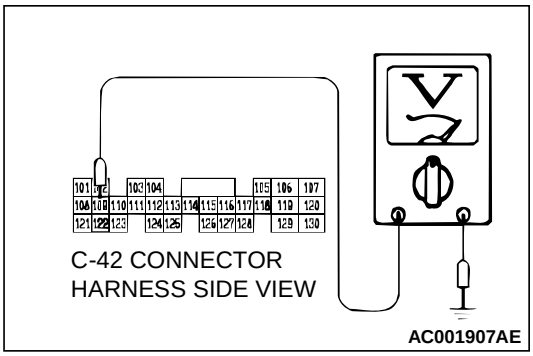
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 25. Check the switch output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "3" position.



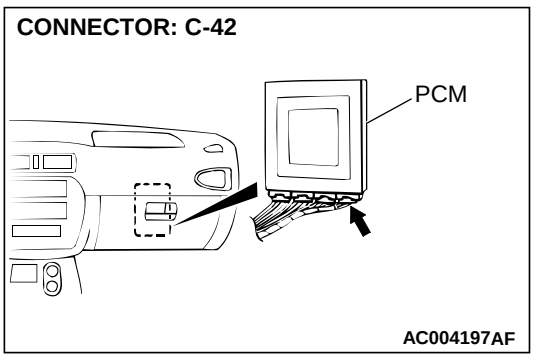
(4) Measure the voltage between terminal 109 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 10.
NO : Go to Step 26.

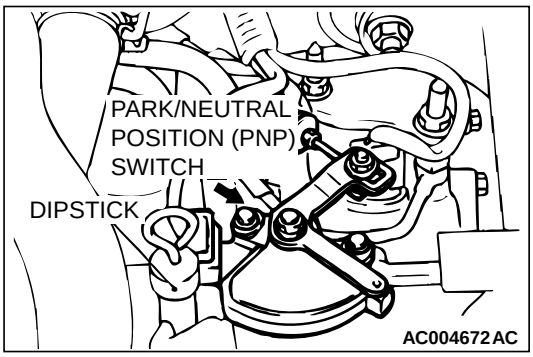
STEP 26. Check connector C-42 at PCM for damage.

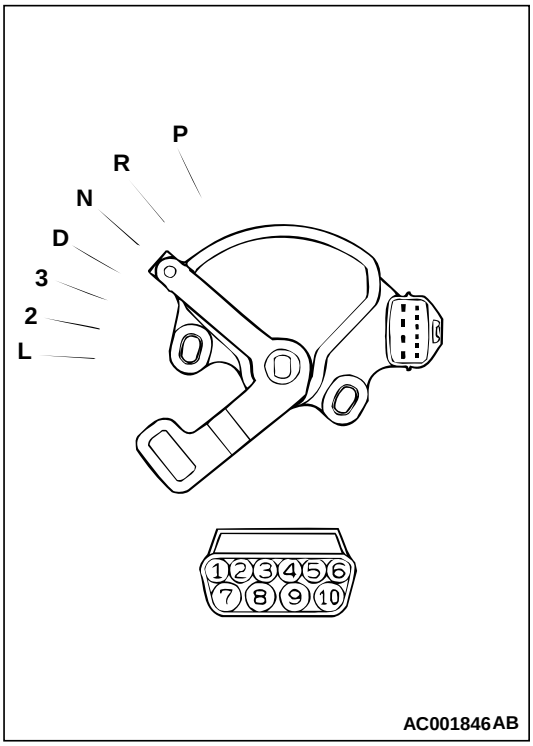


Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between the Park/Neutral position switch connector B-39 terminal 5 and PCM connector C-42 terminal 109.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 27. Check the Park/Neutral position switch.

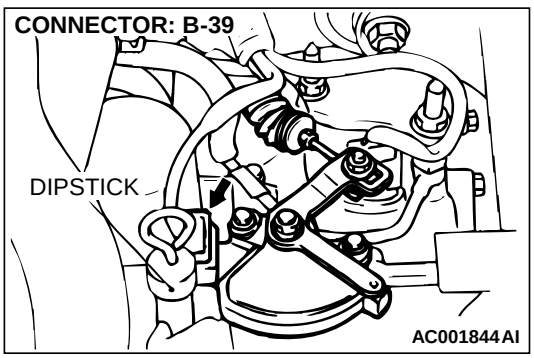
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 28.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



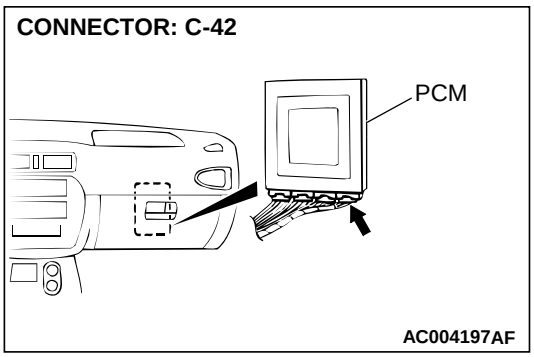
STEP 28. Check connector B-39 at the Park/Neutral position switch for damage.

Q: Is the connector in good condition?

YES : Go to Step 29.

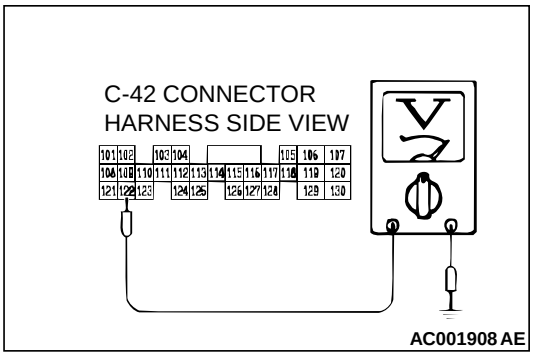
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



STEP 29. Check the switch output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "2" position.

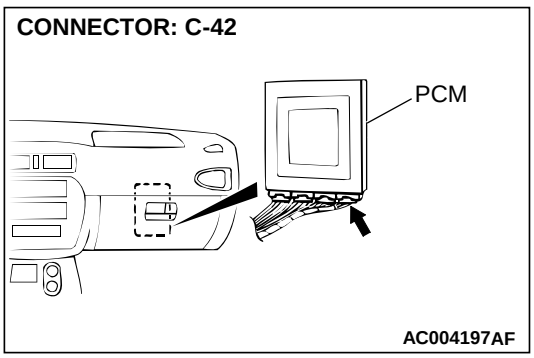


(4) Measure the voltage between terminal 122 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 10.
NO : Go to Step 30.

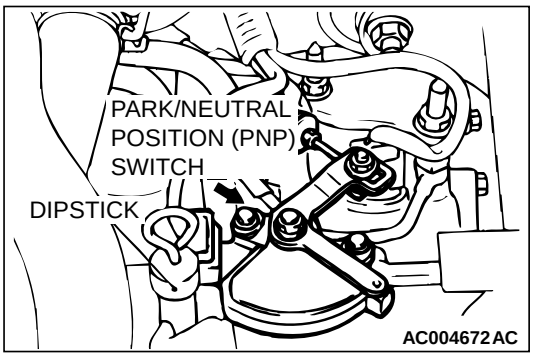


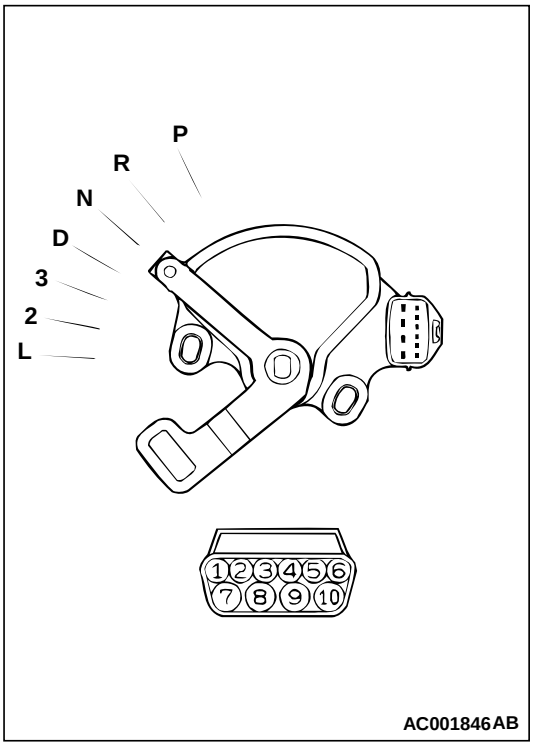
STEP 30. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between the Park/Neutral position switch connector B-39 terminal 2 and PCM connector C-42 terminal 122.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 31. Check the Park/Neutral position switch.

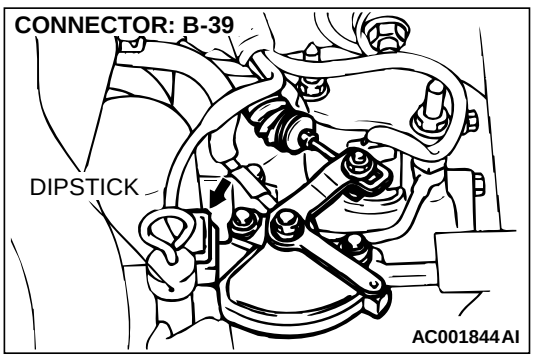
ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 32.

NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.



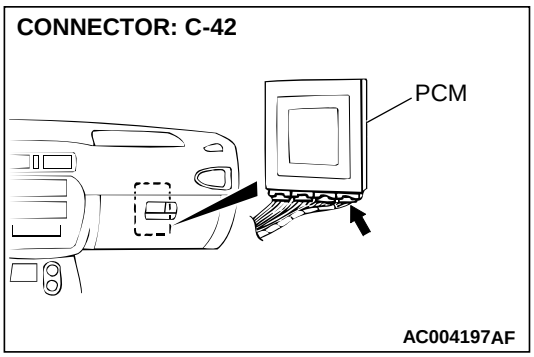
STEP 32. Check connector B-39 at the Park/Neutral position switch for damage.

Q: Is the connector in good condition?

YES : Go to Step 33.

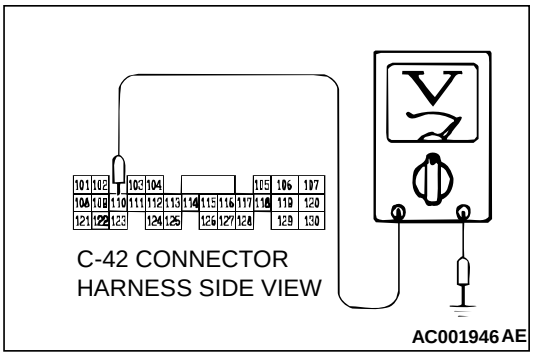
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



STEP 33. Check the switch output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.
(3) Move the selector lever to "L" position.

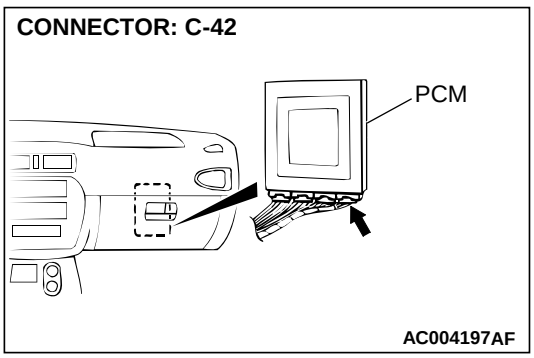


(4) Measure the voltage between terminal 110 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 10.
NO : Go to Step 34.



STEP 34. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Repair it because of the harness open circuit or short circuit to ground between the Park/Neutral position switch connector B-39 terminal 6 and PCM connector C-42 terminal 110.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

DTC 28: Park/Neutral Position Switch System (Short Circuit)

Park/Neutral Position Switch System Circuit
Refer to P.23A-124.

CIRCUIT OPERATION
Refer to P.23A-124.

DTC SET CONDITIONS
If the PCM detects more than one kind of park/neutral position switch input signals for continuous period of thirty seconds, it is judged that there is a short circuit in the Park/Neutral position switch and diagnostic trouble code number "28" is output.

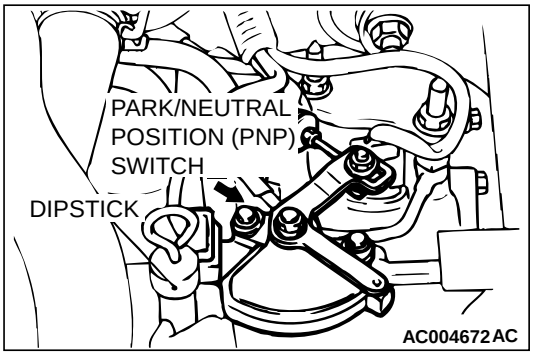
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of the Park/Neutral position switch
- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the PCM

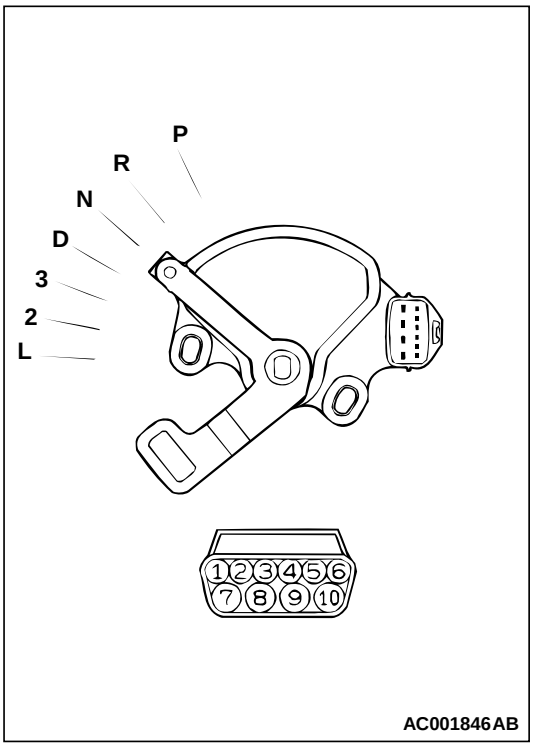
TSB Revision

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Check the Park/Neutral position switch.





ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

Check for continuity between terminals for each selector position.

Q: Is the switch operating properly?

YES : Go to Step 2.

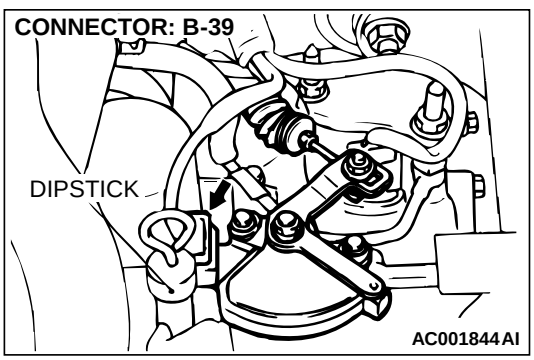
NO : Replace the Park/Neutral position switch. Refer to GROUP 23B, Transaxle P.23B-10.

STEP 2. Check connector B-39 at the Park/Neutral position switch for damage.

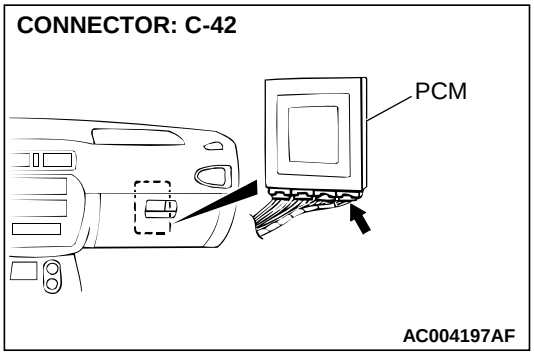
Q: Is the connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision

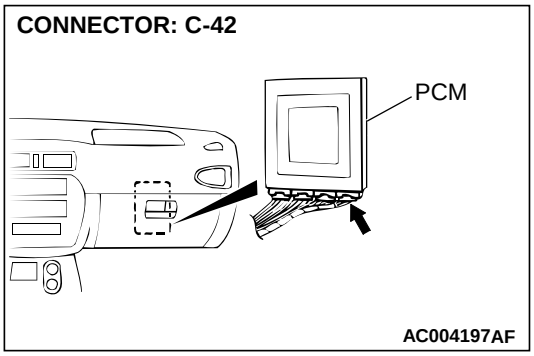


STEP 3. Check connector C-42 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 4.

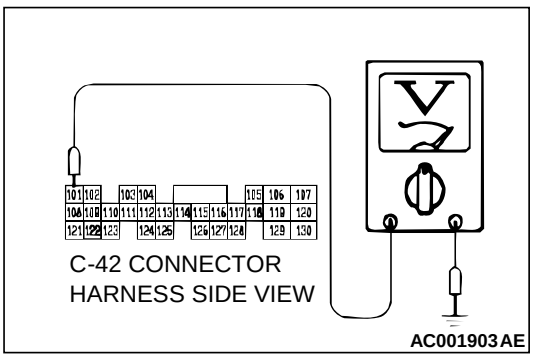
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Check the switch output voltage at PCM connector C-42 by backprobing. ("P" position)

(1) Do not disconnect connector C-42.

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



(3) Measure the voltage between terminal 101 and ground by backprobing.

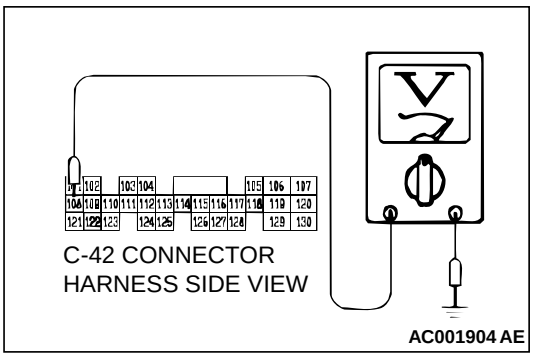
- When selector lever position is "P," voltage should be battery positive voltage.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 5.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 3 and PCM connector C-42 terminal 101.

TSB Revision



STEP 5. Check the switch output voltage at PCM connector C-42 by backprobing. ("R" position)

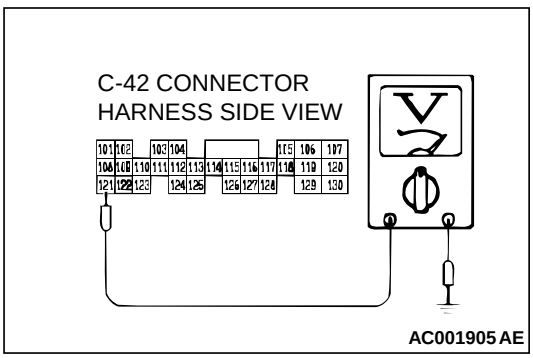
Measure the voltage between terminal 108 and ground by backprobing.

- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be battery positive voltage.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 6.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 7 and PCM connector C-42 terminal 108.



STEP 6. Check the switch output voltage at PCM connector C-42 by backprobing. ("N" position)

Measure the voltage between terminal 121 and ground by backprobing.

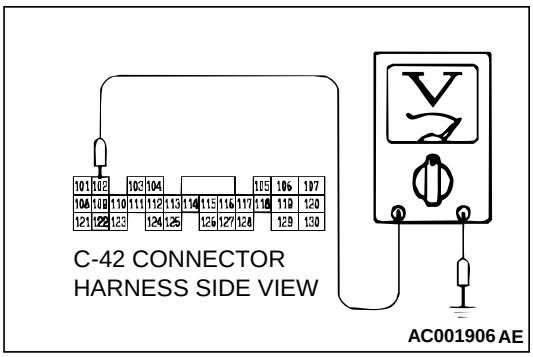
- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be battery positive voltage.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 7.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 4 and PCM connector C-42 terminal 121.

TSB Revision



STEP 7. Check the switch output voltage at PCM connector C-42 by backprobing. ("D" position)

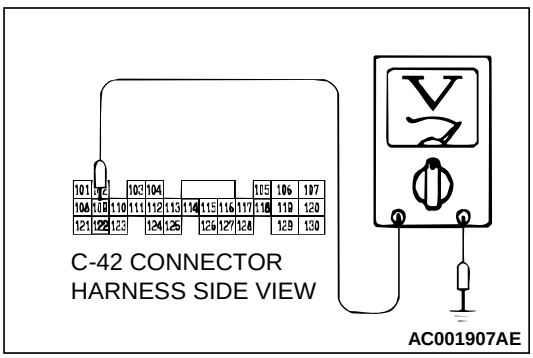
Measure the voltage between terminal 102 and ground by backprobing.

- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be battery positive voltage.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 8.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 1 and PCM connector C-42 terminal 102.



STEP 8. Check the switch output voltage at PCM connector C-42 by backprobing. ("3" position)

Measure the voltage between terminal 109 and ground by backprobing.

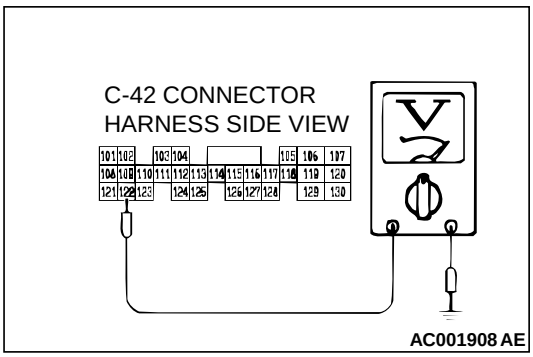
- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be battery positive voltage.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 9.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 5 and PCM connector C-42 terminal 109.

TSB Revision



STEP 9. Check the switch output voltage at PCM connector C-42 by backprobing. ("2" position)

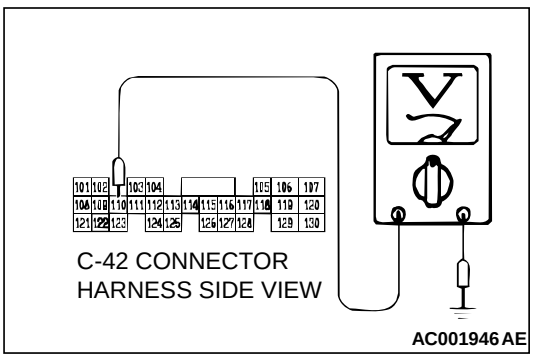
Measure the voltage between terminal 122 and ground by backprobing.

- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be battery positive voltage.
- When selector lever position is "L," voltage should be 0.5 volt or less.

Q: Is the voltage normal?

YES : Go to Step 10.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 2 and PCM connector C-42 terminal 122.



STEP 10. Check the switch output voltage at PCM connector C-42 by backprobing. ("L" position)

Measure the voltage between terminal 110 and ground by backprobing.

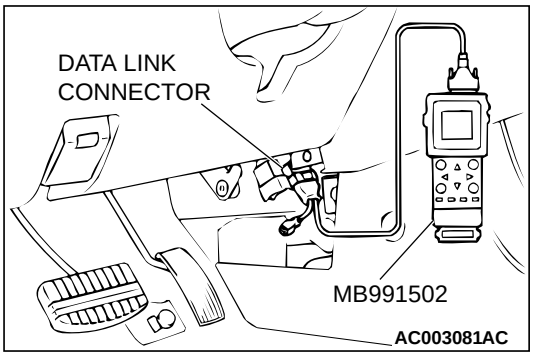
- When selector lever position is "P," voltage should be 0.5 volt or less.
- When selector lever position is "R," voltage should be 0.5 volt or less.
- When selector lever position is "N," voltage should be 0.5 volt or less.
- When selector lever position is "D," voltage should be 0.5 volt or less.
- When selector lever position is "3," voltage should be 0.5 volt or less.
- When selector lever position is "2," voltage should be 0.5 volt or less.
- When selector lever position is "L," voltage should be battery positive voltage.

Q: Is the voltage normal?

YES : Go to Step 11.

NO : Turn the ignition switch to "LOCK" (OFF) position. Repair it because of the harness damage between the Park/Neutral position switch connector B-39 terminal 6 and PCM connector C-42 terminal 110.

TSB Revision



STEP 11. Using scan tool MB991502, check data list item 61: Park/Neutral Position Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 61: Park/Neutral Position Switch.
- Move the selector lever to "P," "R," "N," "D," "3," "2," "L" positions to confirm whether the MUT-II.

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

Q: Is the switch operating properly?

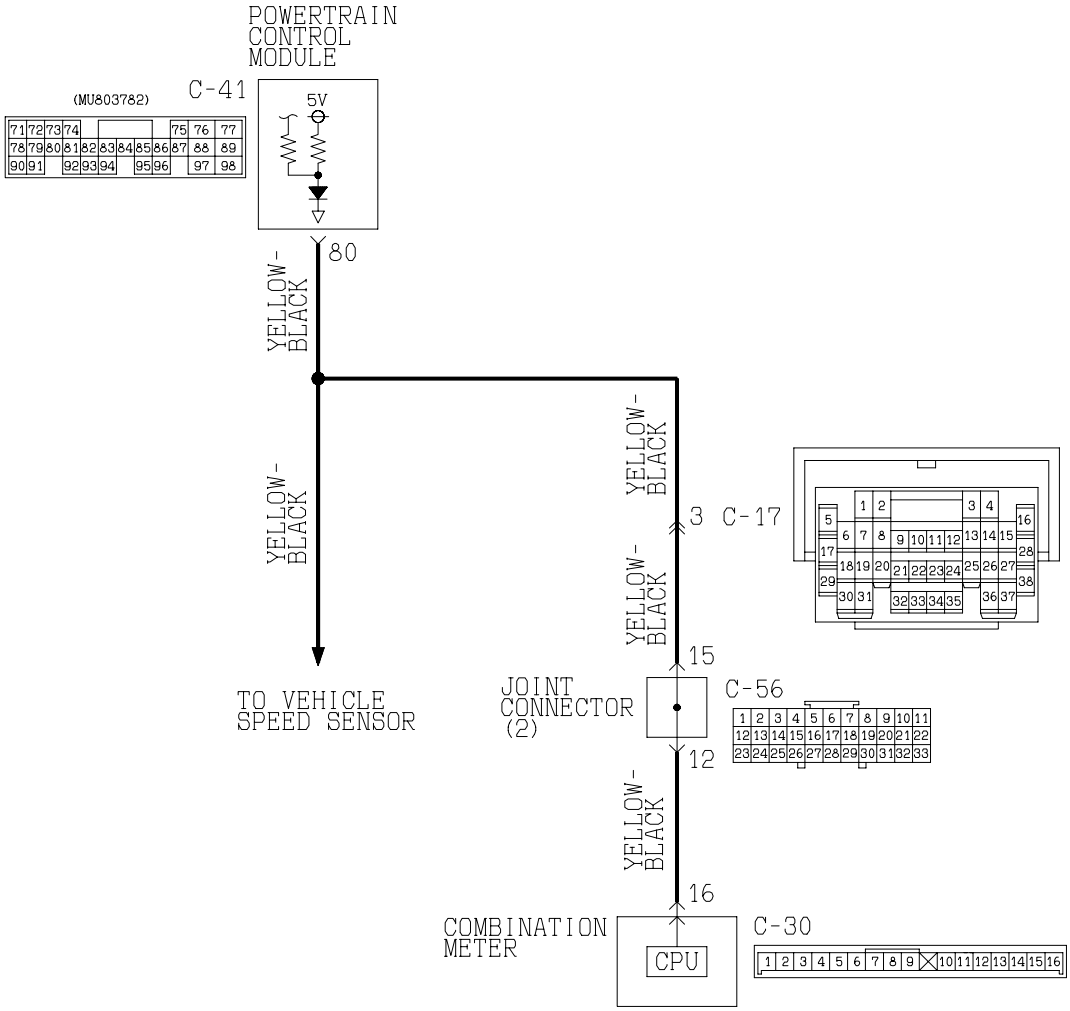
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

DTC 29: Vehicle Speed Sensor System

Vehicle Speed Sensor System Circuit



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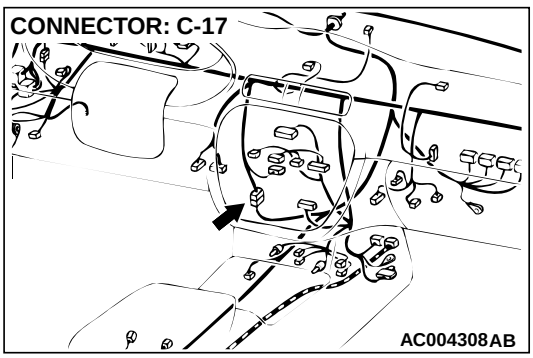
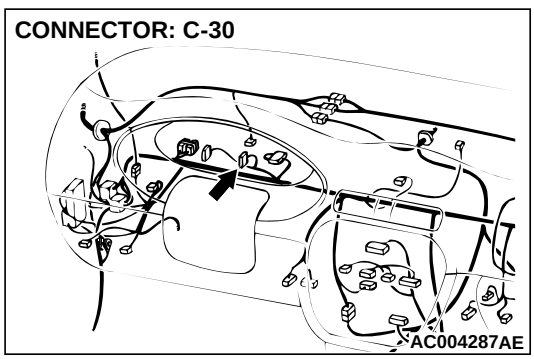
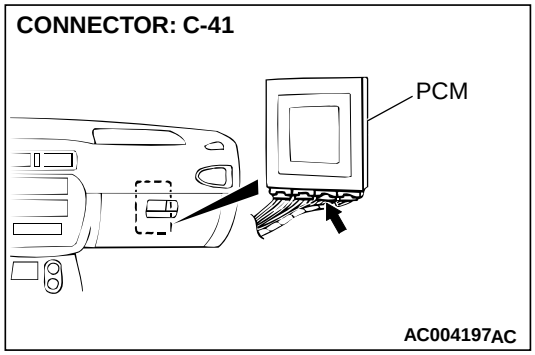
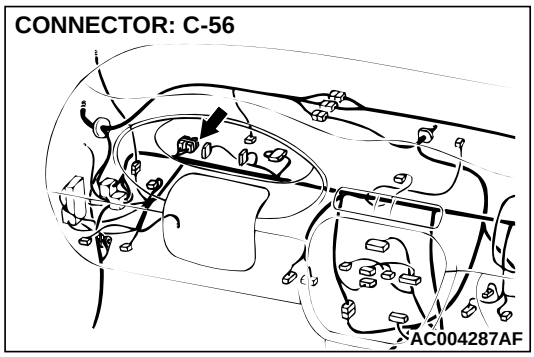




TSB Revision





CIRCUIT OPERATION

- 4.8 – 5.2 volt voltage is applied to the vehicle speed sensor output terminal (terminal 3) from the PCM (terminal 80). The vehicle speed sensor generates a pulse signal when the output terminal is opened and ground.
- The PCM compares the vehicle speed sensor signal to input shaft and output shaft speed sensor signals.
- If the vehicle speed sensor becomes inoperative, the transmission will not shift normally.

DTC SET CONDITIONS

If the PCM detects no pulse signal from the vehicle speed sensor for continuous period of 30 seconds under following conditions, it is judged as a vehicle sensor system malfunction and DTC number "29" is displayed.

- Driving forward
- Output shaft speed is 900 r/min or more

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the vehicle speed sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

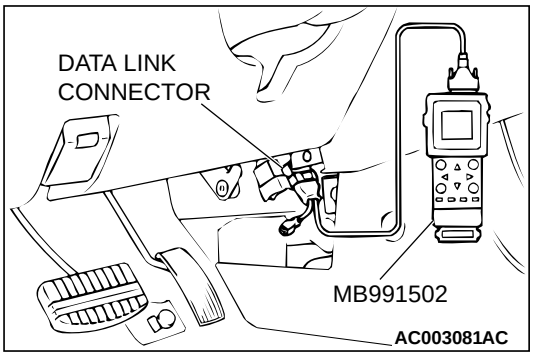
Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Check the speedometer.

Q: Is the speedometer operating properly?

YES : Go to Step 2.
NO : Check the vehicle speed sensor. Refer to GROUP 54A, Combination Meters Assembly and Vehicle Speed Sensor – On-vehicle Service P.54A-65.

TSB Revision



STEP 2. Using scan tool MB991502, check data list item 29: Vehicle Speed Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 29: Vehicle Speed Sensor.
- Check that the speedometer and MUT-II display speed match when driving at a vehicle speed of 40 km/h (25 mph).

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

Q: Is the sensor operating properly?

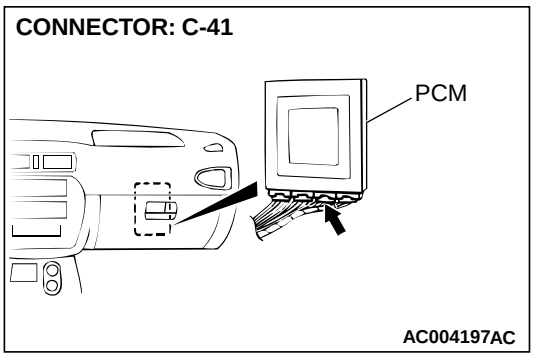
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 3.

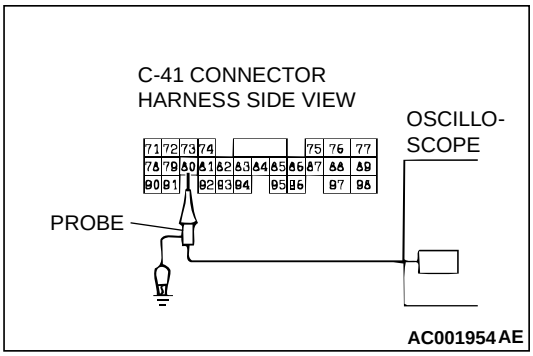
TSB Revision

STEP 3. Using the oscilloscope, check the waveform at PCM connector C-41.

(1) Do not disconnect connector C-41.

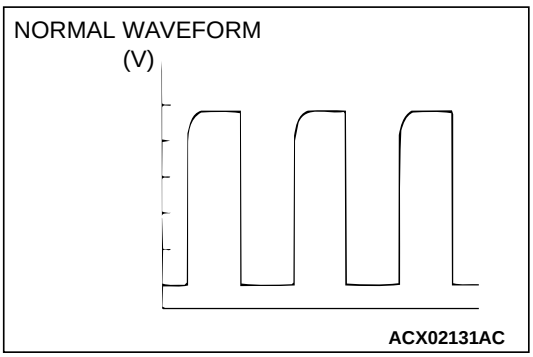


(2) Connect an oscilloscope probe to PCM connector C-41 terminal 80 by backprobing.
(3) Start the engine.



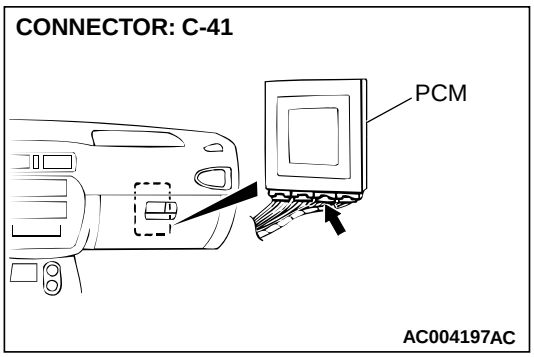
(4) Check the waveform.
- The waveform should show a pattern similar to the illustration when running the vehicle.

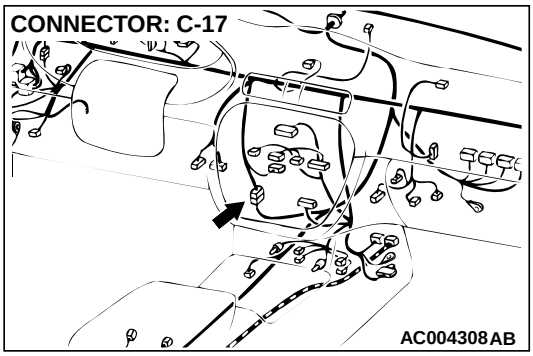
(5) Turn the ignition switch to "LOCK" (OFF) position.



Q: Is the waveform normal?

YES : Go to Step 5.
NO : Go to Step 4.

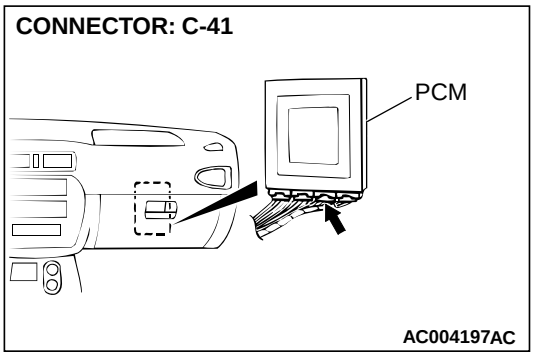




STEP 4. Check connectors C-41 at PCM and C-17 at intermediate connector for damage.
Q: Are the connectors in good condition?

YES : Repair it because of harness open circuit or damage between PCM connector C-41 terminal 80 and intermediate connector C-17 terminal 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

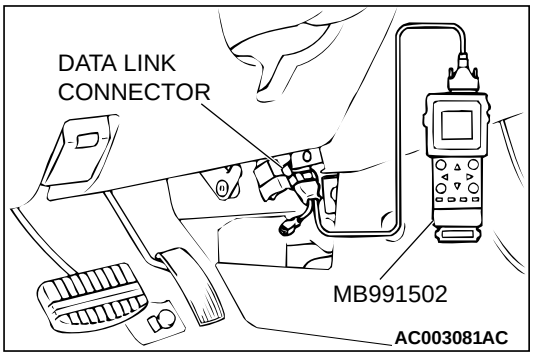


STEP 5. Check connector C-41 at PCM for damage.
Q: Is the connector in good condition?

YES : Go to Step 6.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



STEP 6. Using scan tool MB991502, check data list item 29: Vehicle Speed Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 29, Vehicle Speed Sensor.
- Check that the speedometer and MUT-II display speed match when driving at a vehicle speed of 40 km/h (25 mph).

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

Q: Is the sensor operating properly?

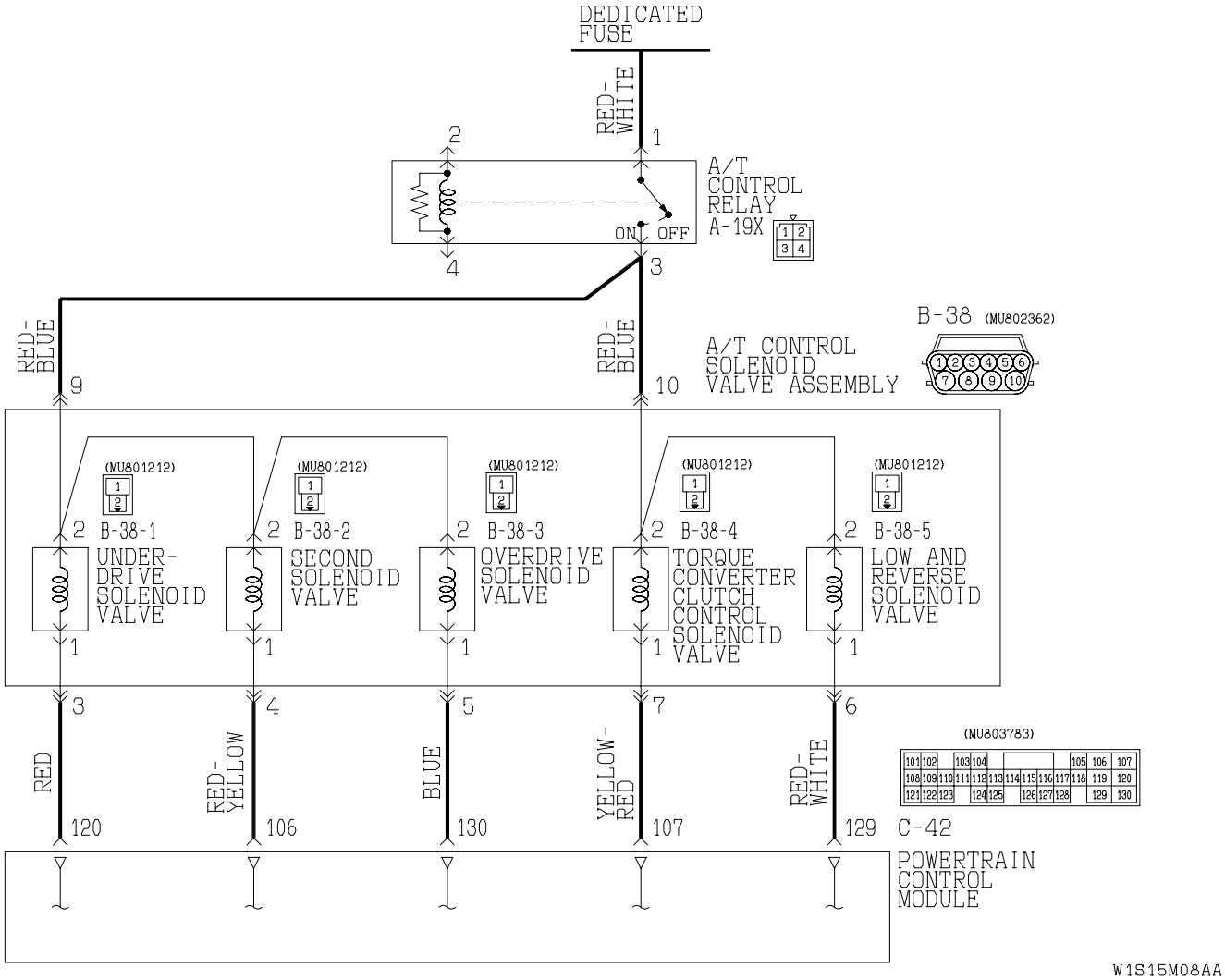
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

DTC 31: Low-Reverse Solenoid Valve System

Solenoid Valve System Circuit



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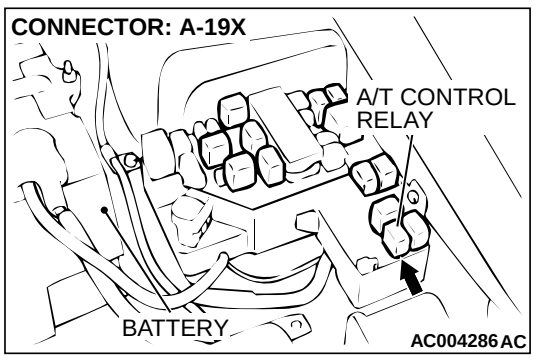

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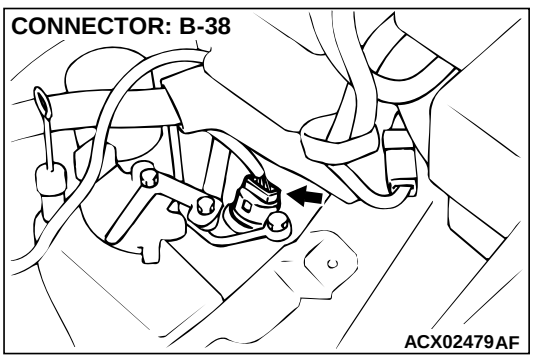

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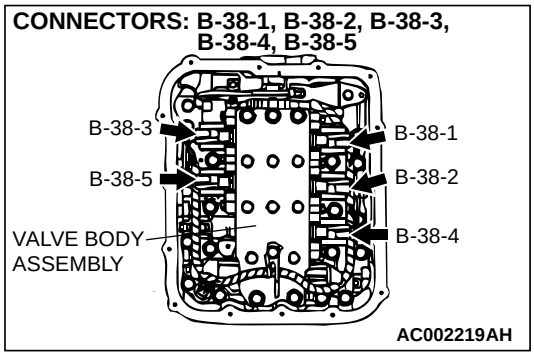
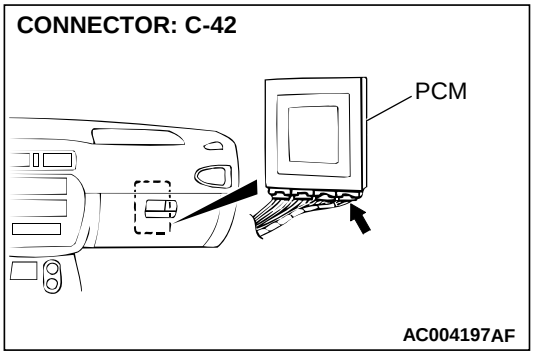
TSB Revision





CIRCUIT OPERATION

- A/T control relay supplies battery positive voltage to each solenoid valve (terminal 9 and 10).
- Solenoid valve closes when energized (on), and opens when deenergized (off). The PCM energize or deenergize solenoid valve, based on inputs data from sensors such as Throttle Position Sensor, Park/Neutral Position Switch, Stoplight Switch, Vehicle Speed Sensor, Input Shaft Speed Sensor, Output Shaft Speed Sensor, A/T Fluid Temperature Sensor etc.
- The PCM provides the ground to energize solenoid. The ground time is displayed in percent.
- As solenoid is energized or deenergized, it influences hydraulic pressure in the transmission applying and releasing elements.

DTC SET CONDITIONS

If the resistance value for a solenoid valve circuit is greater than 3.5 Ω for 4 seconds at 100°C (212°F) or less than 2.6 Ω for 4 seconds at 100°C (212°F), it is judged that there is a short circuit or an open circuit in the solenoid valve and the diagnostic trouble code number "31" is displayed. The transmission is locked into 3rd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of low-reverse solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

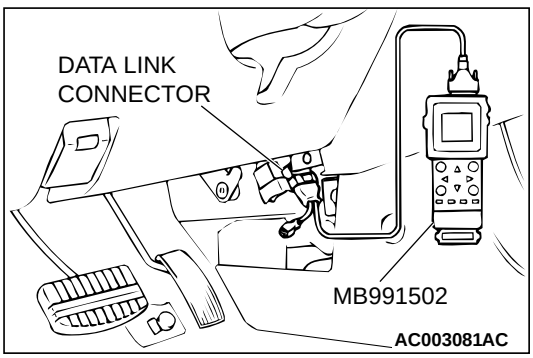
STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

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

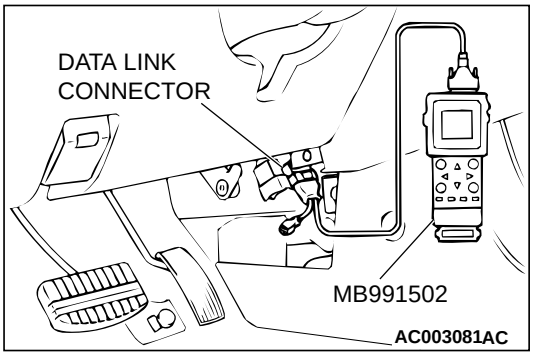
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?

YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 2.



TSB Revision



STEP 2. Using scan tool MB991502, check actuator test item 01: Low-Reverse Solenoid Valve.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 01: Low-Reverse Solenoid Valve.
- An operation sound should be heard from solenoid valve when the low-reverse solenoid valve is operated.

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

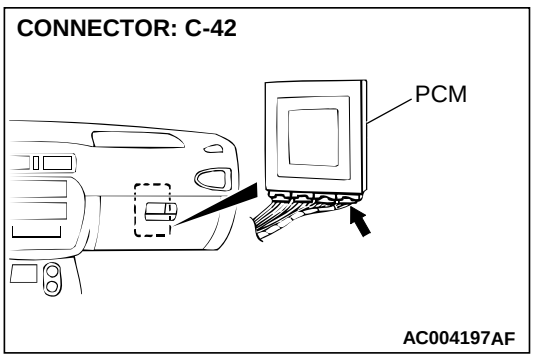
Q: Is the solenoid valve operating properly?

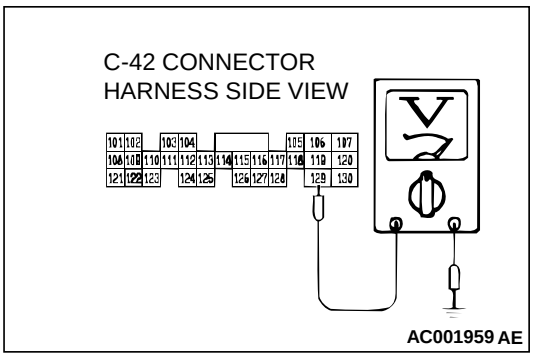
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 3.

STEP 3. Check the solenoid valve output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 129 and ground by backprobing.
- Voltage should be battery positive voltage.

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

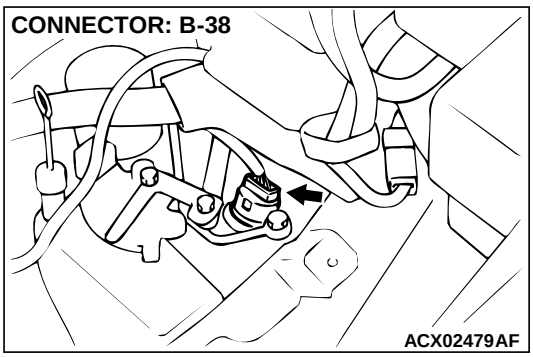
Q: Is the voltage normal?

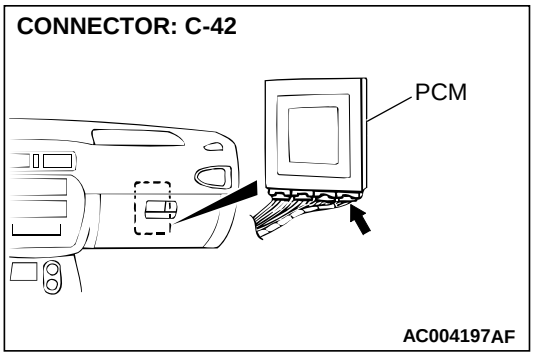
YES : Go to Step 4.
NO : Go to Step 9.

TSB Revision

STEP 4. Check connectors B-38 at solenoid valve assembly and C-42 at PCM for damage.
Q: Are the connectors in good condition?

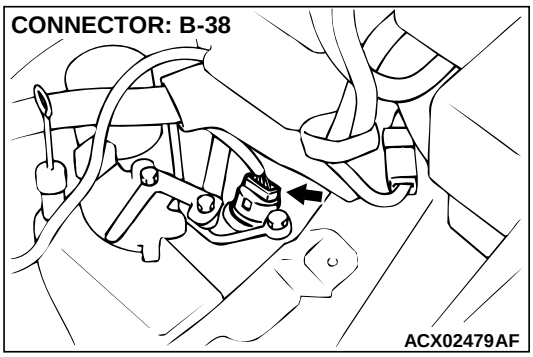
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

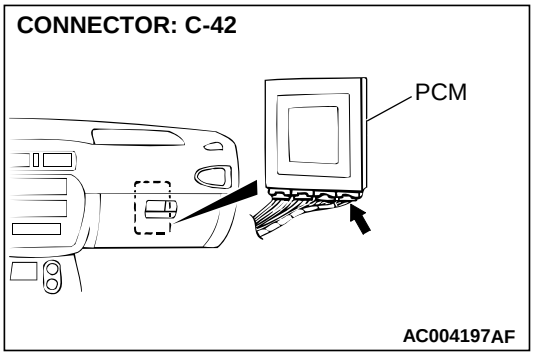




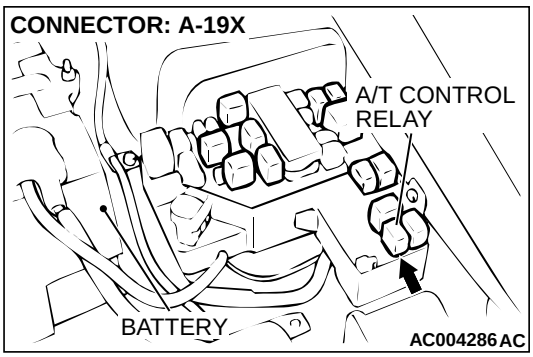
STEP 5. Check harness for damage between solenoid valve assembly connector B-38 terminal 6 and PCM connector C-42 terminal 129.
Q: Is the harness wire in good condition?

YES : Go to Step 6.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision

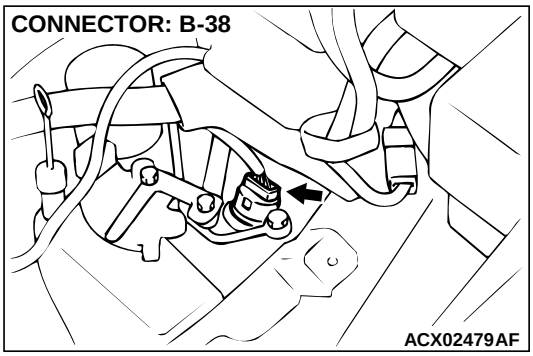


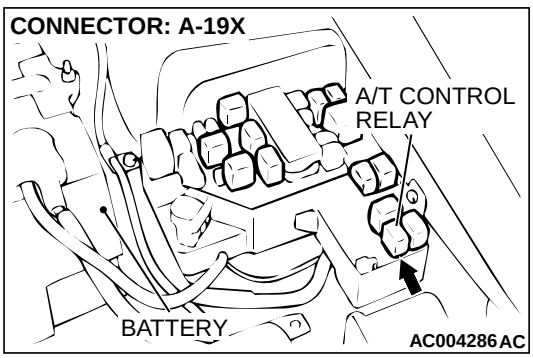
STEP 6. Check connector A-19X at A/T control relay for damage.

Q: Is the connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





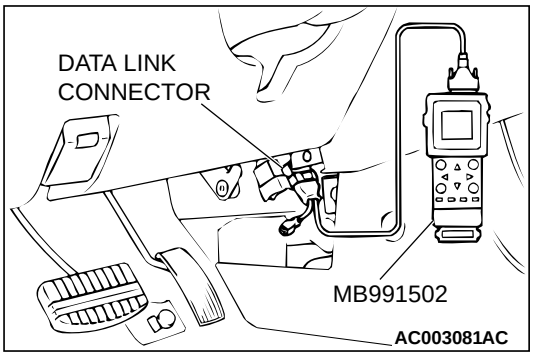
STEP 7. Check harness for damage between solenoid valve assembly connector B-38 terminal 10 and A/T control relay connector A-19X terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 8.

NO : Repair it.

TSB Revision



STEP 8. Using scan tool MB991502, check actuator test item 01: Low-Reverse Solenoid Valve.

⚠ CAUTION

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

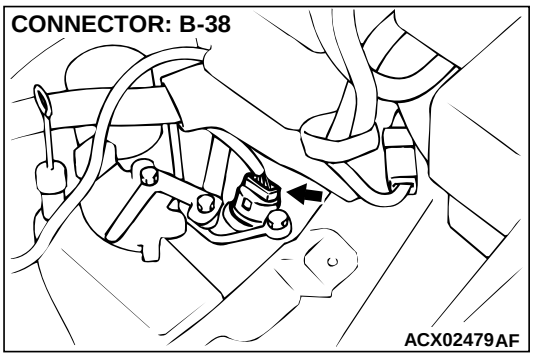
(1) Connect scan tool MB991502 to data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to the actuator test mode for item 01: Low-Reverse Solenoid Valve.
- An operation sound should be heard from solenoid valve when the low-reverse solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.



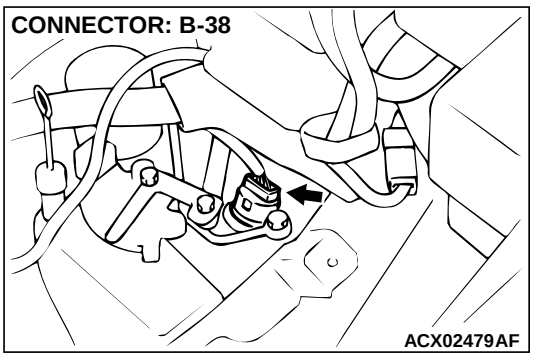
STEP 9. Check connector B-38 at solenoid valve assembly for damage.

Q: Is the connector in good condition?

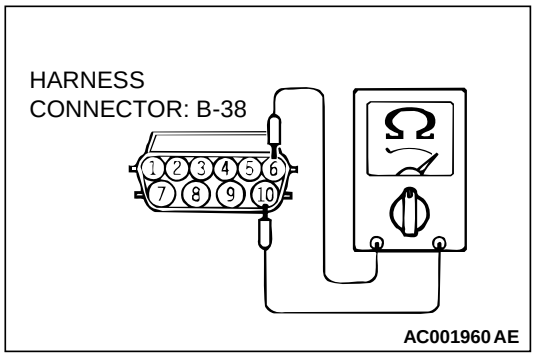
YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 10. Check the low-reverse solenoid valve at solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the solenoid valve side.



(2) Measure the resistance between terminal 6 and 10.

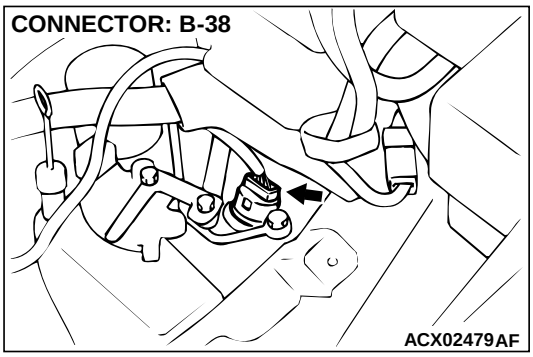
Standard value: 2.7 – 3.4 Ω

Q: Is the resistance at the standard value?

YES : Go to Step 11.

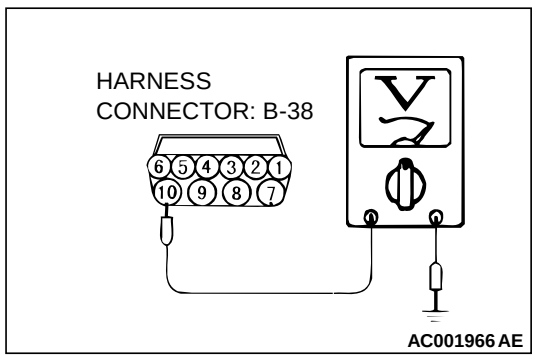
NO : Replace the low-reverse solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

STEP 11. Check the power supply voltage at solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.

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



(3) Measure the voltage between terminal 10 and ground.
- Voltage should be battery positive voltage.

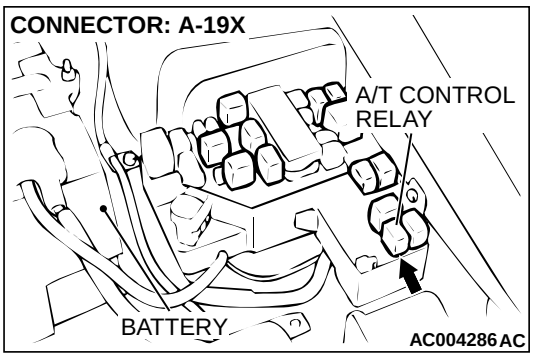
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 13.

NO : Go to Step 12.

TSB Revision

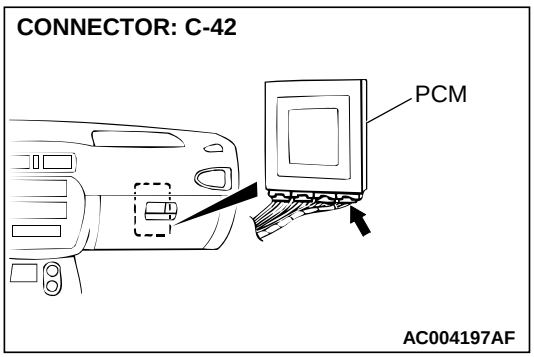


STEP 12. Check connector A-19X at A/T control relay for damage.

Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between solenoid valve assembly connector B-38 terminal 10 and A/T control relay connector A-19X terminal 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

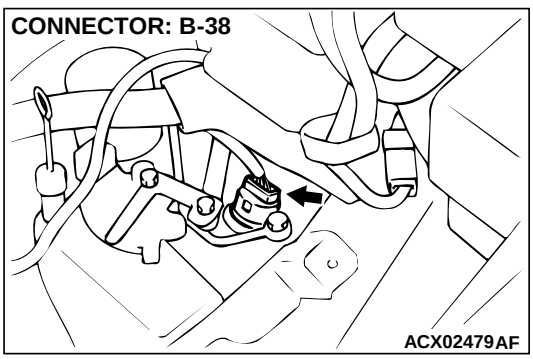


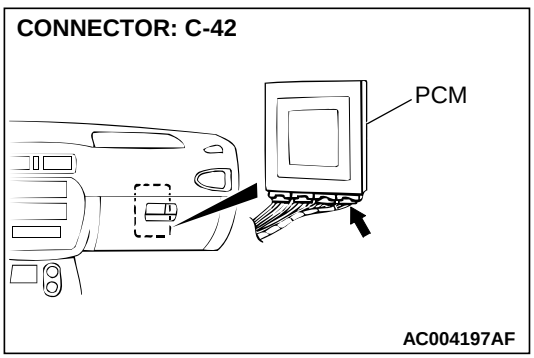
STEP 13. Check connector C-42 at PCM connector for damage.

Q: Is the connector in good condition?

YES : Go to Step 14.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 14. Check harness for open circuit, or short circuit to ground between solenoid valve assembly connector B-38 terminal 6 and PCM connector C-42 terminal 129.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Repair it.

TSB Revision

DTC 32: Underdrive Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-156.

CIRCUIT OPERATION
Refer to P.23A-156.

DTC SET CONDITIONS
If the resistance value for a solenoid valve circuit is greater than 3.5 Ω for 4 seconds at 100°C (212°F) or less than 2.6 Ω for 4 seconds at 100°C (212°F), it is judged that there is a short circuit or an open circuit in the solenoid valve and the diagnostic trouble code number "32" is displayed. The transmission is locked into 3rd gear as a fail-safe measure.

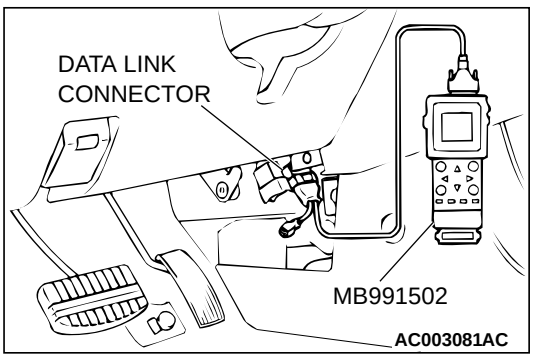
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of underdrive solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

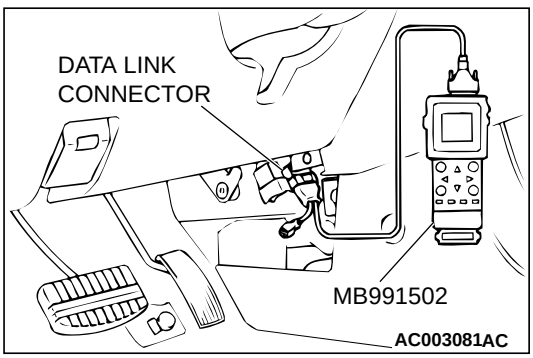
⚠ CAUTION
To prevent damage to scan tool MB991502, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?
YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 02: Underdrive Solenoid Valve.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 02: Underdrive Solenoid Valve.
- An operation sound should be heard from solenoid valve when the underdrive solenoid valve is operated.

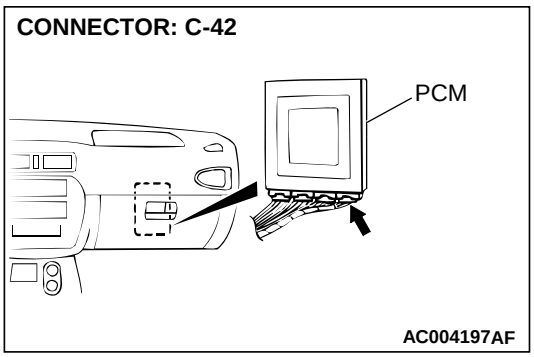
(4) Turn the ignition switch to "LOCK" (OFF) position.

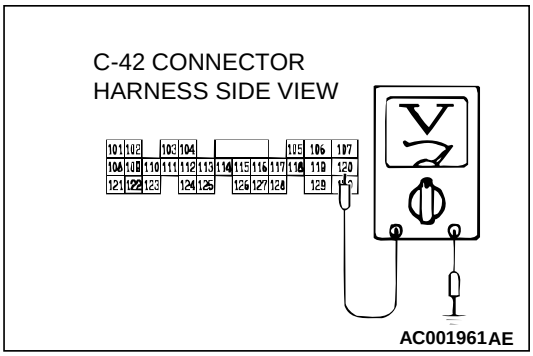
Q: Is the solenoid valve operating properly?
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

TSB Revision

STEP 3. Check the solenoid valve output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 120 and ground by backprobing.
- Voltage should be battery positive voltage.

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

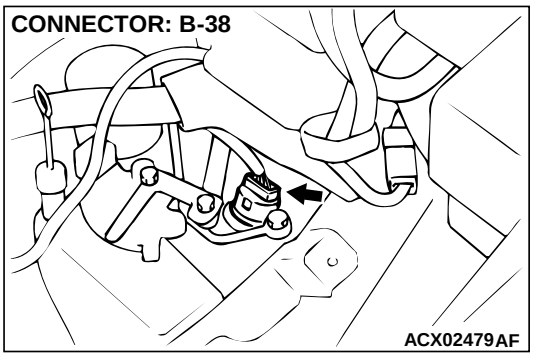
Q: Is the voltage normal?

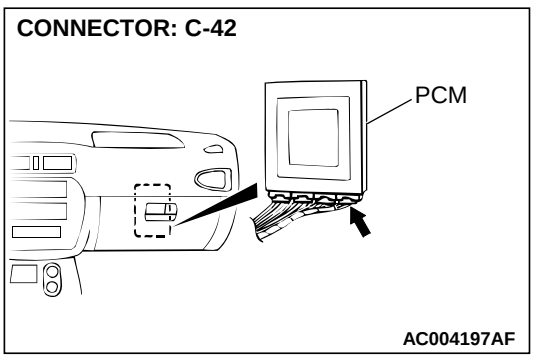
YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Check connectors B-38 at solenoid valve assembly and C-42 at PCM for damage.

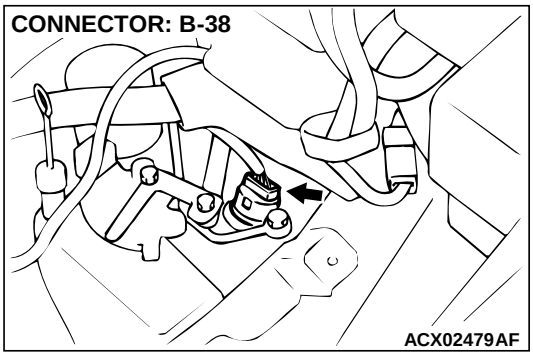
Q: Are the connectors in good condition?

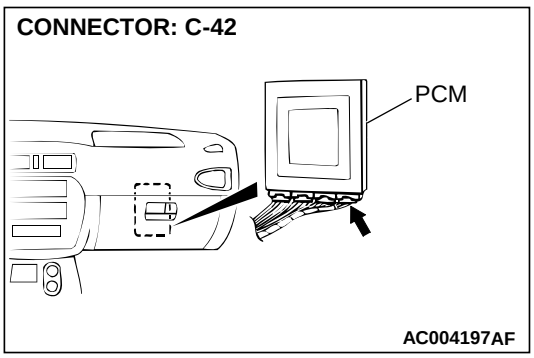
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



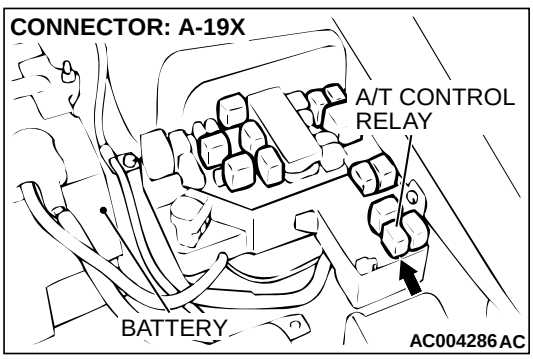


STEP 5. Check harness for damage between solenoid valve assembly connector B-38 terminal 3 and PCM connector C-42 terminal 120.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it.



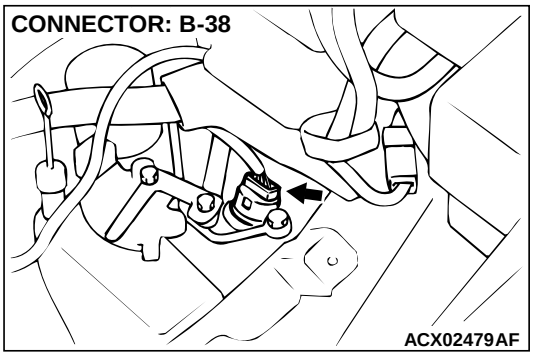
STEP 6. Check connector A-19X at A/T control relay for damage.

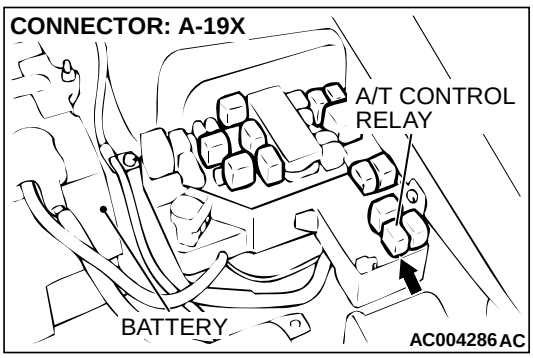
Q: Is the connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



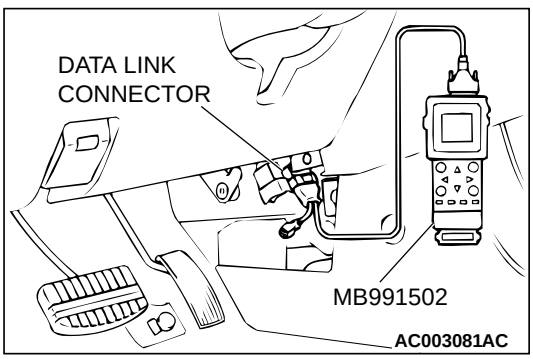


STEP 7. Check harness for damage between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 8.

NO : Repair it.



STEP 8. Using scan tool MB991502, check actuator test item 02: Underdrive Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to data link connector.

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

(3) Set scan tool MB991502 to the actuator test mode for item 02: Underdrive Solenoid Valve.

- An operation sound should be heard from solenoid valve when the underdrive solenoid valve is operated.

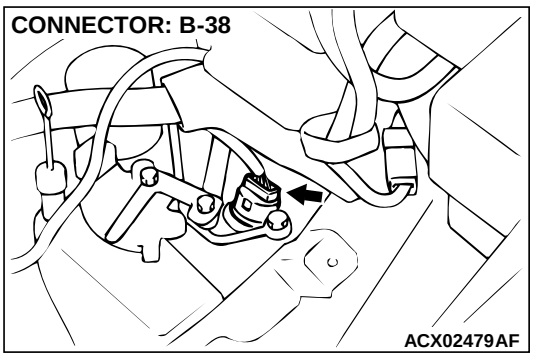
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

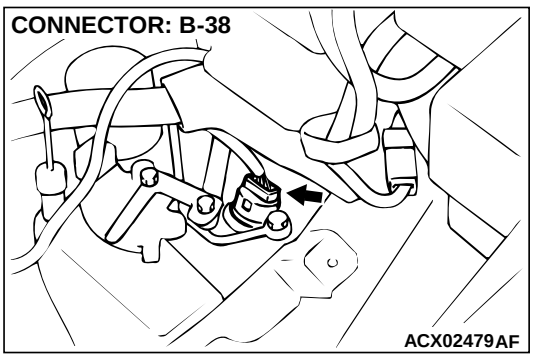


STEP 9. Check connector B-38 at solenoid valve assembly for damage.

Q: Is the connector in good condition?

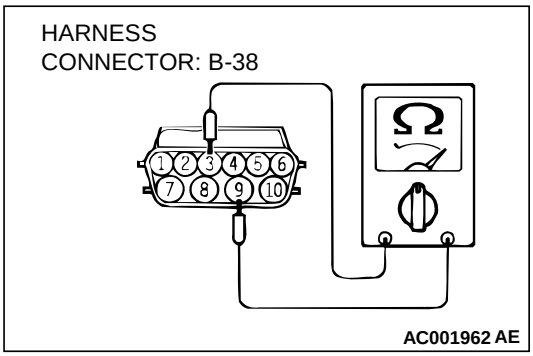
YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 10. Check the underdrive solenoid valve at solenoid valve assembly connector B-38.

(1) Disconnect connector B-38 and measure at the solenoid valve side.



(2) Measure the resistance between terminal 3 and 9.

Standard value: 2.7 – 3.4 Ω

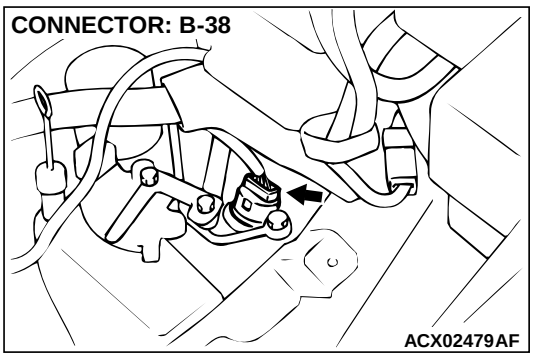
Q: Is the resistance at the standard value?

YES : Go to Step 11.

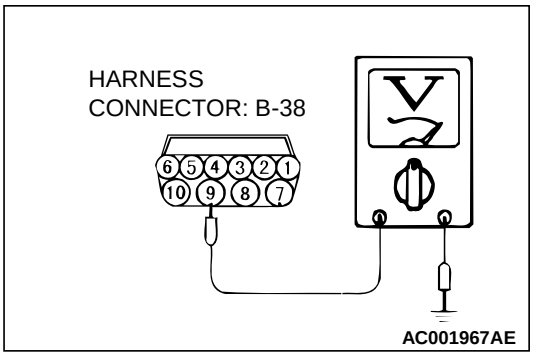
NO : Replace the underdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision

STEP 11. Check the power supply voltage at solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



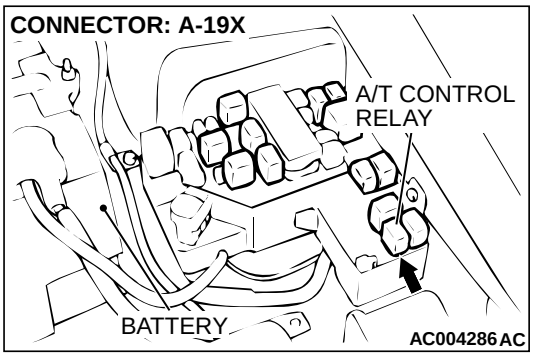
(3) Measure the voltage between terminal 9 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 13.
NO : Go to Step 12.

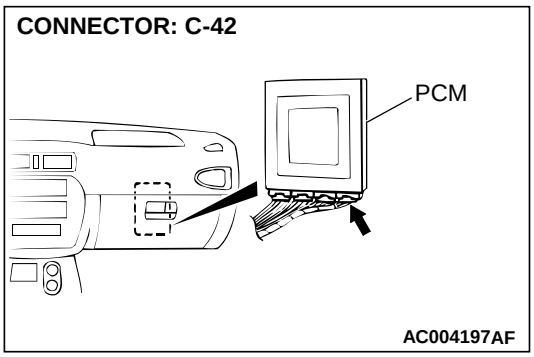
STEP 12. Check connector A-19X at A/T control relay for damage.



Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

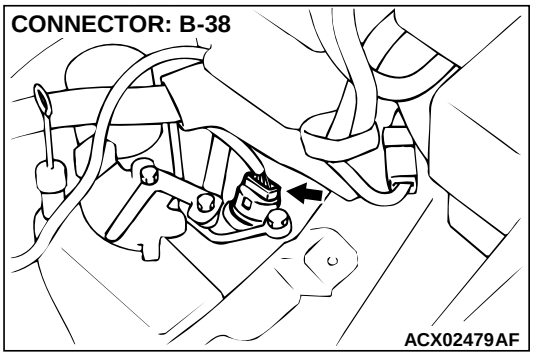
STEP 13. Check connector C-42 at PCM connector for damage.

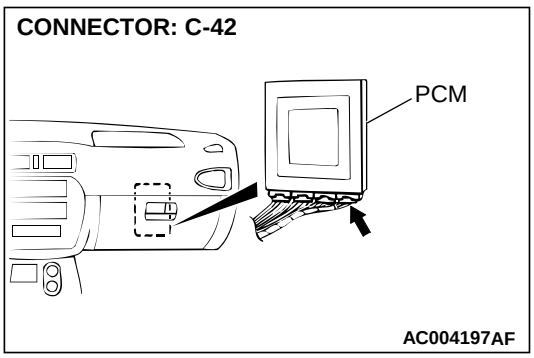


Q: Is the connector in good condition?

YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 14. Check harness for open circuit, or short circuit to ground between solenoid valve assembly connector B-38 terminal 3 and PCM connector C-42 terminal 120.
Q: Is the harness wire in good condition?

YES : Replace the PCM.
NO : Repair it.

DTC 33: Second Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-156.

CIRCUIT OPERATION
Refer to P.23A-156.

DTC SET CONDITIONS
If the resistance value for a solenoid valve circuit is greater than 3.5 Ω for 4 seconds at 100°C (212°F) or less than 2.6 Ω for 4 seconds at 100°C (212°F), it is judged that there is a short circuit or an open circuit in the solenoid valve and the diagnostic trouble code number "33" is displayed. The transmission is locked into 3rd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of second solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

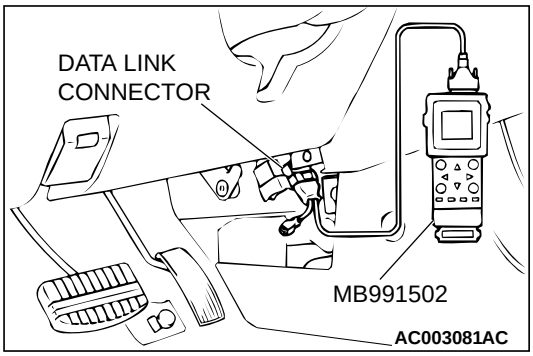
Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

⚠ CAUTION

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

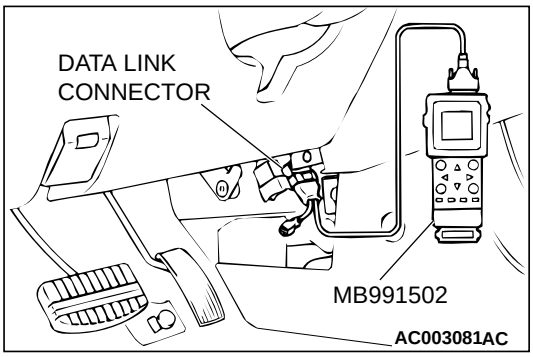


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?

YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 03: Second Solenoid Valve.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 03, Second Solenoid Valve.
- An operation sound should be heard from solenoid valve when the second solenoid valve is operated.

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

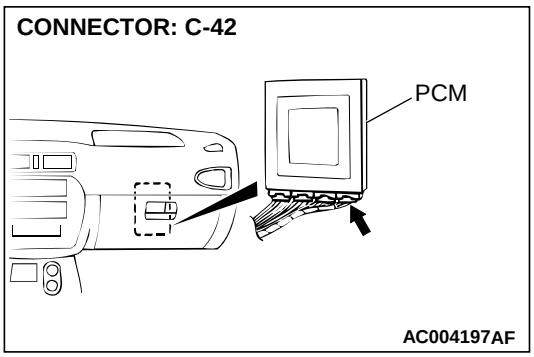
Q: Is the solenoid valve operating properly?

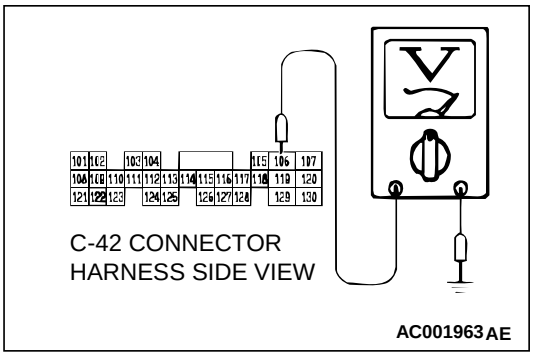
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

TSB Revision

STEP 3. Check the solenoid valve output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 106 and ground by backprobing.
- Voltage should be battery positive voltage.

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

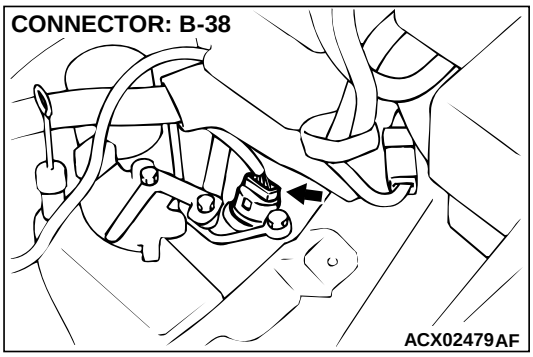
Q: Is the voltage normal?

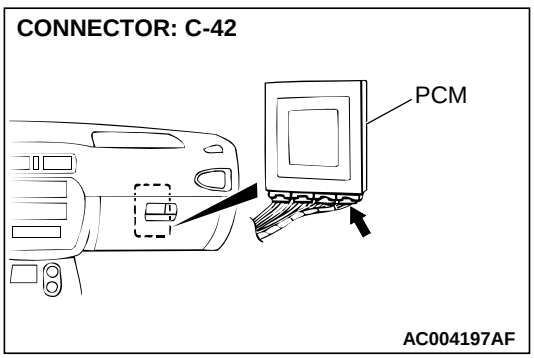
YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Check connectors B-38 at solenoid valve assembly and C-42 at PCM for damage.

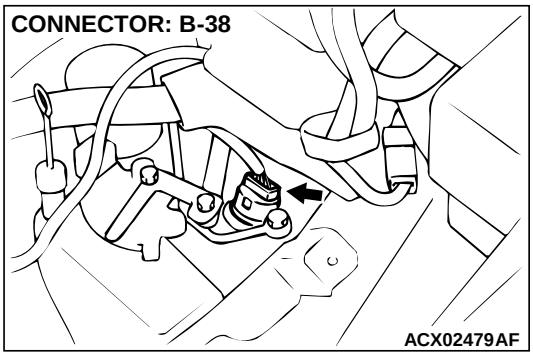
Q: Are the connectors in good condition?

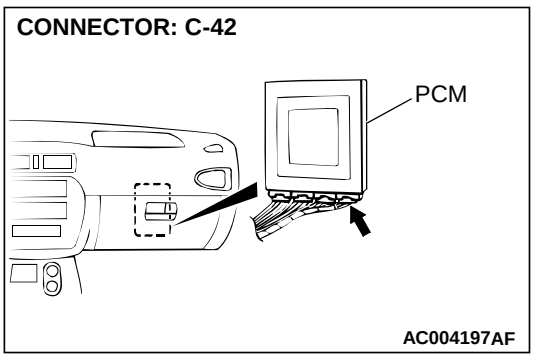
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



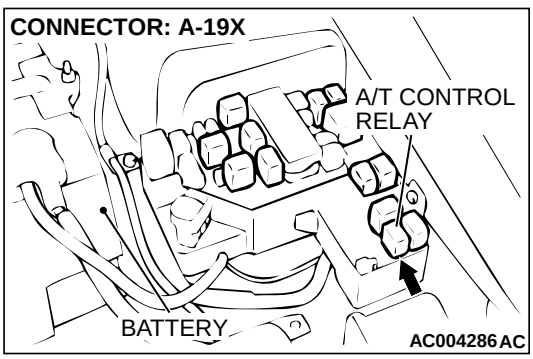


STEP 5. Check harness for damage between solenoid valve assembly connector B-38 terminal 4 and PCM connector C-42 terminal 106.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it.



STEP 6. Check connector A-19X at A/T control relay for damage.

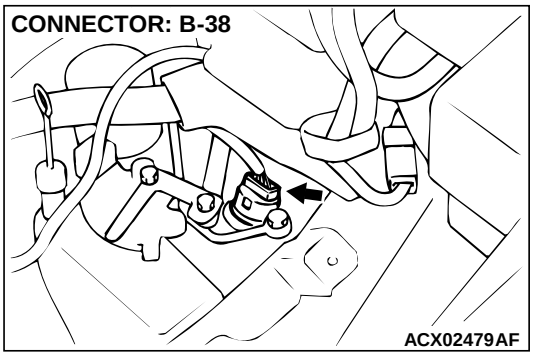
Q: Is the connector in good condition?

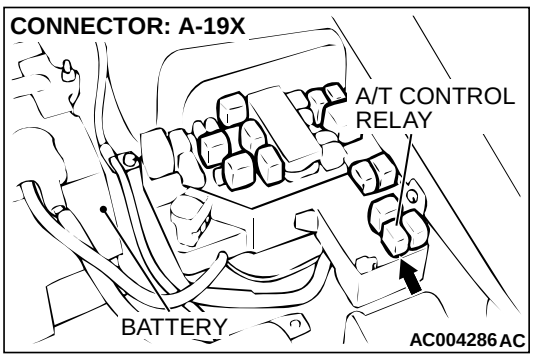
YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision

STEP 7. Check harness for damage between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.





Q: Is the harness wire in good condition?

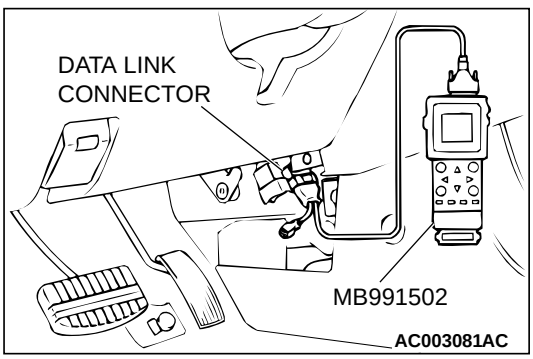
YES : Go to Step 8.

NO : Repair it.

STEP 8. Using scan tool MB991502, check actuator test item 03: Second Solenoid Valve.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to the actuator test mode for item 03: Second Solenoid Valve.
- An operation sound should be heard from solenoid valve when the second solenoid valve is operated.

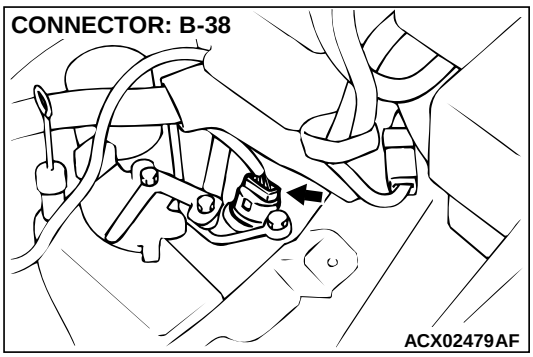
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

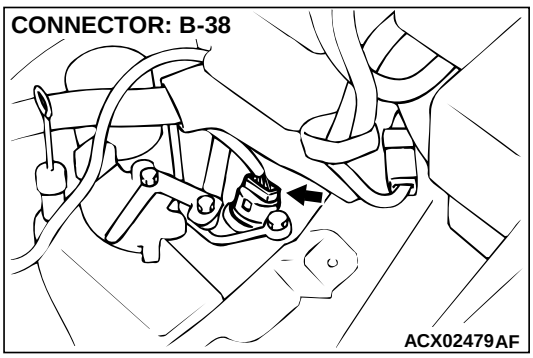


STEP 9. Check connector B-38 at solenoid valve assembly for damage.

Q: Is the connector in good condition?

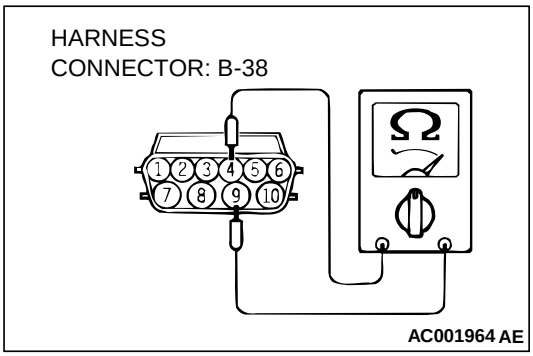
YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 10. Check the second solenoid valve at solenoid valve assembly connector B-38.

(1) Disconnect connector B-38 and measure at the solenoid valve side.



(2) Measure the resistance between terminal 4 and 9.

Standard value: 2.7 – 3.4 Ω

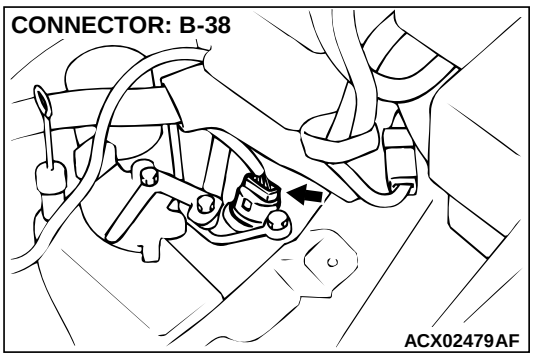
Q: Is the resistance at the standard value?

YES : Go to Step 11.

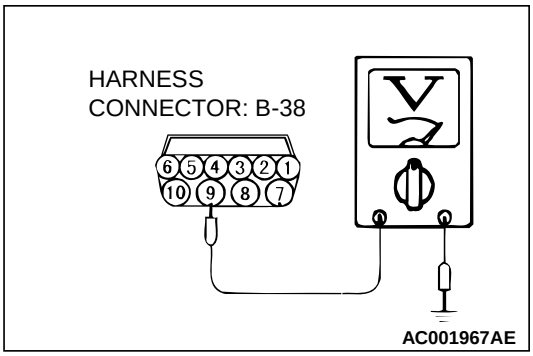
NO : Replace the second solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision

STEP 11. Check the power supply voltage at solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



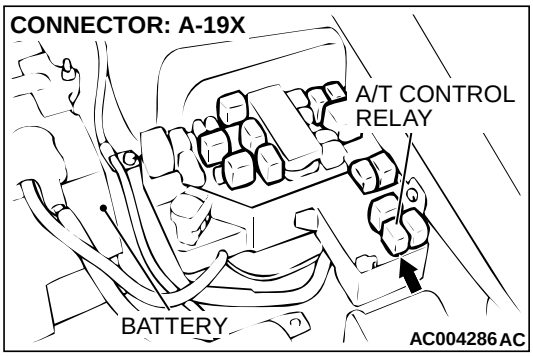
(3) Measure the voltage between terminal 9 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 13.
NO : Go to Step 12.

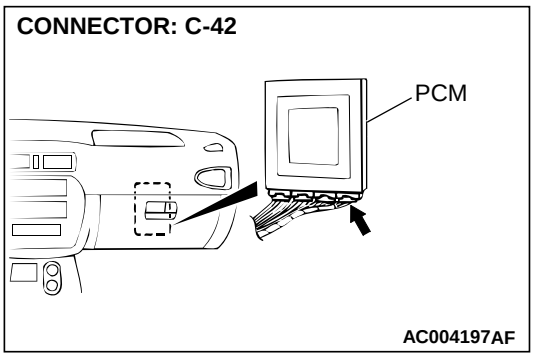
STEP 12. Check connector A-19X at A/T control relay for damage.



Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

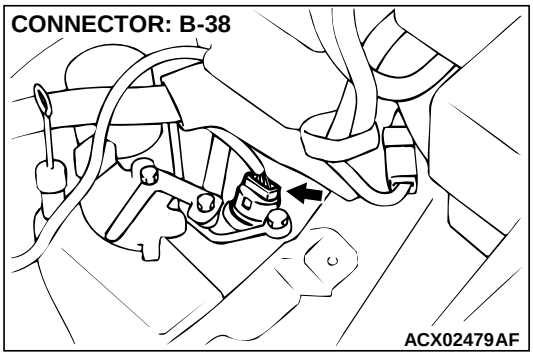
STEP 13. Check connector C-42 at PCM connector for damage.

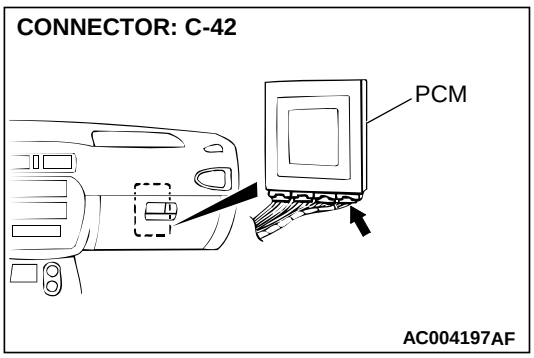


Q: Is the connector in good condition?

YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 14. Check harness for open circuit, or short circuit to ground between solenoid valve assembly connector B-38 terminal 4 and PCM connector C-42 terminal 106.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Repair it.

DTC 34: Overdrive Solenoid Valve System

Solenoid Valve System Circuit

Refer to P.23A-156.

CIRCUIT OPERATION

Refer to P.23A-156.

DTC SET CONDITIONS

If the resistance value for a solenoid valve circuit is greater than 3.5 Ω for 4 seconds at 100°C (212°F) or less than 2.6 Ω for 4 seconds at 100°C (212°F), it is judged that there is a short circuit or an open circuit in the solenoid valve and the diagnostic trouble code number "34" is displayed. The transmission is locked into 3rd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

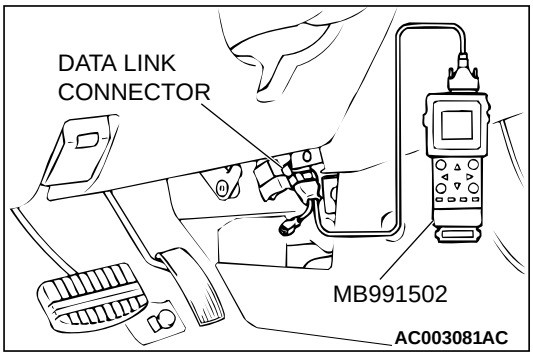
- Malfunction of underdrive solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

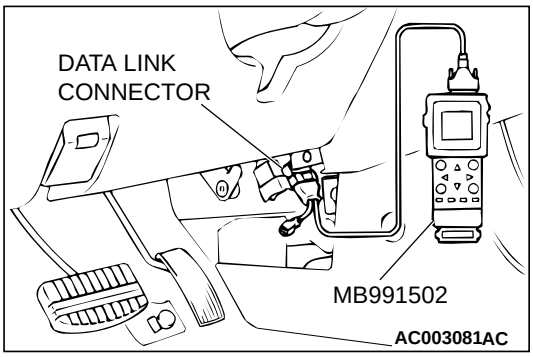
⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?

YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 2.



STEP 2. Using scan tool MB991502, check actuator test item 04: Overdrive Solenoid Valve.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 04, Overdrive Solenoid Valve.
- An operation sound should be heard from solenoid valve when the overdrive solenoid valve is operated.

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

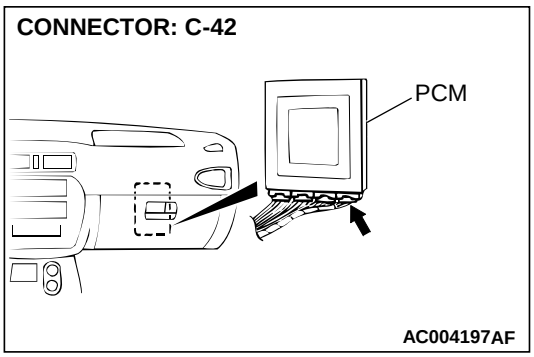
Q: Is the solenoid valve operating properly?

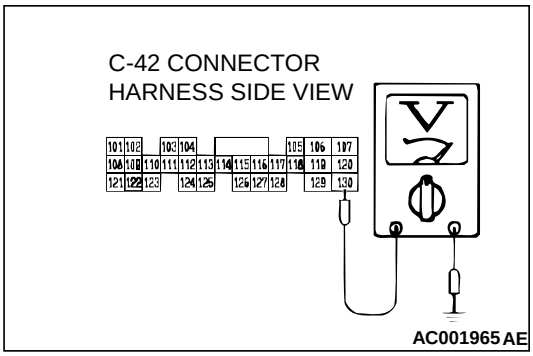
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

TSB Revision

STEP 3. Check the solenoid valve output voltage at PCM connector C-42 by backprobing.

(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 130 and ground by backprobing.
- Voltage should be battery positive voltage.

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

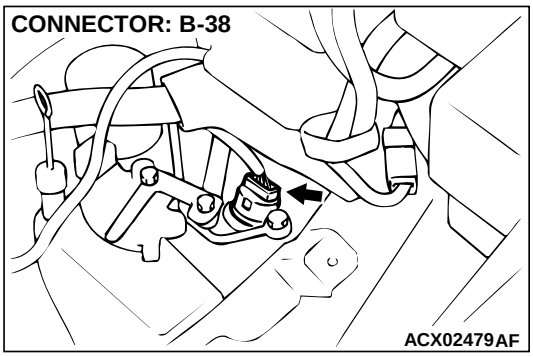
Q: Is the voltage normal?

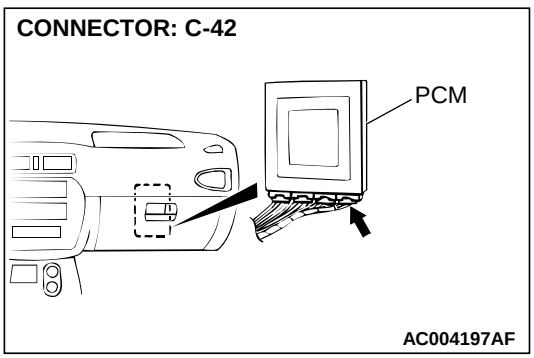
YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Check connectors B-38 at solenoid valve assembly and C-42 at PCM for damage.

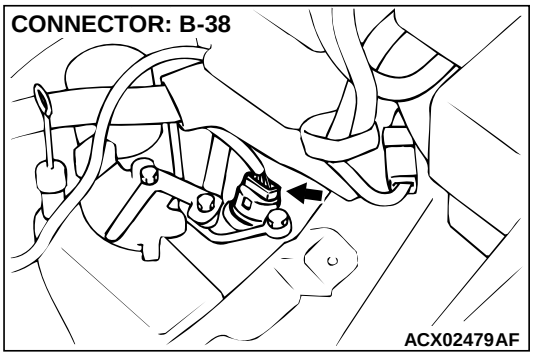
Q: Are the connectors in good condition?

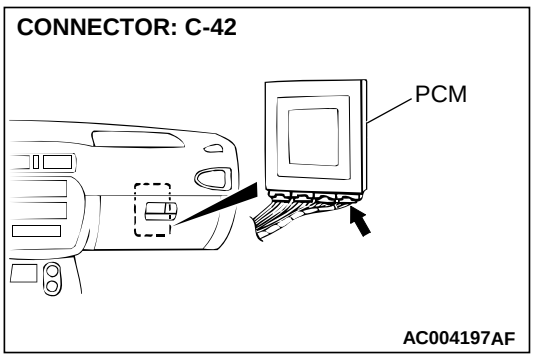
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





TSB Revision



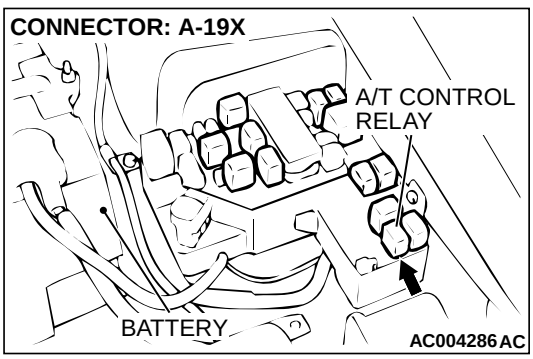


STEP 5. Check harness for damage between solenoid valve assembly connector B-38 terminal 5 and PCM connector C-42 terminal 130.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it.



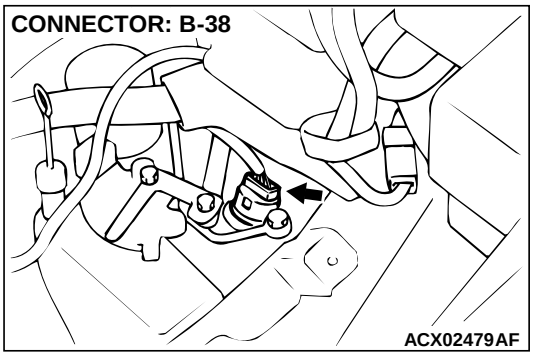
STEP 6. Check connector A-19X at A/T control relay for damage.

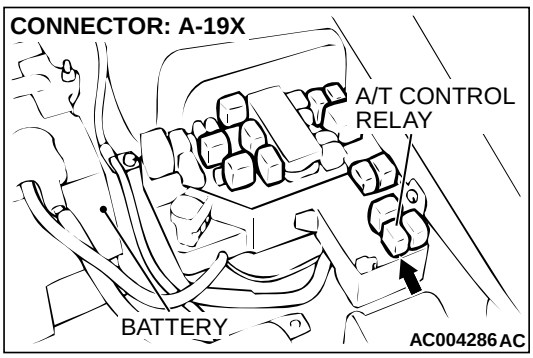
Q: Is the connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



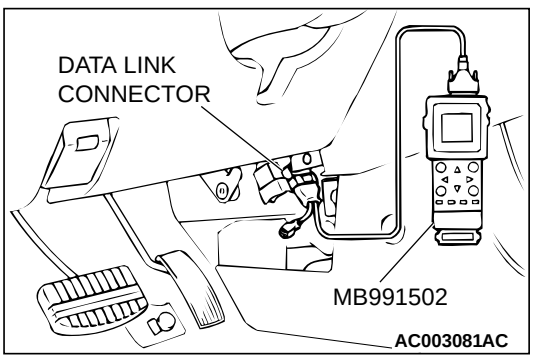


STEP 7. Check harness for damage between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 8.

NO : Repair it.



STEP 8. Using scan tool MB991502, check actuator test item 04: Overdrive Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to data link connector.

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

(3) Set scan tool MB991502 to the actuator test mode for item 04: Overdrive Solenoid Valve.

- An operation sound should be heard from solenoid valve when the overdrive solenoid valve is operated.

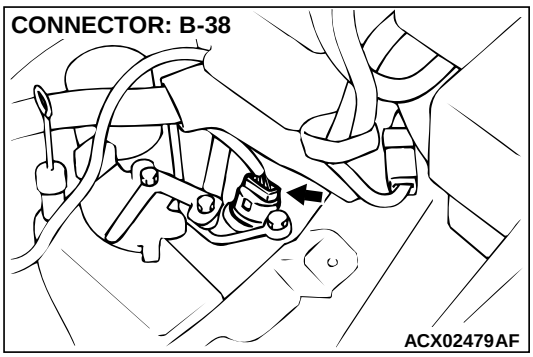
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

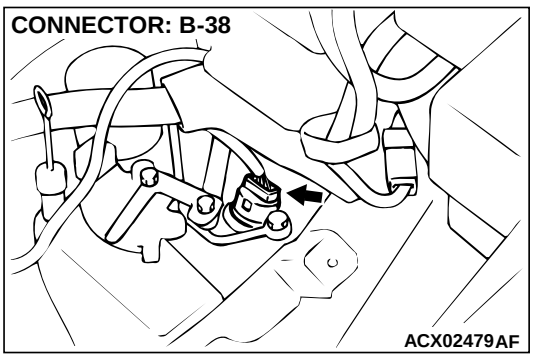


STEP 9. Check connector B-38 at solenoid valve assembly for damage.

Q: Is the connector in good condition?

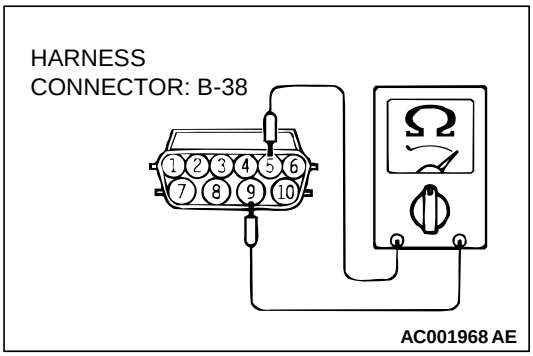
YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 10. Check the overdrive solenoid valve at solenoid valve assembly connector B-38.

(1) Disconnect connector B-38 and measure at the solenoid valve side.



(2) Measure the resistance between terminal 5 and 9.

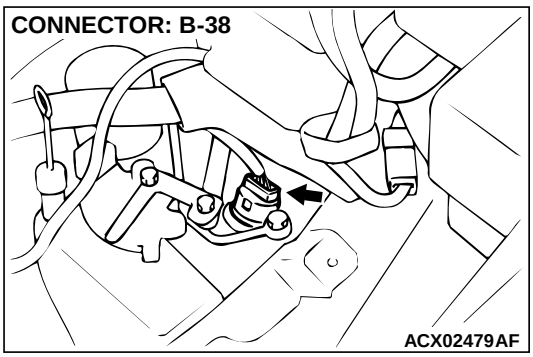
Standard value: 2.7 – 3.4 Ω

Q: Is the resistance at the standard value?

YES : Go to Step 11.

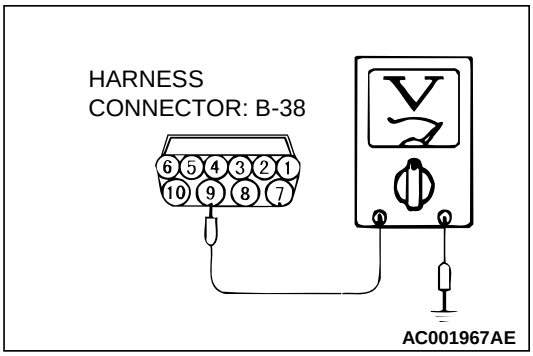
NO : Replace the overdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision



STEP 11. Check the power supply voltage at solenoid valve assembly connector B-38.

(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.

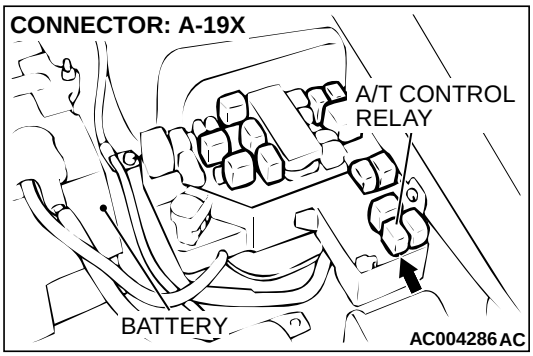


(3) Measure the voltage between terminal 9 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

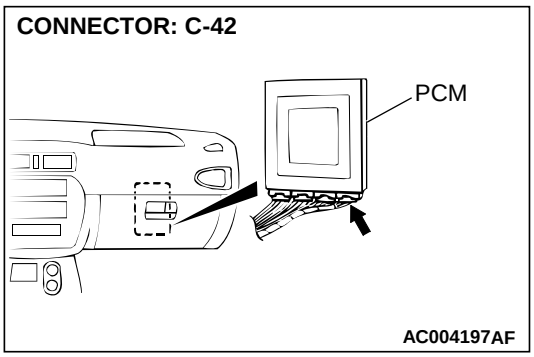
YES : Go to Step 13.
NO : Go to Step 12.



STEP 12. Check connector A-19X at A/T control relay for damage.

Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between solenoid valve assembly connector B-38 terminal 9 and A/T control relay connector A-19X terminal 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

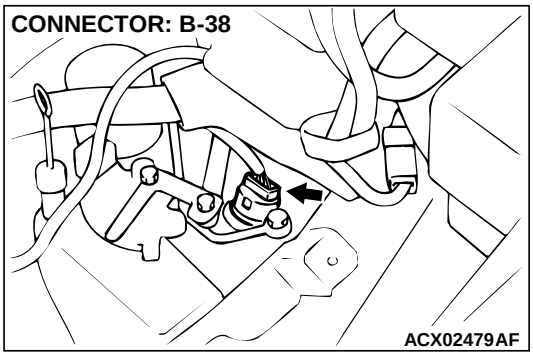


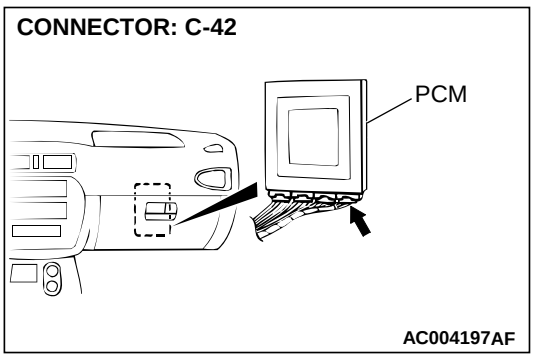
STEP 13. Check connector C-42 at PCM connector for damage.

Q: Is the connector in good condition?

YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 14. Check harness for open circuit, or short circuit to ground between solenoid valve assembly connector B-38 terminal 5 and PCM connector C-42 terminal 130.
Q: Is the harness wire in good condition?

YES : Replace the PCM.
NO : Repair it.

DTC 36: Torque Converter Clutch Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-156.

CIRCUIT OPERATION
Refer to P.23A-156.

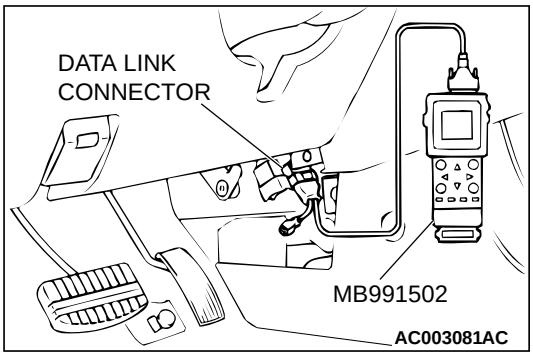
DTC SET CONDITIONS
If the resistance value for a solenoid valve circuit is greater than 3.5 Ω for 4 seconds at 100°C (212°F) or less than 2.6 Ω for 4 seconds at 100°C (212°F), it is judged that there is a short circuit or an open circuit in the solenoid valve and the diagnostic trouble code number "36" is displayed. The transmission is locked into 3rd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of torque converter clutch solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

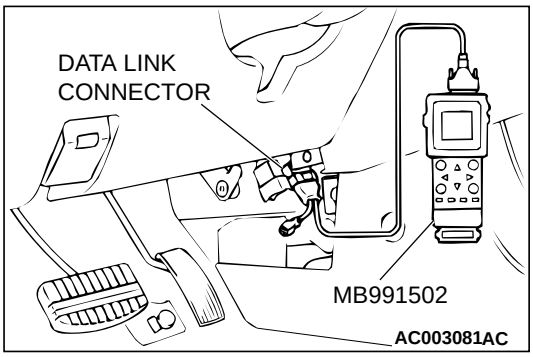
⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?

YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 2.



STEP 2. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06: Torque Converter Clutch Solenoid Valve.
- An operation sound should be heard from solenoid valve when the torque converter clutch solenoid valve is operated.

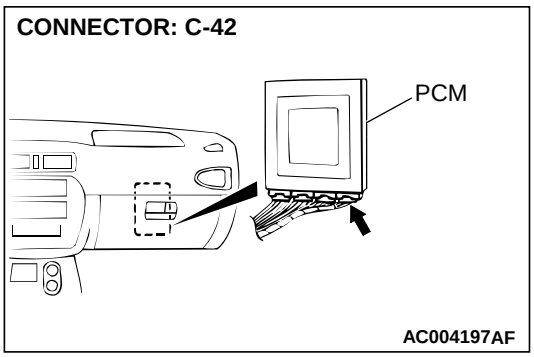
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

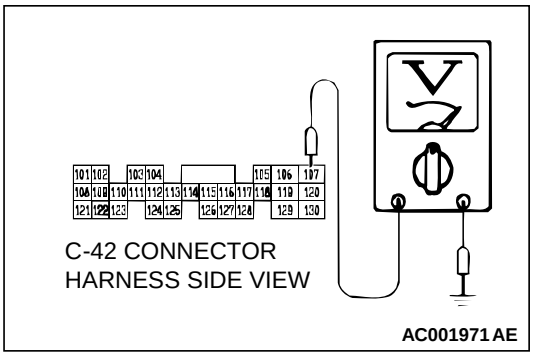
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 3.

TSB Revision

STEP 3. Check the solenoid valve output voltage at PCM connector C-42 by backprobing.



(1) Do not disconnect connector C-42.
(2) Turn the ignition switch to "ON" position.



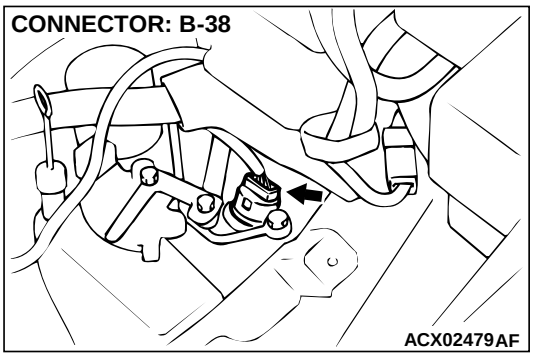
(3) Measure the voltage between terminal 107 and ground by backprobing.
- Voltage should be battery positive voltage.

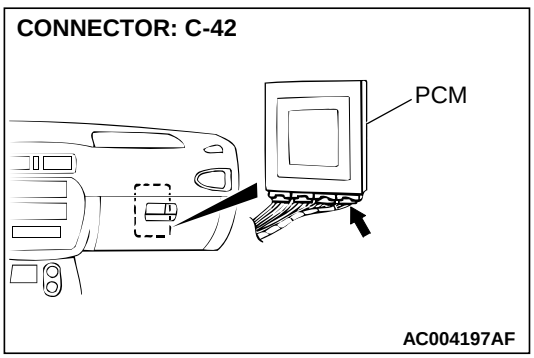
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the voltage normal?

YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Check connectors B-38 at solenoid valve assembly and C-42 at PCM for damage.

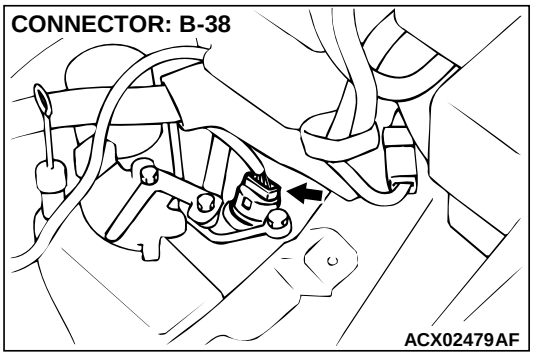


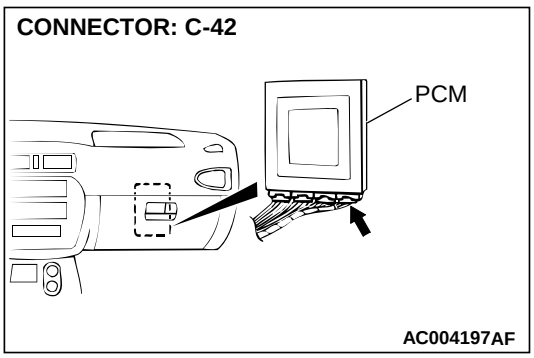


Q: Are the connectors in good condition?

YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



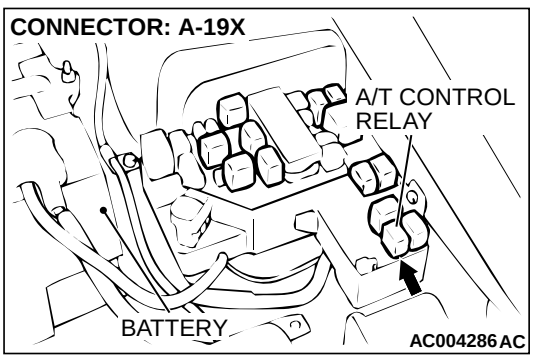


STEP 5. Check harness for damage between solenoid valve assembly connector B-38 terminal 7 and PCM connector C-42 terminal 107.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it.



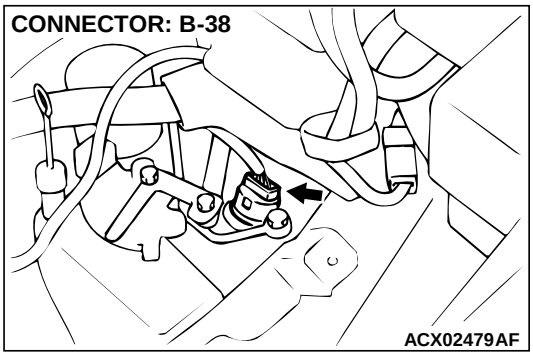
STEP 6. Check connector A-19X at A/T control relay for damage.

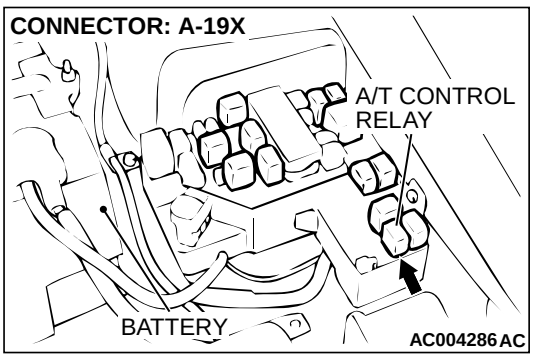
Q: Is the connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



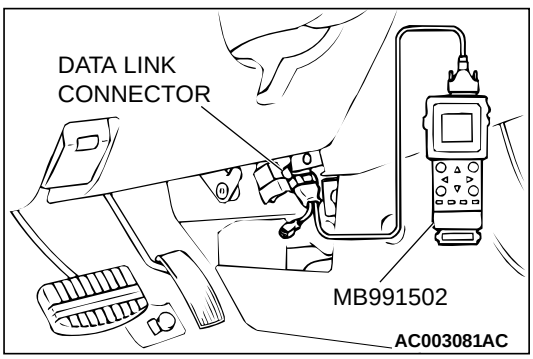


STEP 7. Check harness for damage between solenoid valve assembly connector B-38 terminal 10 and A/T control relay connector A-19X terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 8.

NO : Repair it.



STEP 8. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to data link connector.

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

(3) Set scan tool MB991502 to the actuator test mode for item 06: Torque Converter Clutch Solenoid Valve.

- An operation sound should be heard from solenoid valve when the torque converter clutch solenoid valve is operated.

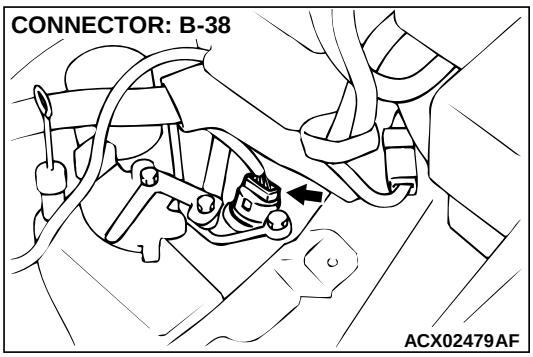
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

TSB Revision

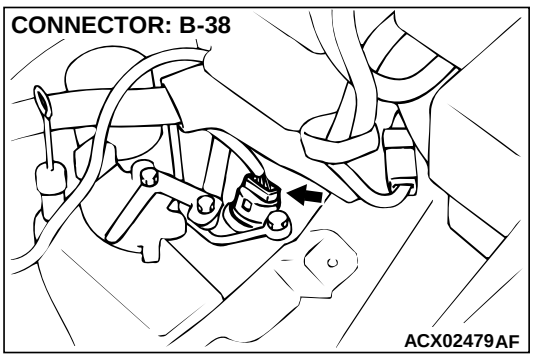


STEP 9. Check connector B-38 at solenoid valve assembly for damage.

Q: Is the connector in good condition?

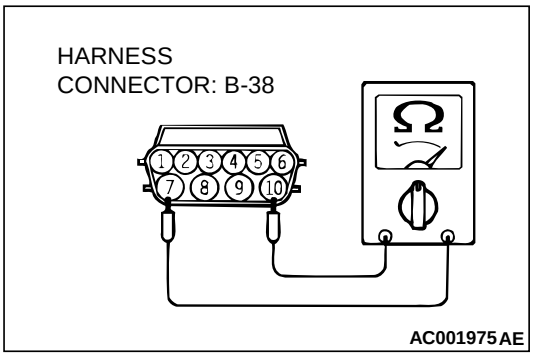
YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 10. Check the torque converter clutch solenoid valve at solenoid valve assembly connector B-38.

(1) Disconnect connector B-38 and measure at the solenoid valve side.



(2) Measure the resistance between terminal 7 and 10.

Standard value: 2.7 – 3.4 Ω

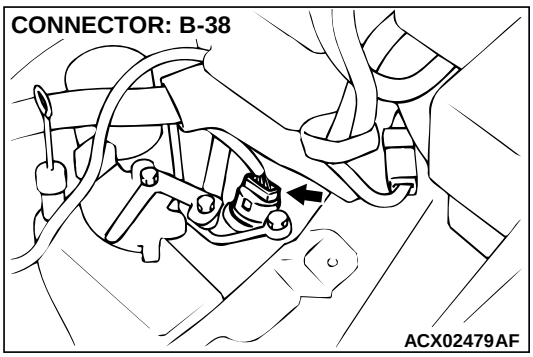
Q: Is the resistance at the standard value?

YES : Go to Step 11.

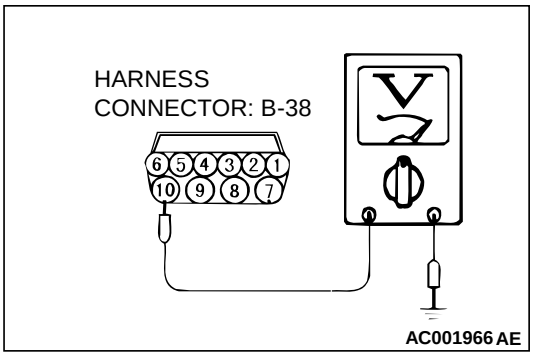
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision

STEP 11. Check the power supply voltage at solenoid valve assembly connector B-38.



(1) Disconnect connector B-38 and measure at the harness side.
(2) Turn the ignition switch to "ON" position.



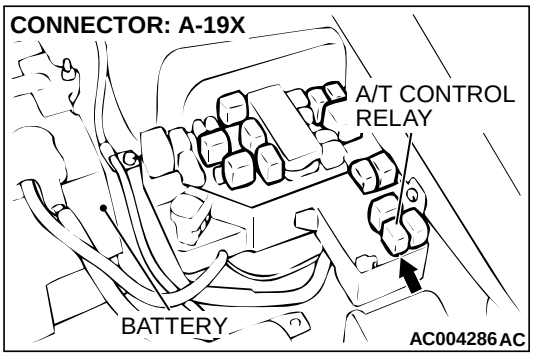
(3) Measure the voltage between terminal 10 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 13.
NO : Go to Step 12.

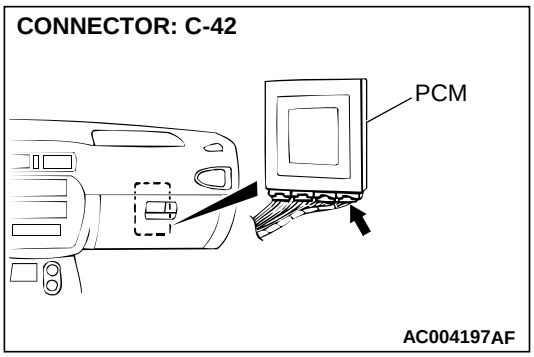
STEP 12. Check connector A-19X at A/T control relay for damage.



Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between solenoid valve assembly connector B-38 terminal 10 and A/T control relay connector A-19X terminal 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

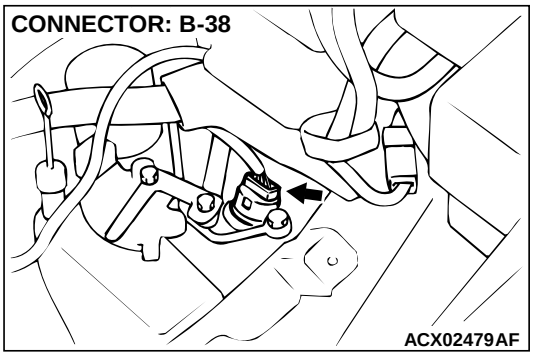
STEP 13. Check connector C-42 at PCM connector for damage.

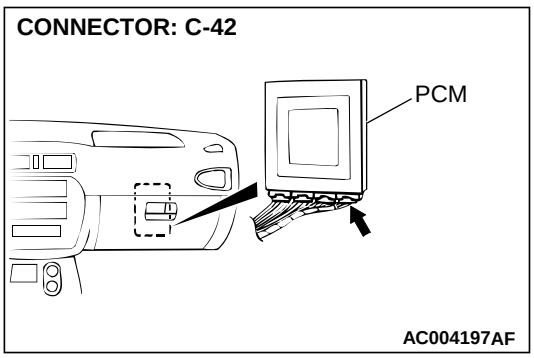


Q: Is the connector in good condition?

YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision





STEP 14. Check harness for open circuit, or short circuit to ground between solenoid valve assembly connector B-38 terminal 7 and PCM connector C-42 terminal 107.

Q: Is the harness wire in good condition?

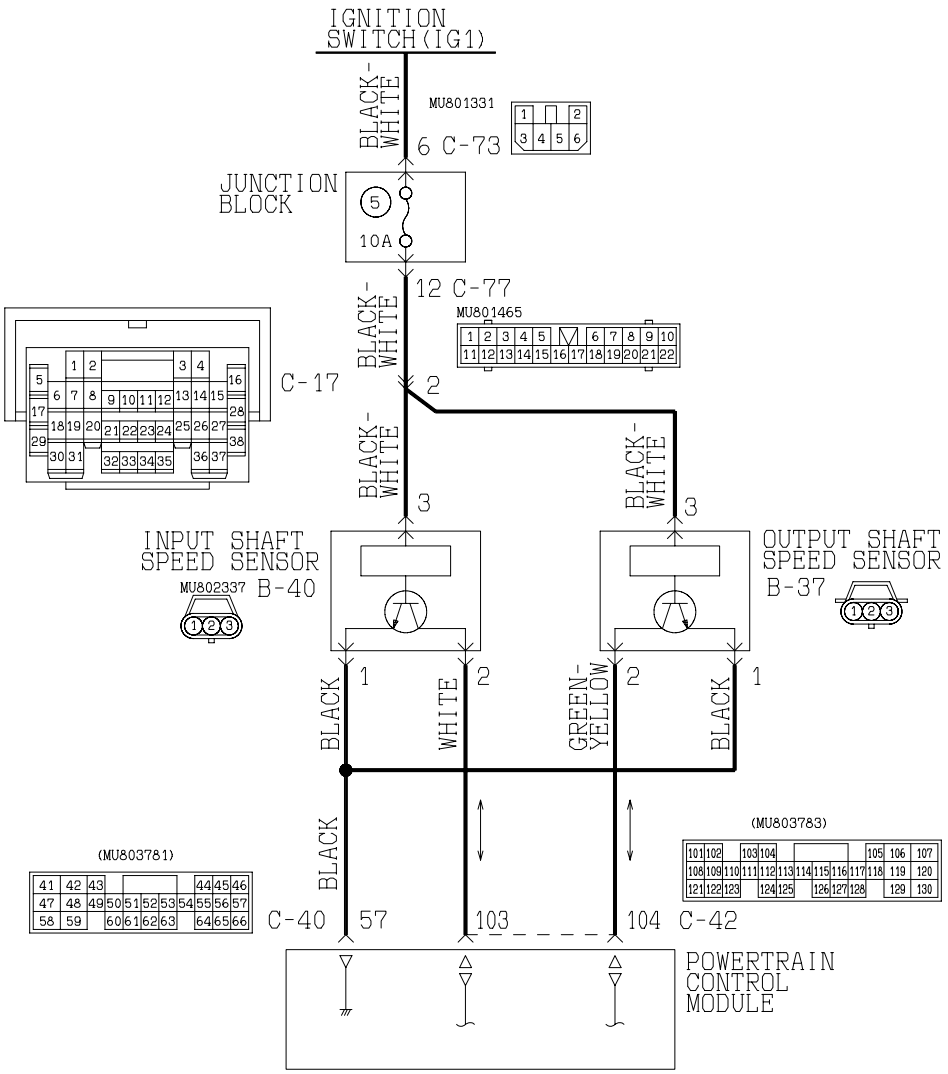
YES : Replace the PCM.

NO : Repair it.

TSB Revision

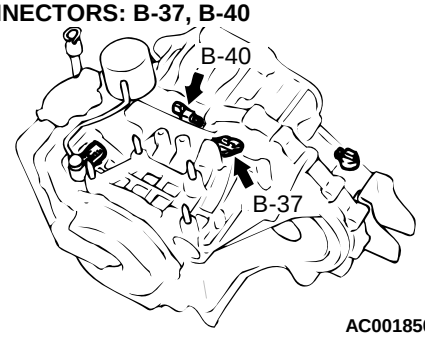
DTC 41: 1st Gear Incorrect Ratio
DTC 42: 2nd Gear Incorrect Ratio
DTC 43: 3rd Gear Incorrect Ratio
DTC 44: 4th Gear Incorrect Ratio
DTC 46: Reverse Gear Incorrect Ratio

Input Shaft Speed Sensor and Output Shaft Speed Sensor System Circuit



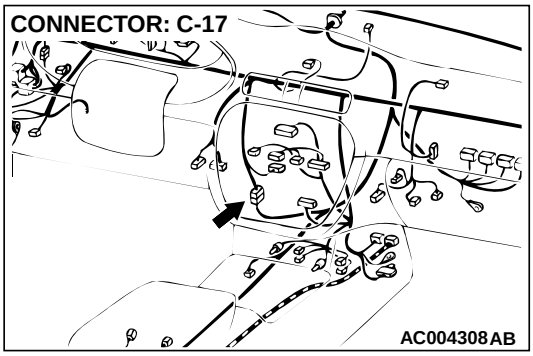
W1S15M09AA
AC004619AB

CONNECTORS: B-37, B-40



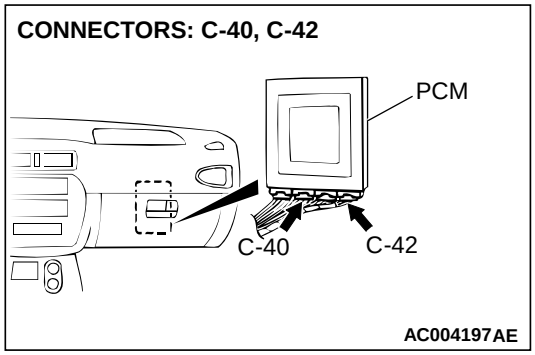
AC001850AE

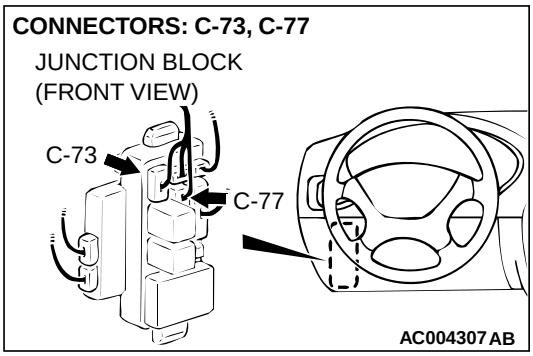
CONNECTOR: C-17



AC004308AB

TSB Revision





CIRCUIT OPERATION

- A coil built into the input shaft speed sensor generates pulse signal of 0 ⇔ 5 volts at both ends of this coil when the input shaft rotates. The pulse signal frequency increases with the rise in input shaft speed.
- Both ends of the coil are connected to the PCM (terminals 57 and 103) via the input shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the input shaft speed with the signal input to terminal (terminal 103).
- A coil built into the output shaft speed sensor generates pulse signal of 0 ⇔ 5 volts at both ends of this coil when the output shaft rotates. The pulse signal frequency increases with the rise in output shaft speed.
- Both ends of the coil are connected to the PCM (terminals 57 and 104) via the output shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the output shaft speed with the signal input to terminal (terminal 104).

DTC SET CONDITIONS

If the output from the output shaft speed sensor multiplied by the 1st gear ratio is not the same as the output from the input shaft speed sensor after shifting to 1st gear has been completed, diagnostic trouble code number "41" is output. If diagnostic trouble code number "41" is output four times, the transmission is locked into 3rd gear as a fail-safe measure.

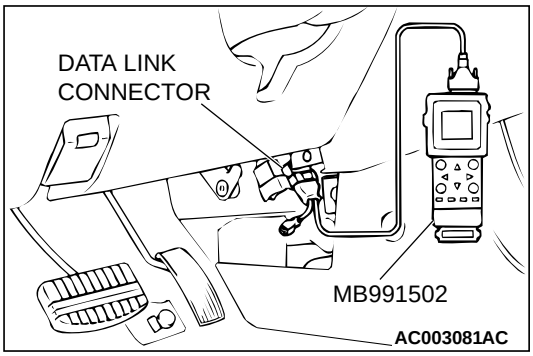
TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the input shaft speed sensor
- Malfunction of the output shaft speed sensor
- Malfunction of the PCM
- Malfunction of the underdrive clutch retainer
- Malfunction of the transfer drive gear or driven gear
- Malfunction of the low-reverse brake system (for code number "41," "46")
- Malfunction of the underdrive clutch system (for code number "41," "42," "43")
- Malfunction of the second brake system (for code number "42," "44")
- Malfunction of the overdrive clutch system (for code number "43," "44")
- Malfunction of the reverse clutch system (for code number "46")
- Noise generated

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

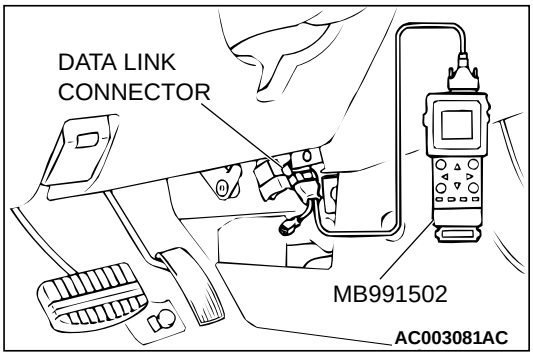
⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is A/T diagnostic trouble code numbers "22" or "23" output?

YES : Refer to P.23A-94, code number 22: Input Shaft Speed Sensor System, or refer to P.23A-105, code number 23: Output Shaft Speed Sensor System.
NO : Go to Step 2.



STEP 2. Using scan tool MB991502, check actuator test.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for following items.
  a. item 01: Low-reverse Solenoid Valve
  b. item 02: Underdrive Solenoid Valve
  c. item 03: Second Solenoid Valve
  d. item 04: Overdrive Solenoid Valve
    - An operation sound should be heard from solenoid valve when solenoid valve is operated.
(4) Turn the ignition switch to "LOCK" (OFF) position.

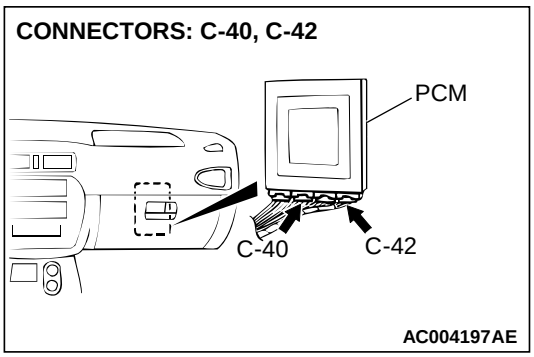
Q: Is the solenoid valve operating properly?

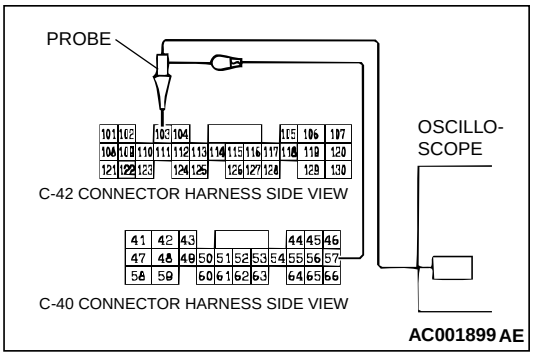
YES : Go to Step 3.
NO : Replace the corresponding solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision

STEP 3. Using the oscilloscope, check the waveform at PCM connectors C-40 and C-42 by backprobing.

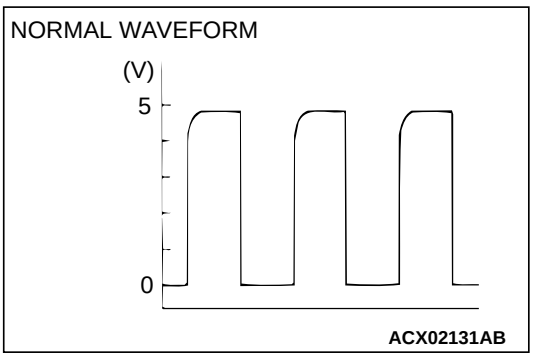
(1) Do not disconnect connectors C-40 and C-42.





(2) Connect an oscilloscope probe to PCM connector C-40 terminal 57 and to PCM connector C-42 terminal 103 by backprobing.

(3) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)



(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volts and less. The output waveform should not contain the noise.

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

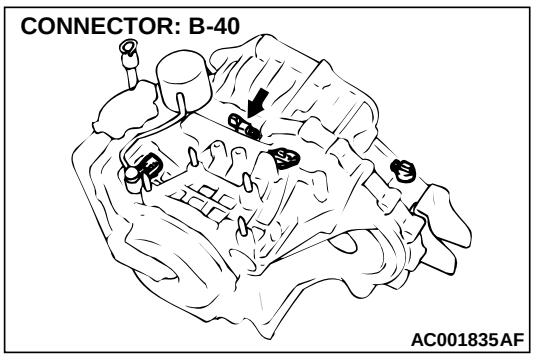
Q: Is the waveform normal?

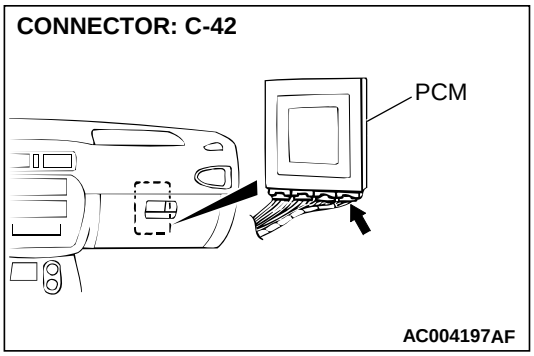
YES : Go to Step 8.
NO : Go to Step 4.

TSB Revision

STEP 4. Check connectors B-40 at input shaft speed sensor and C-42 at PCM for damage.
Q: Are the connectors in good condition?

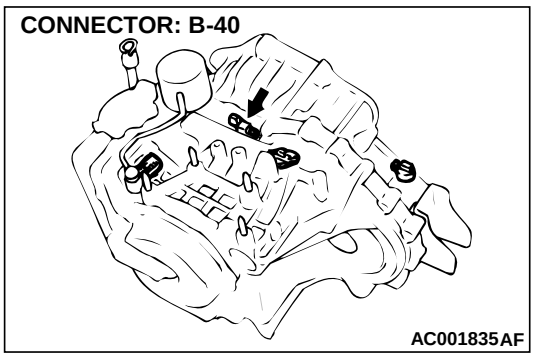
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

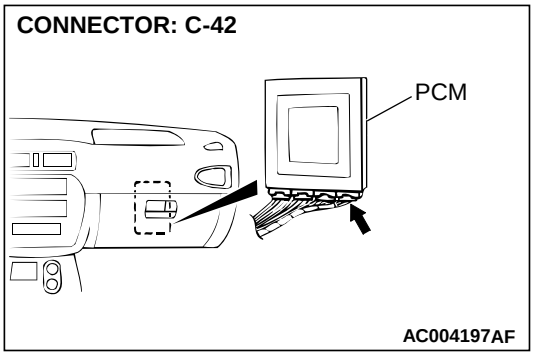




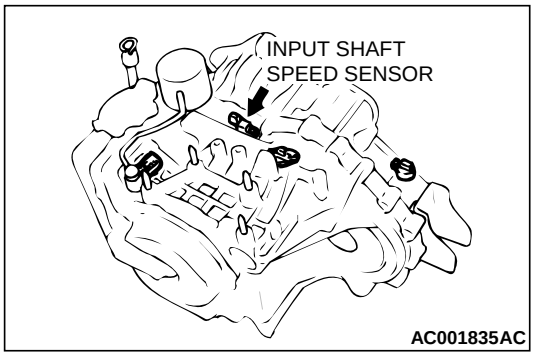
STEP 5. Check harness for damage between input shaft speed sensor connector B-40 terminal 2 and PCM connector C-42 terminal 103.
Q: Is the harness wire in good condition?

YES : Go to Step 6.
NO : Repair it.





TSB Revision

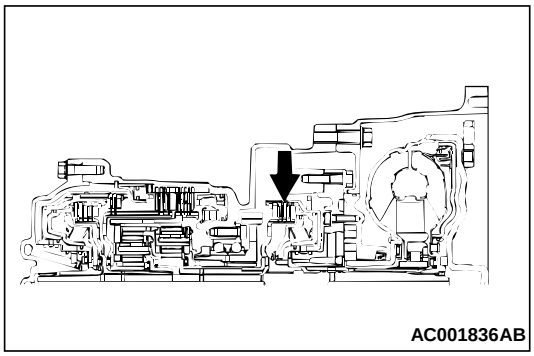


STEP 6. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code output?

YES : Go to Step 7.
NO : The inspection is complete.



STEP 7. Replace the underdrive clutch retainer.

(1) Replace the underdrive clutch retainer. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-51.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

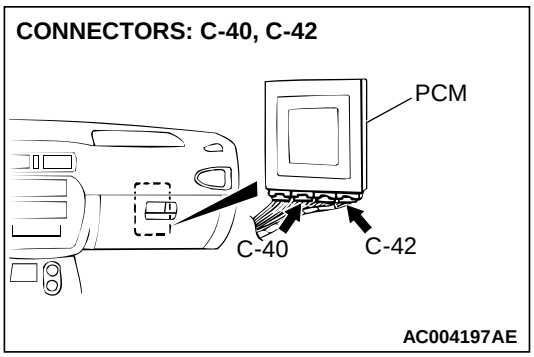
Q: Is the A/T diagnostic trouble code output?

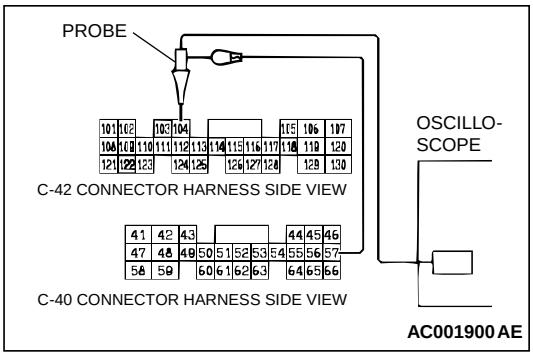
YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.
NO : The inspection is complete.

TSB Revision

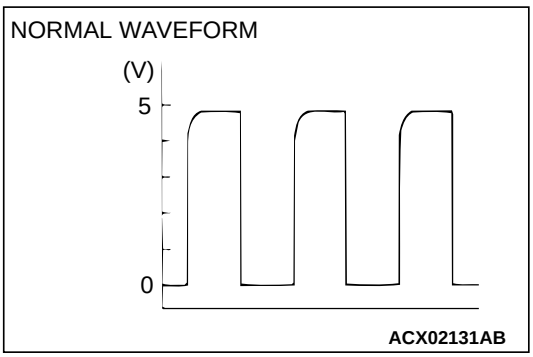
STEP 8. Using the oscilloscope, check the waveform at PCM connectors C-40 and C-42 by backprobing.

(1) Do not disconnect connectors C-40 and C-42.





(2) Connect an oscilloscope probe to PCM connector C-40 terminal 57 and to PCM connector C-42 terminal 104 by backprobing.
(3) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)



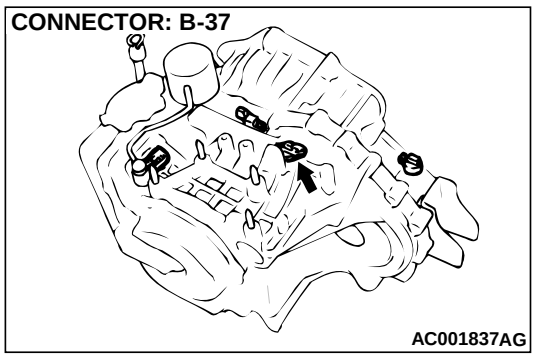
(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volts and less. The output waveform should not contain the noise.

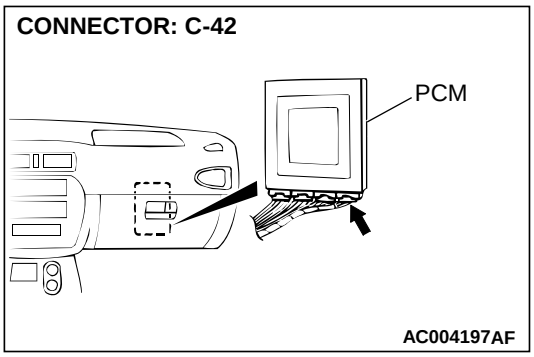
(5) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 13.
NO : Go to Step 9.

TSB Revision



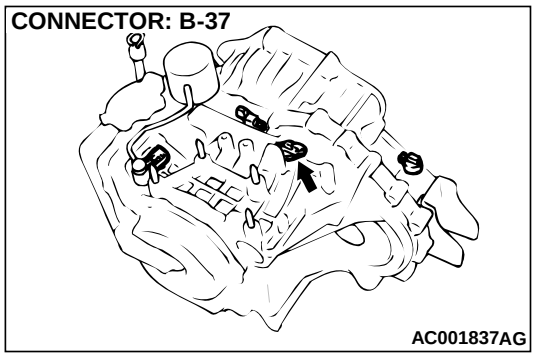


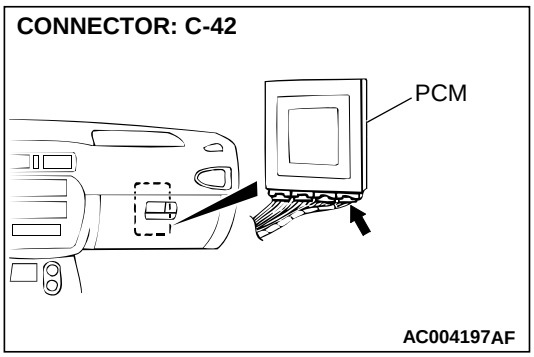
STEP 9. Check connectors B-37 at output shaft speed sensor and C-42 at PCM for damage.

Q: Are the connectors in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





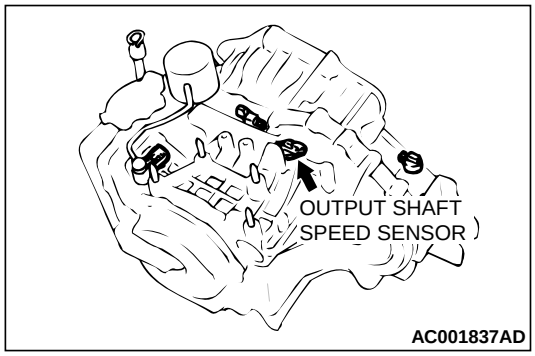
STEP 10. Check harness for damage between output shaft speed sensor connector B-37 terminal 2 and PCM connector C-42 terminal 104.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it.

TSB Revision

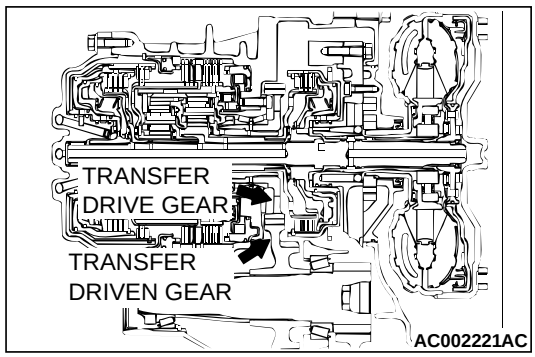


STEP 11. Replace the output shaft speed sensor.

(1) Replace the output shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code (DTC).

Q: Is the A/T diagnostic trouble code output?

YES : Go to Step 12.
NO : The inspection is complete.

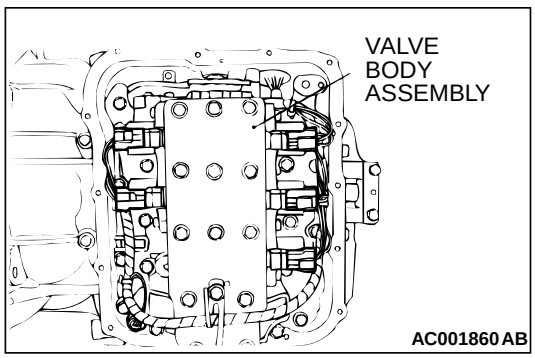


STEP 12. Replace the transfer drive gear or driven gear.

(1) Replace the transfer drive gear or driven gear. Refer to GROUP 23B, Transaxle P.23B-10, Output Shaft P.23B-62.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code output?

YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.
NO : The inspection is complete.



STEP 13. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code output?

YES : Go to Step 14.
NO : The inspection is complete.

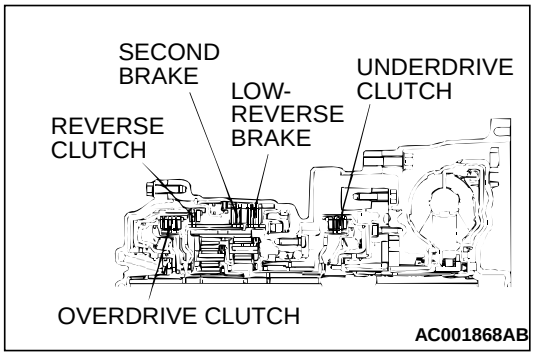
STEP 14. Replace the PCM.

(1) Replace the PCM.
(2) Carry out a test drive.
(3) Read in the diagnostic trouble code.

Q: Is the A/T diagnostic trouble code output?

YES : Go to Step 15.
NO : The inspection is complete.

TSB Revision



STEP 15. Overhaul the A/T.

(1) Replace the following parts.
- Replace the underdrive clutch. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-51. (When the codes of No.41, No.42, No.43 are output individually or in plural.)
- Replace the overdrive clutch. Refer to GROUP 23B, Reverse and Overdrive Clutch P.23B-53. (When the codes of No.43, No.44 are output individually or in plural.)
- Replace the reverse clutch. Refer to GROUP 23B, Reverse and Overdrive Clutch P.23B-53. (When the code of No.46 is output.)
- Replace the low-reverse brake. Refer to GROUP 23B, Transaxle P.23B-10. (When the codes of No.41 and No.46 are output.)
- Replace the second brake. Refer to GROUP 23B, Transaxle P.23B-10. (When the codes of No.42 and No.44 are output.)
- Replace the one-way clutch. Refer to GROUP 23B, Planetary Gear P.23B-58. (When the code of No.41 is output individually.)

(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code output again?

YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.

NO : The inspection is complete.

DTC 52: Torque Coverter Clutch System

DTC SET CONDITIONS

If input shaft speed sensor is abnormal and drive duty rate for the torque converter clutch solenoid valve is 100 percent for continuous period of 4 seconds or more, it is judged that there is an abnormality in the torque converter clutch system and diagnostic trouble code number "52" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the input shaft speed sensor
- Malfunction of the underdrive clutch retainer
- Malfunction of the valve body
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

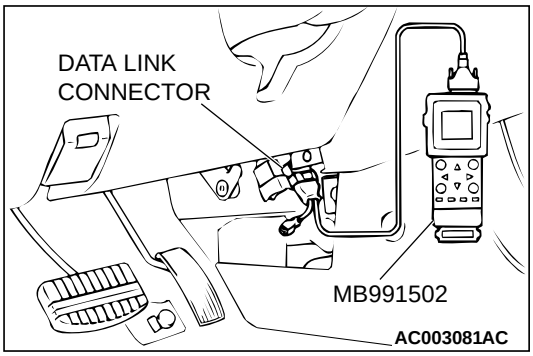
Required Special Tool:
MB991502: Scan Tool (MUT-II)

TSB Revision

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

⚠ CAUTION

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

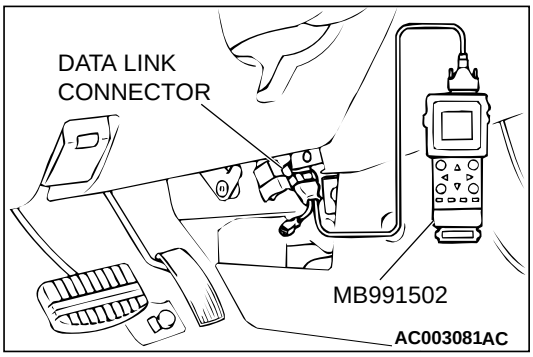


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is A/T diagnostic trouble code number "22" output?

YES : Refer to P.23A-94, code number 22: Input Shaft Speed Sensor System.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06: Torque Converter Clutch Solenoid Valve.
- An operation sound should be heard from solenoid valve when the torque converter clutch solenoid valve is operated.

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

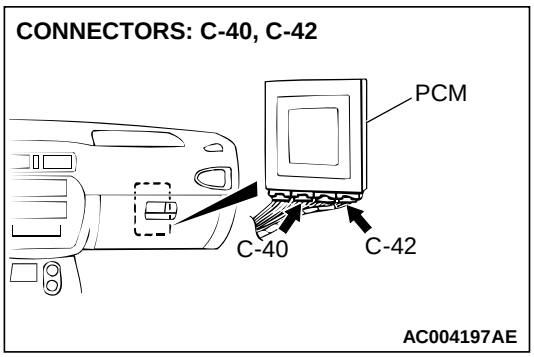
Q: Is the solenoid valve operating properly?

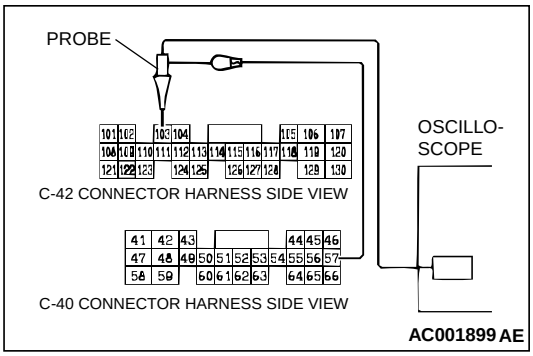
YES : Go to Step 3.
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision

STEP 3. Using the oscilloscope, check the waveform at PCM connectors C-40 and C-42 by backprobing.

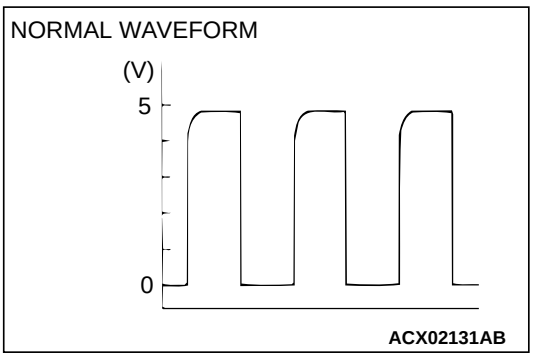
(1) Do not disconnect connectors C-40 and C-42.





(2) Connect an oscilloscope probe to PCM connector C-40 terminal 57 and to PCM connector C-42 terminal 103 by backprobing.

(3) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)



(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volts and less. The output waveform should not contain the noise.

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

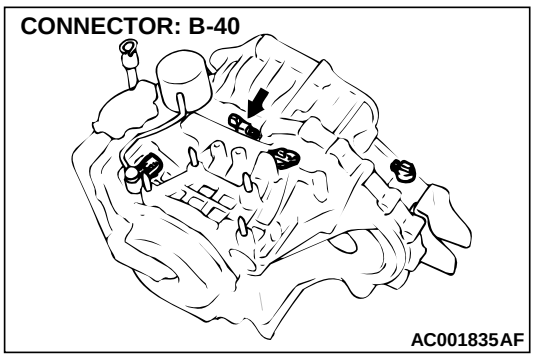
Q: Is the waveform normal?

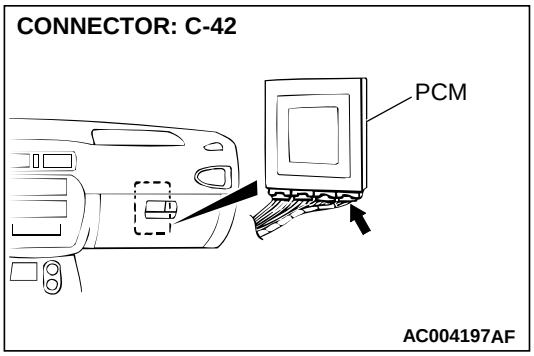
YES : Go to Step 8.
NO : Go to Step 4.

TSB Revision

STEP 4. Check connectors B-40 at input shaft speed sensor and C-42 at PCM for damage.
Q: Are the connectors in good condition?

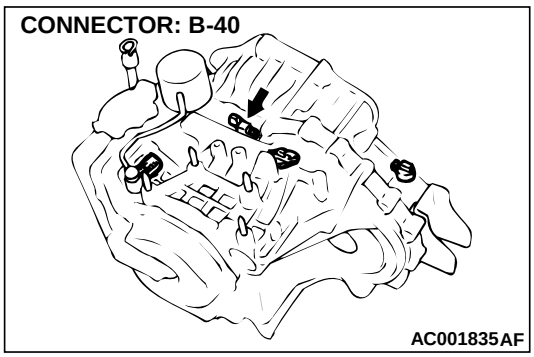
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

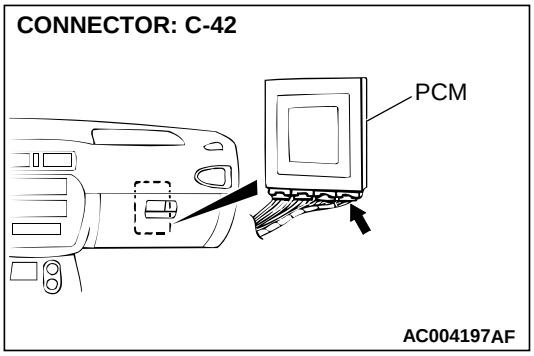




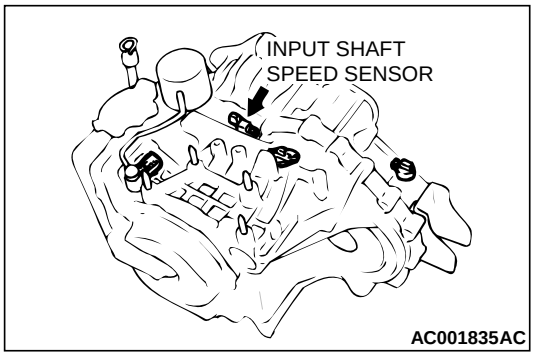
STEP 5. Check harness for damage between input shaft speed sensor connector B-40 terminal 2 and PCM connector C-42 terminal 103.
Q: Is the harness wire in good condition?

YES : Go to Step 6.
NO : Repair it.





TSB Revision

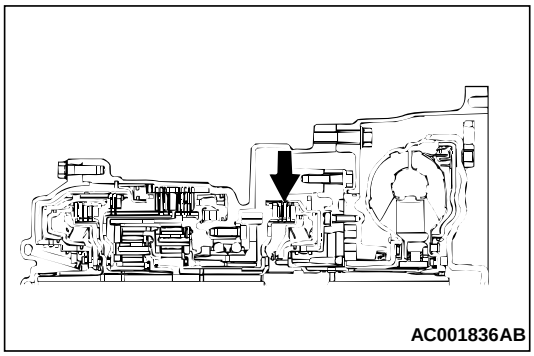


STEP 6. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code "52" is output?

YES : Go to Step 7.
NO : The inspection is complete.

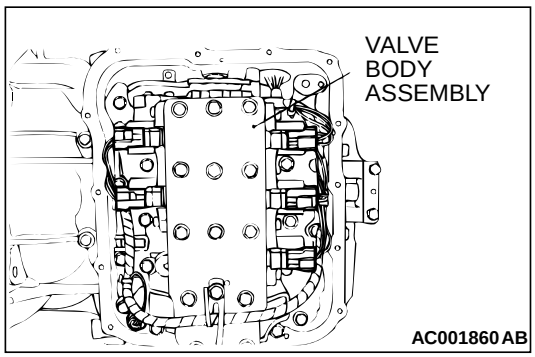


STEP 7. Replace the underdrive clutch retainer.

(1) Replace the underdrive clutch retainer. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-51.
(2) Carry out a test drive.
(3) Read in the diagnostic trouble code (DTC).

Q: Is the A/T diagnostic trouble code "52" is output?

YES : The A/T diagnostic trouble code may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, after market components installed on the vehicle, etc.
NO : The inspection is complete.



STEP 8. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code "52" is output?

YES : Go to Step 9.
NO : The inspection is complete.

STEP 9. Replace the PCM.

(1) Replace the PCM.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code "52" is output?

YES : Replace the torque converter. Refer to GROUP 23B, Transaxle P.23B-10.
NO : The inspection is complete.

TSB Revision

DTC 53: Torque Converter Clutch is Stuck On

DTC SET CONDITIONS

If the torque converter clutch remains engaged for a continuous period of ten seconds when the PCM is attempting to disengage the torque converter clutch, it is judged that the torque converter clutch is stuck on and diagnostic trouble code number "53" is output.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

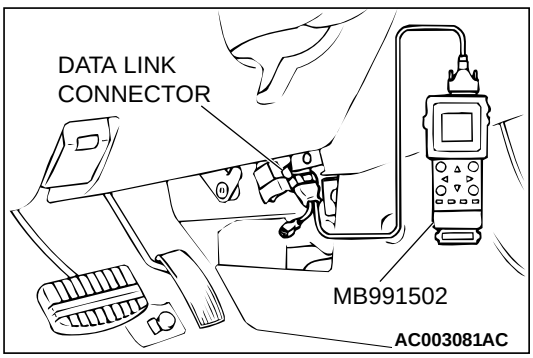
- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the valve body
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 52: Amount of Torque Converter Clutch Slippage.

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



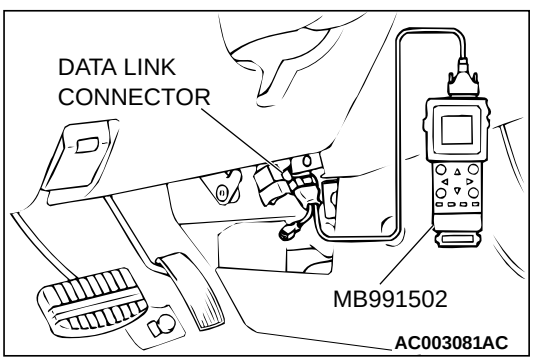
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)
(3) Set scan tool MB991502 to data reading mode for item 52: Amount of Torque Converter Clutch Slippage.
- Driving at constant speed of 50 km/h (31 mph), the display should be "–10 to 10 r/min."
- The display should be "–300 to –100 r/min" or "100 to 300 r/min" when the accelerator pedal is released (50 km/h (31 mph) and less).

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

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.



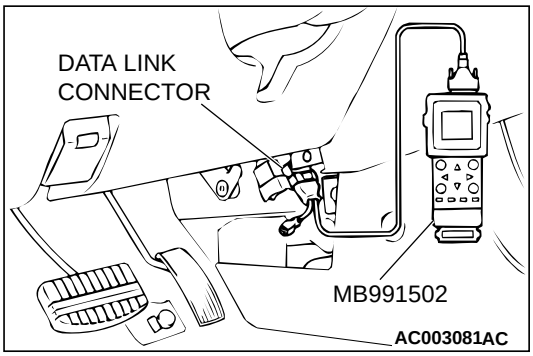
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06: Torque Converter Clutch Solenoid Valve.
- An operation sound should be heard from solenoid valve when the torque converter clutch solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 3.
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68.

TSB Revision



STEP 3. Using scan tool MB991502, check data list item 52: Amount of Torque Converter Clutch Slippage. (Second check)

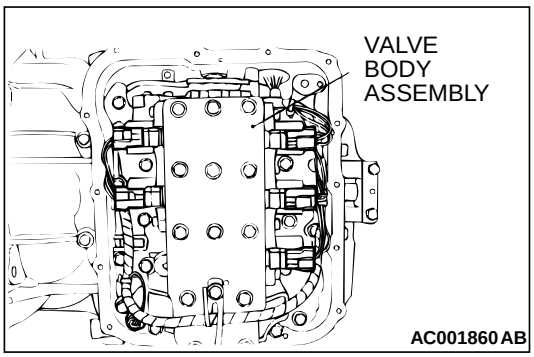
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at constant speed of 50km/h (31mph). (Gear range: 3rd gear)
(3) Set scan tool MB991502 to data reading mode for item 52: Amount of Torque Converter Clutch Slippage.
- Driving at constant speed of 50km/h (31mph), the display should be "–10 to 10 r/min."
- The display should be "–300 to –100 r/min" or "100 to 300 r/min" when the accelerator pedal is released (50 km/h (31 mph) and less).

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

Q: Is the sensor operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 4.



STEP 4. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code.

Q: Is the A/T diagnostic trouble code "53" is output?

YES : Go to Step 5.

NO : The inspection is complete.

STEP 5. Replace the PCM.

(1) Replace the PCM.
(2) Carry out a test drive.
(3) Read in the A/T diagnostic trouble code (DTC).

Q: Is the A/T diagnostic trouble code "53" is output?

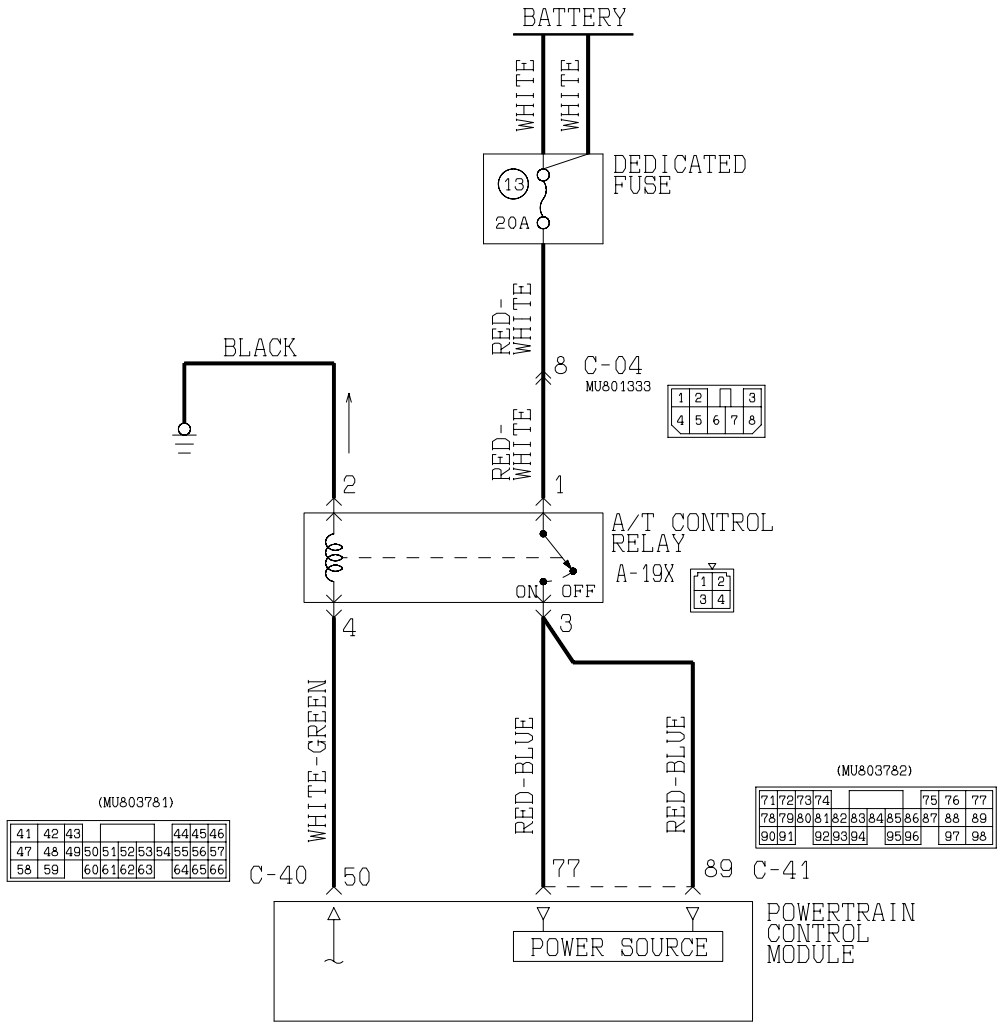
YES : Replace the Torque Converter. Refer to GROUP 23B, Transaxle P.23B-10.

NO : The inspection is complete.

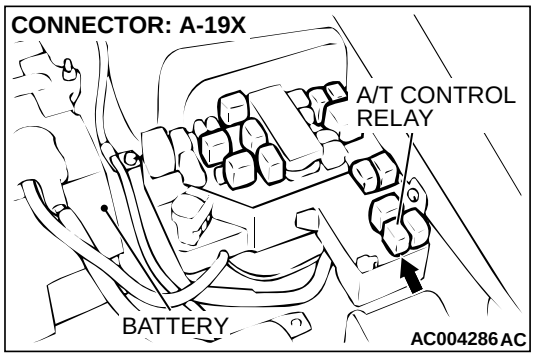
TSB Revision

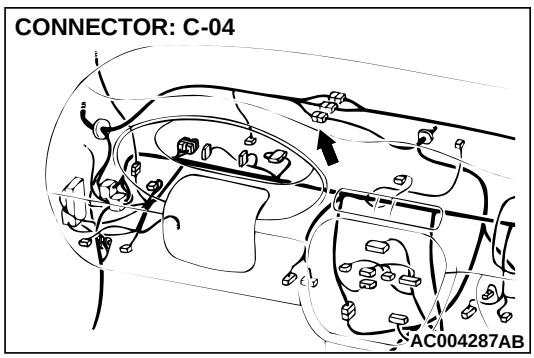
DTC 54: A/T Control Relay System

A/T Control Relay System Circuit

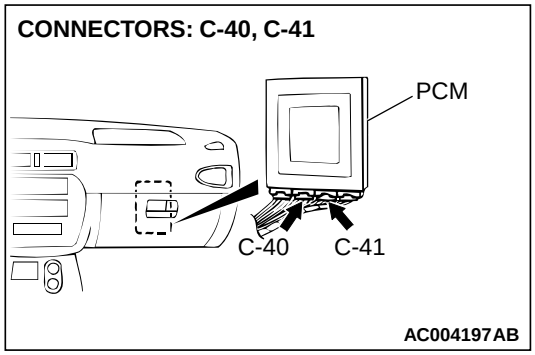


W1S15M10AA
AC004620AB





TSB Revision



CIRCUIT OPERATION

- A/T control relay (terminal number 1) receives the battery positive voltage from the battery.
- When turning the ignition switch to the "ON," the PCM receives battery voltage from the ignition switch (terminal 98). Then the PCM (terminal number 50) applies a voltage to the A/T control relay (terminal number 4), and the A/T control relay switch is turned on. When the A/T control relay switch is turned on, the battery applies a power supply voltage to the PCM (terminal numbers 77 and 89).

DTC SET CONDITIONS

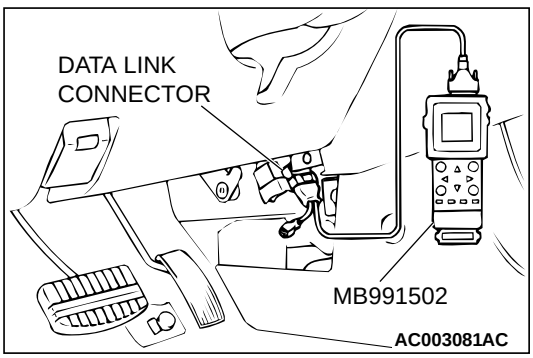
If the A/T control relay voltage is less than 7 volts after the ignition switch has been turned to the "ON," it is judged that there is an open circuit or a short-circuit in the A/T control relay ground and diagnostic trouble code number "54" is output. The transmission is locked into the 3rd gear as a fail-safe measure.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the A/T control relay
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check data list item 54: A/T Control Relay Output Voltage.

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

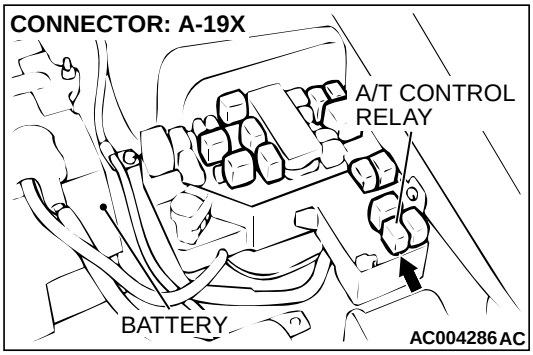
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 54: A/T Control Relay Output Voltage.
  - Voltage should be battery positive voltage.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the relay operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

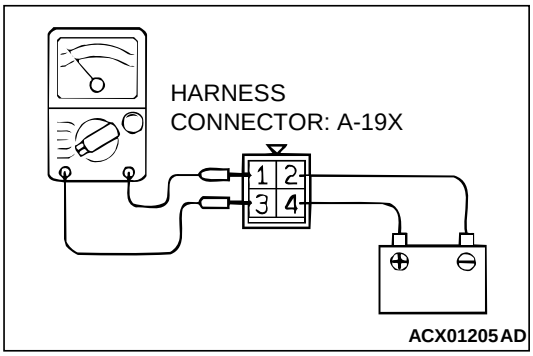
NO : Go to Step 2.

TSB Revision



STEP 2. Check the A/T control relay.

(1) Remove the A/T control relay A-19X.



(2) Use jumper wires to terminal 2 of A/T control relay connector A-19X to the negative battery terminal, and terminal number 4 of A/T control relay connector A-19X to the positive battery terminal.

(3) Measure the resistance between terminal 1 and 3 of A/T control relay connector A-19X.

- Should be than 2 ohm when the jumper wire connected.
- Open circuit when the jumper wire disconnected.

Q: Is the resistance normal?

YES : Go to Step 3.

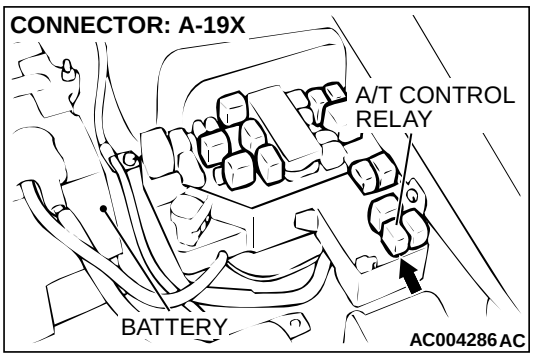
NO : Replace the A/T control relay.

STEP 3. Check connector A-19X at A/T control relay for damage.

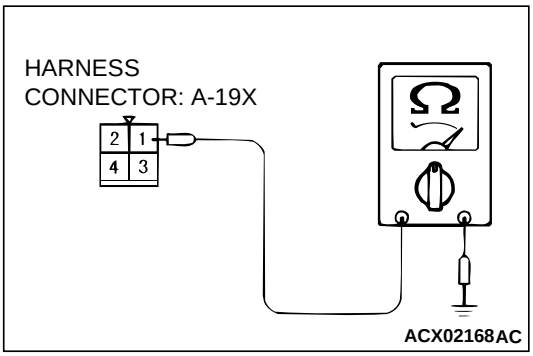
Q: Is the connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision



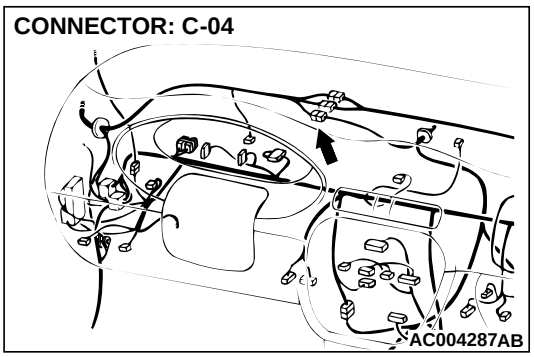
STEP 4. Check the power supply voltage at A/T control relay connector A-19X.

(1) Disconnect the A/T control relay and measure at the connector side.
(2) Turn the ignition switch to "ON" position.
(3) Measure the voltage between terminal 1 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

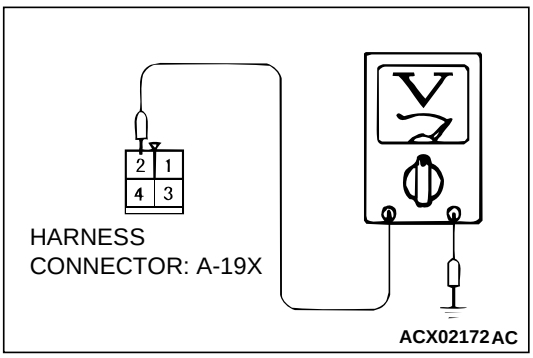
YES : Go to Step 6.
NO : Go to Step 5.



STEP 5. Check connector C-04 at intermediate connector for damage.

Q: Is the connector in good condition?

YES : Repair it because of harness open circuit or short circuit to ground between A/T control relay connector A-19X terminal 1 and battery.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 6. Check the continuity at A/T control relay connector A-19X.

(1) Disconnect the A/T control relay and measure at the connector side.
(2) Check for the continuity between terminal 2 and ground.
- Should be less than 2 ohm.

Q: Is the continuity normal?

YES : Go to Step 7.
NO : Rapier it because of harness open circuit or damage between A/T control relay connector A-19X terminal 2 and the earth.

TSB Revision

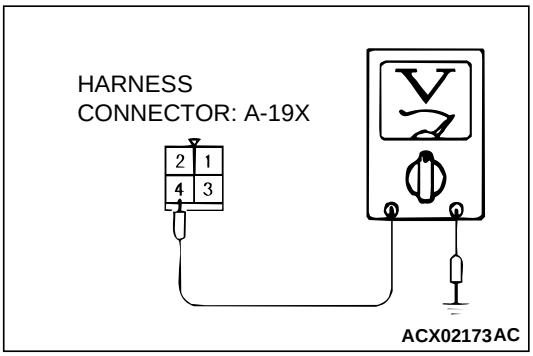
STEP 7. Check the power supply voltage at A/T control relay connector A-19X.

(1) Disconnect the A/T control relay and measure at the connector side.
(2) Turn the ignition switch to "ON" position.
(3) Measure the voltage between terminal 4 and ground.
- Voltage should be battery positive voltage.

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

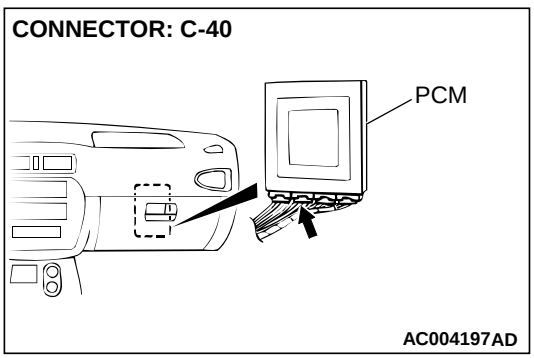
Q: Is the voltage normal?

YES : Go to Step 11.
NO : Go to Step 8.



STEP 8. Check the power supply voltage at PCM connector C-40 by backprobing.

(1) Do not disconnect connector C-40.
(2) Turn the ignition switch to "ON" position.

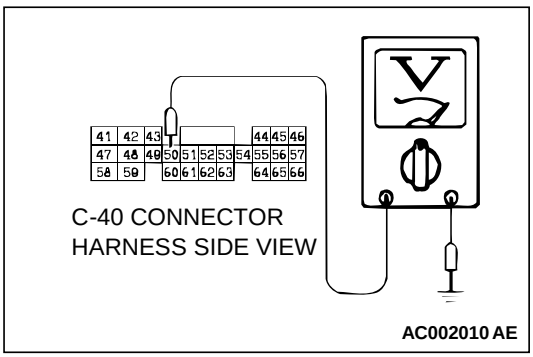


(3) Measure the voltage between terminal 50 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

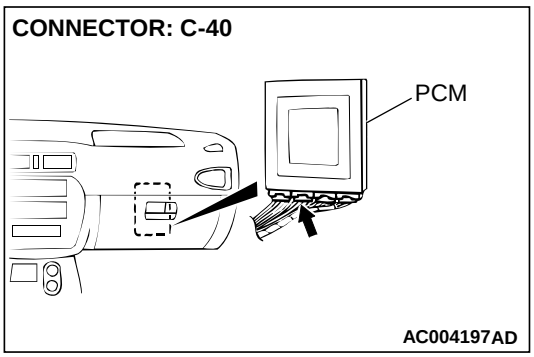
YES : Go to Step 9.
NO : Go to Step 10.



STEP 9. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Repair it because of harness open circuit between A/T control relay connector A-19X terminal 4 and PCM connector C-40 terminal 50.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



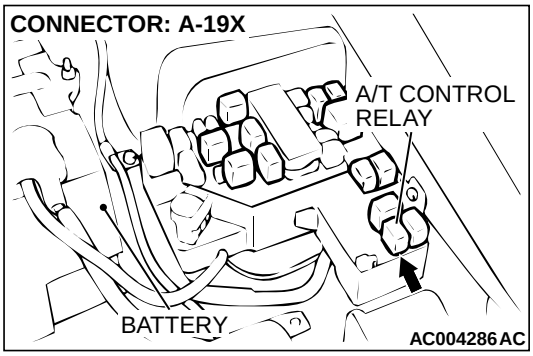
TSB Revision

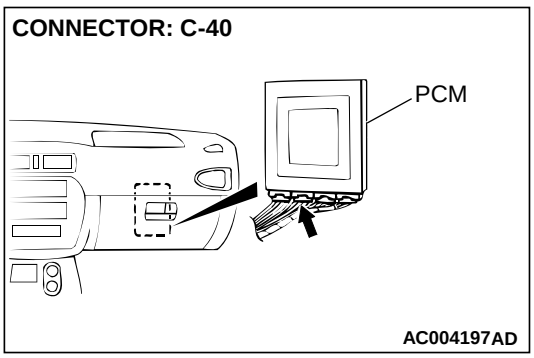
STEP 10. Check for short circuit to ground between A/T control relay connector A-19X terminal 4 and PCM connector C-40 terminal 50.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it.





STEP 11. Using scan tool MB991502, check data list item 54: A/T control relay output Voltage.

⚠ CAUTION

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

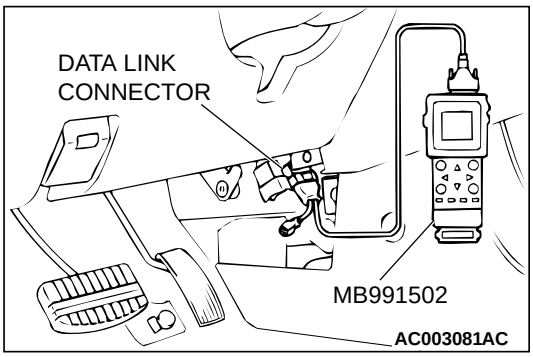
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 54: A/T Control Relay Output Voltage.
- Voltage should be battery positive voltage.

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

Q: Is the relay operating properly?

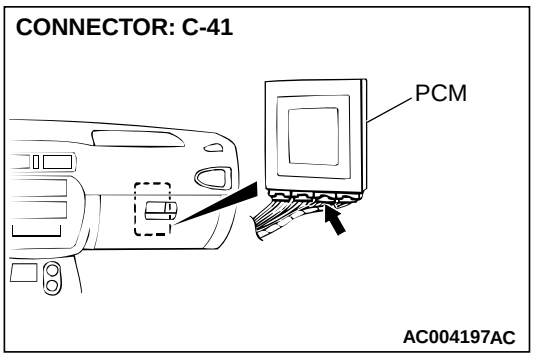
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Replace the PCM.

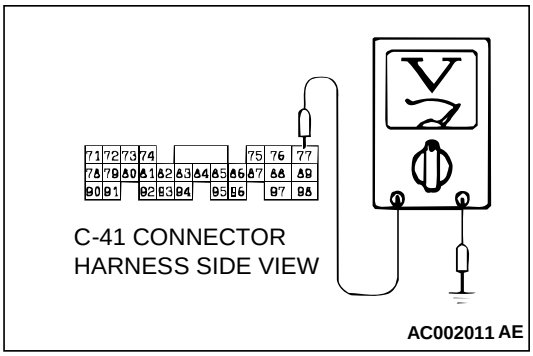


TSB Revision

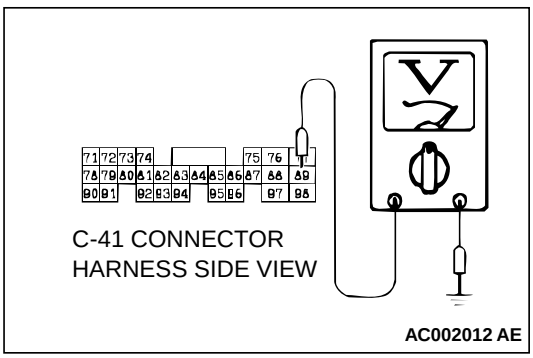
STEP 12. Check the relay output voltage at PCM connector C-41 by backprobing.



(1) Do not disconnect connector C-41.
(2) Turn the ignition switch to "ON" position.



(3) Measure the voltage between terminal 77 and ground by backprobing.
- Voltage should be battery positive voltage.



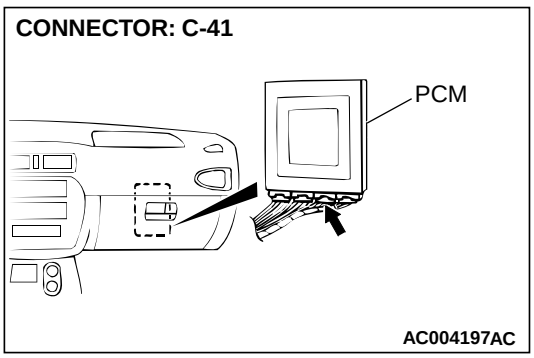
(4) Measure the voltage between terminal 89 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 11.
NO : Go to Step 13.

STEP 13. Check connector C-41 at PCM for damage.



Q: Is the connector in good condition?

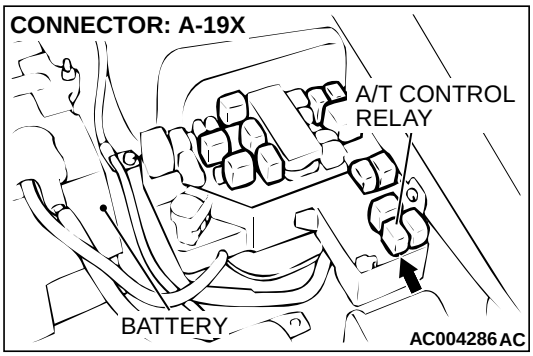
YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

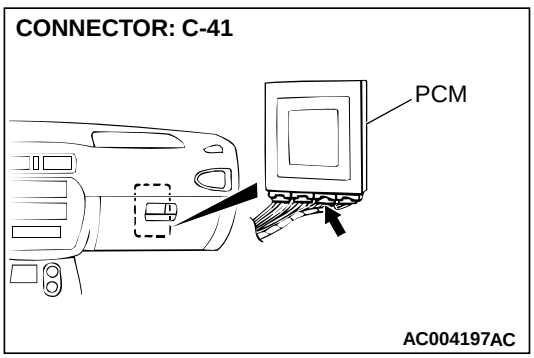
TSB Revision

STEP 14. Check harness for short circuit to ground, open circuit or damage between A/T control relay connector A-19X terminal 3 and PCM connector C-41 terminals 77 and 89.

Q: Is the harness wire in good condition?

YES : Go to Step 15.
NO : Repair it.

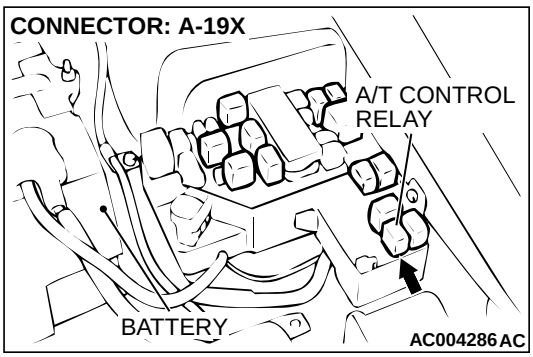




STEP 15. Check harness for damage between A/T control relay connector A-19X terminal 1 and battery.

Q: Is the harness wire in good condition?

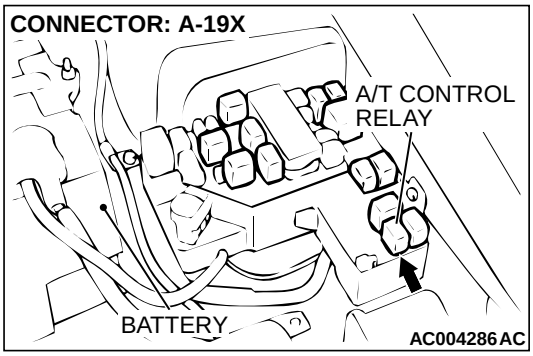
YES : Go to Step 16.
NO : Repair it.



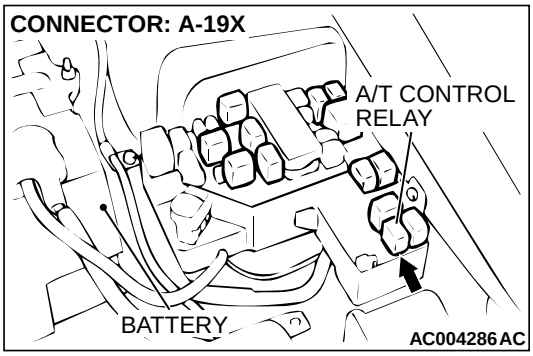
STEP 16. Check harness for damage between A/T control relay connector A-19X terminal 2 and the ground.

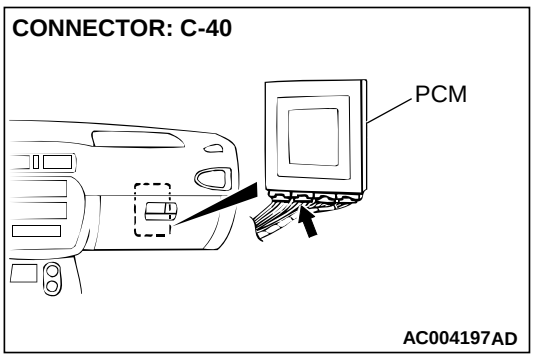
Q: Is the harness wire in good condition?

YES : Go to Step 17.
NO : Repair it.



TSB Revision





STEP 17. Check harness for short circuit to ground between A/T control relay connector A-19X terminal 4 and PCM connector C-40 terminal 50.

Q: Is the harness wire in good condition?

YES : Repair it because of harness short circuit to ground between A/T control relay connector A-19X terminal 3 and solenoid valve assy connector B-38 terminal 9.

NO : Repair it.

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Vehicle does not Move

COMMENT

If the engine does not start when the selector lever is in "P" or "N" position, the cause is probably a malfunction of Park/Neutral position switch system, transaxle control cable assembly, engine system, torque converter or oil pump.

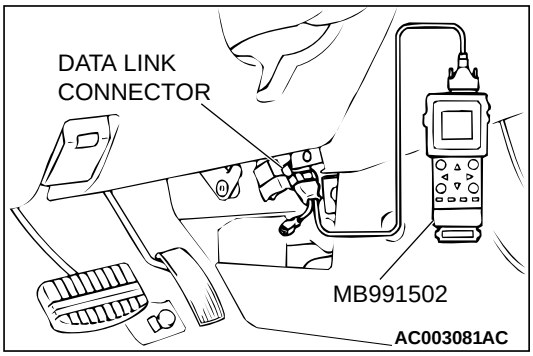
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the Park/Neutral position switch
- Malfunction of the transaxle control cable assembly
- Malfunction of the engine system
- Malfunction of the torque converter
- Malfunction of the oil pump
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:

MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

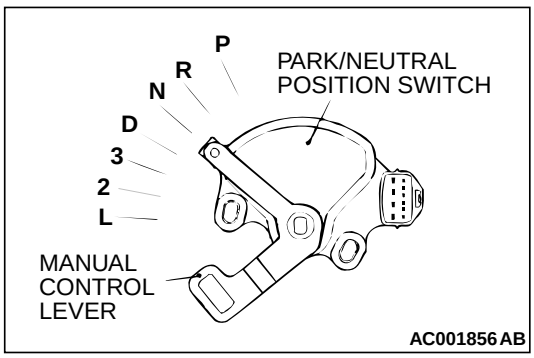
⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is A/T diagnostic trouble code numbers "27" or "28" displayed?

YES : Refer to P.23A-124, P.23A-143, code number 27, 28: Park/Neutral Position Switch System.
NO : Go to Step 2.



STEP 2. Check the transaxle control cable assembly.

Move the selector lever to each position, and check if the manual control lever position of the Park/Neutral position switch corresponds to the selector lever position.

Q: Is the manual control lever position correct?

YES : Go to Step 3.
NO : Repair the transaxle control cable. Refer to P.23A-278, Park/Neutral Position Switch and Control Cable Adjustment. Confirm that the malfunction symptom is correct.

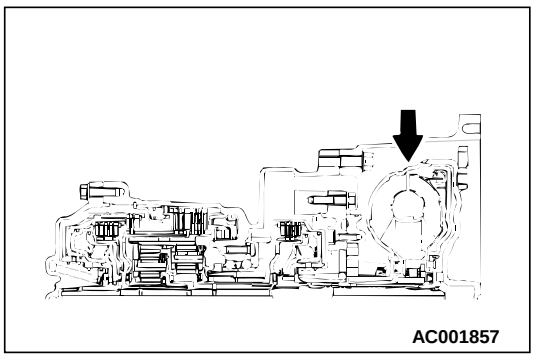
STEP 3. Check the engine.

Refer to GROUP 13A <2.4L Engine>, Diagnosis – Trouble Symptom Chart – Starting P.13A-22 or GROUP 13B <3.0L Engine>, Diagnosis – Trouble Symptom Chart – Starting P.13B-22.

Q: Is the inspection result good?

YES : Go to Step 4.
NO : Repair or replace the appropriate engine components.

TSB Revision

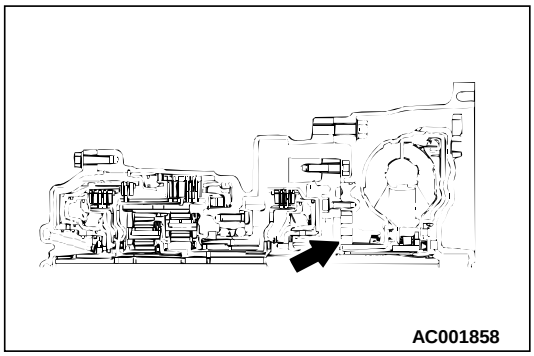

AC001857

STEP 4. Check the torque converter.

(1) Remove the transaxle.
(2) Check the torque converter for installation condition (whether installed in a slanted direction or not), its spline or its teeth for damage. Refer to GROUP 23B, Transaxle P.23B-10.

Q: Is the torque converter in good condition?

YES : Go to Step 5.
NO : Repair or replace it.


AC001858

STEP 5. Replace the oil pump.

Replace the oil pump (Oil pump cannot be repaired). Refer to GROUP 23B, Transaxle P.23B-10. Confirm that the malfunction symptom is eliminated.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 2: Does not Move Forward

COMMENT

If the vehicle does not move forward when the selector lever is shifted from "N" to "D", "2" or "L" range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the underdrive clutch or valve body.

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

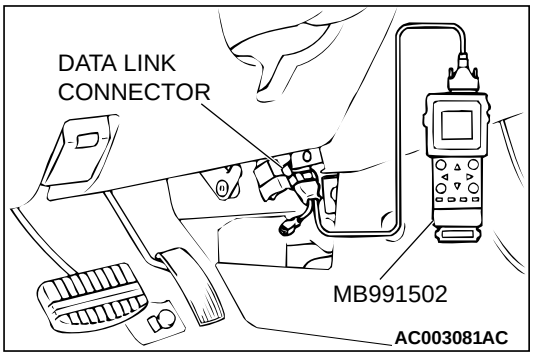
- Abnormal line pressure
- Malfunction of the underdrive solenoid valve
- Malfunction of the underdrive clutch
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:

MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check actuator test item 02: Underdrive Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 02: Underdrive Solenoid Valve.
- An operation sound should be heard from solenoid valve when solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 2.
NO : Repair or replace the underdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Check the hydraulic pressure.

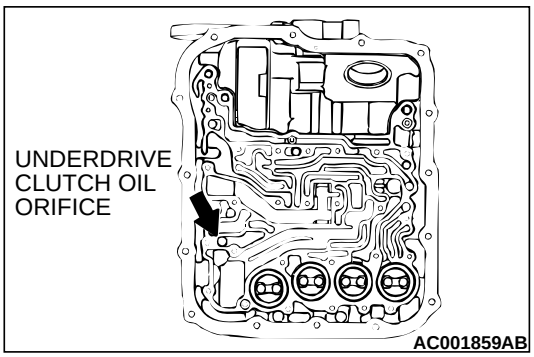
Measure the hydraulic pressure of each element when the selector lever is at the "L" range, and check if each hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

YES : Go to Step 3.
NO : Go to Step 4.

STEP 3. Check the underdrive clutch system.

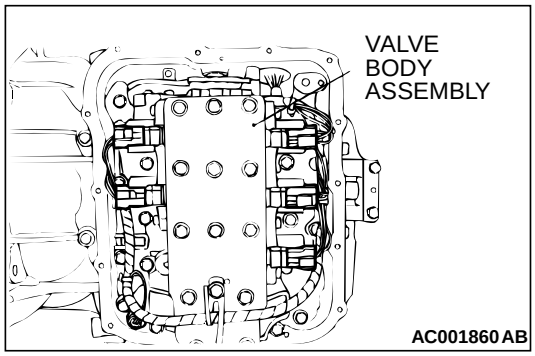
(1) Remove the valve body cover and valve body. Refer to P.23A-290, Transaxle Assembly and GROUP 23B, Transaxle P.23B-10.
(2) Blow compressed air into the underdrive clutch oil orifice of the transaxle case, and check if the underdrive clutch piston moves and air pressure is maintained in that condition.



Q: Is the air pressure maintained?

YES : Go to Step 4.
NO : Go to Step 5.

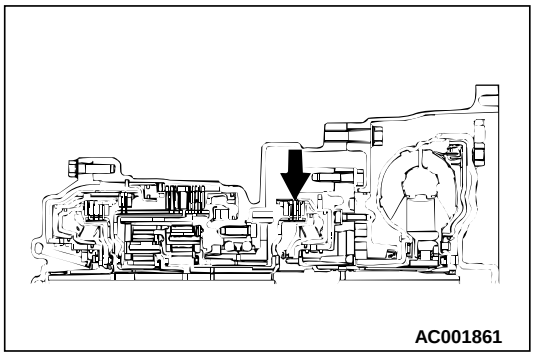
TSB Revision



STEP 4. Disassemble and clean the valve body.
Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. If the symptom is not eliminated, go to Step 6.



STEP 5. Check the underdrive clutch.
(1) Remove the transaxle assembly.
(2) Check the facing for seizure and the piston seal ring for damage and interference with the retainer. Repair or replace the faulty parts. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-51. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 3: Does not Move Backward

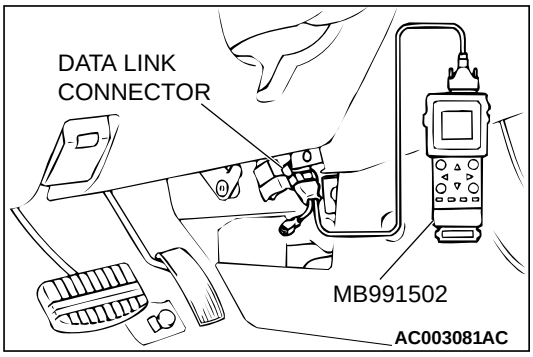
COMMENT
If the vehicle does not backward when the selector lever is shifted from "N" to "R" range while the engine is idling, the cause is probably abnormal pressure or a malfunction of the reverse clutch, low-reverse brake, or valve body.

TROUBLESHOOTING HINTS (The most likely causes for this case:)
- Abnormal reverse clutch pressure
- Abnormal low-reverse brake pressure
- Malfunction of the low-reverse solenoid valve
- Malfunction of the reverse clutch
- Malfunction of the low-reverse brake
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:
MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check actuator test item 01: Low-Reverse Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 01: Low-Reverse Solenoid Valve.
- An operation sound should be heard from solenoid valve when solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 2.
NO : Repair or replace the low-reverse solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Check the hydraulic pressure (for reverse clutch).

Measure the hydraulic pressure for reverse clutch when the selector lever is at the "R" range, and check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check the hydraulic pressure (for low-reverse brake).

Measure the hydraulic pressure for low-reverse brake when the selector lever is at the "R" range, and check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

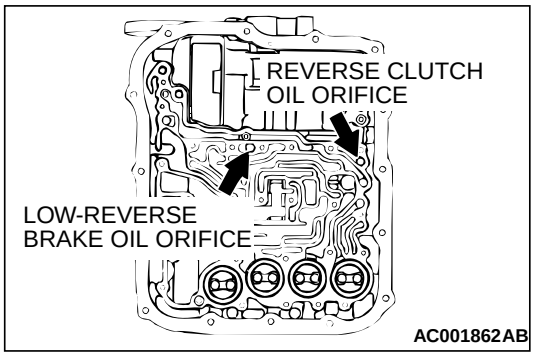
YES : Go to Step 4.
NO : Go to Step 5.

TSB Revision

STEP 4. Check the reverse clutch system and low-reverse brake system.

(1) Remove the valve body cover and valve body. Refer to P.23A-290, Transaxle Assembly and GROUP 23B, Transaxle P.23B-10.

(2) Blow compressed air into the reverse clutch oil orifice of the transaxle case. Then check if the reverse clutch piston moves and air pressures are maintained in that condition. Repeat for the low-reverse brake.

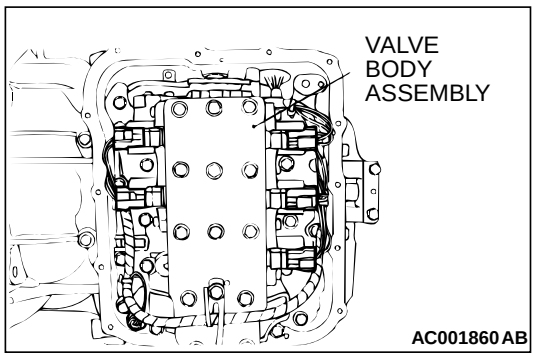


Q: Are both air pressures maintained?

YES : Go to Step 5.
NO : Go to Step 6.

STEP 5. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

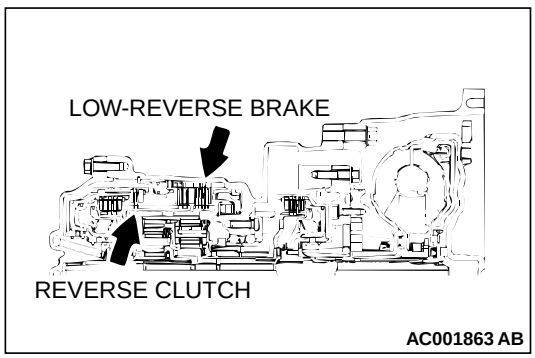


Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 7.

STEP 6. Check the reverse clutch and low-reverse brake. Remove the transaxle.

Check the facing for seizure and the piston seal ring for damage and interference with the retainer. Repair or replace the faulty parts. Refer to GROUP 23B, Transaxle P.23B-10, Reverse and Overdrive Clutch P.23B-53. Then check the symptom.



Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

TSB Revision

INSPECTION PROCEDURE 4: Does not Move (forward or backward)

COMMENT

If the vehicle does not move forward or backward when the selector lever is shifted to any position while the engine is idling, the cause is probably abnormal line pressure, or a malfunction of the power train, oil pump or valve body.

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

- Abnormal line pressure
- Malfunction of the power train
- Malfunction of the oil pump
- Malfunction of the valve body
- Low A/T fluid level
- Malfunction of the PCM

DIAGNOSIS

STEP 1. Check the hydraulic pressure.

Measure the hydraulic pressure of each element when the transaxle is in 1st, 2nd or reverse. Check if each hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test. If some elements are within the standard value and some are not, recheck the symptom.

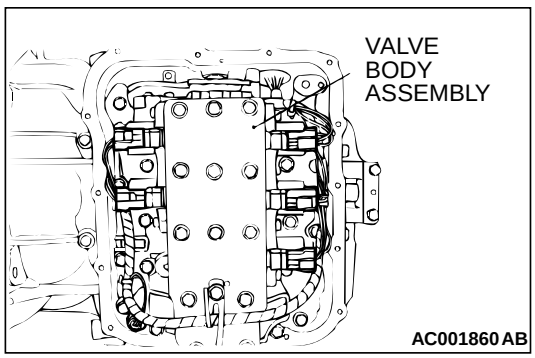
Q: Are all pressures within the standard value?

YES : Check A/T fluid level and condition. If not OK, repair or replace as necessary, then recheck symptom. If OK, go to Step 3.

NO : Go to Step 2.

STEP 2. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.



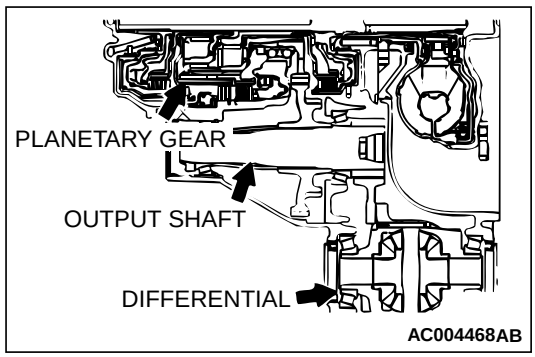
Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.

NO : Replace the valve body assembly. Then check the symptom. If the symptom is not eliminated, go to Step 4.

STEP 3. Check the transaxle power train components.

Disassemble the transaxle and check the planetary carrier and output shaft, etc. Repair or replace the damaged parts. Refer to GROUP 23B, Transaxle P.23B-10, Planetary Gear P.23B-58, Output Shaft P.23B-62, Differential P.23B-64. Then check the symptom.

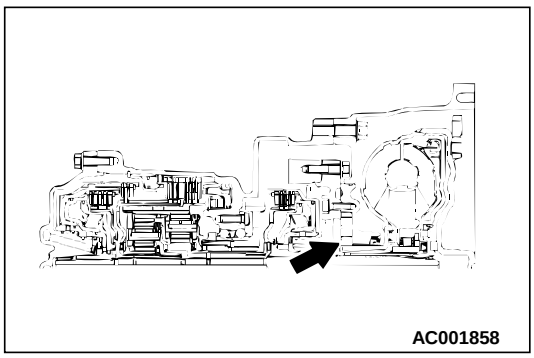


Q: Is the symptom eliminated?

YES : Diagnosis is complete.

NO : Go to Step 5.

TSB Revision


AC001858

STEP 4. Replace the oil pump.

(1) Remove the transaxle.
(2) Replace the oil pump (Oil pump cannot be repaired). Refer to GROUP 23B, Transaxle P.23B-10. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 5.

STEP 5. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 5: Engine Stalls when Moving Selector Lever from "N" to "D" or "N" to "R"

COMMENT

If the engine stalls when the selector lever is shifted from "N" to "D" or "R" range while the engine is idling, the cause is probably a malfunction of the engine system, torque converter clutch solenoid valve, valve body or torque converter (torque converter clutch malfunction).

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

- Malfunction of the engine system
- Malfunction of the torque converter clutch solenoid
- Malfunction of the valve body
- Malfunction of the torque converter (Malfunction of the torque converter clutch)
- Malfunction of the PCM

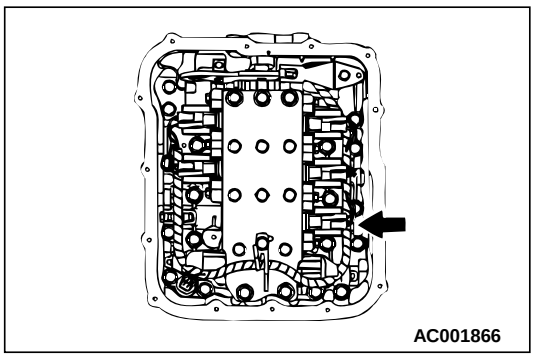
DIAGNOSIS

STEP 1. Check the engine system.

Refer to GROUP 13A <2.4L Engine>, Diagnosis – Trouble Symptom Chart – When the engine is hot, it stalls at idle P.13A-22 or GROUP 13B <3.0L Engine>, Diagnosis – Trouble Symptom Chart – When the engine is hot, it stalls at idle P.13B-22.

Q: Is the inspection result good?

YES : Go to Step 2.
NO : Repair or replace the engine components.

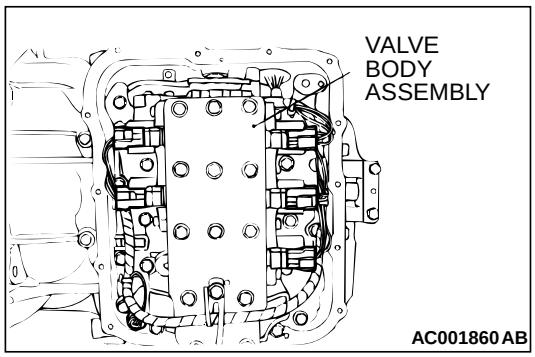

AC001866

STEP 2. Replace the torque converter clutch solenoid valve.

Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 3.



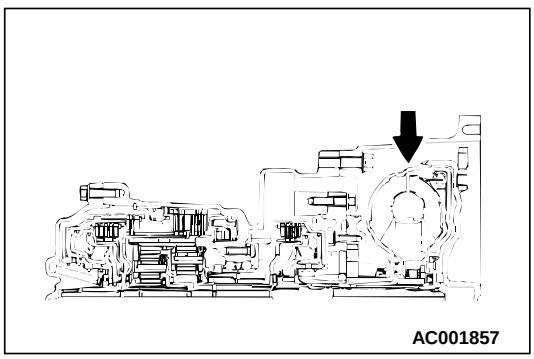
AC001860 AB

STEP 3. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. If the symptom is not eliminated, go to Step 4.


AC001857

STEP 4. Replace the torque converter assembly.

(1) Remove the transaxle.
(2) Replace the torque converter assembly. Refer to GROUP 23B, Transaxle P.23B-10. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 5.

STEP 5. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 6: Shift Shocks when Shifting from "N" to "D" and Long Delay

COMMENT

If abnormal shocks or delay of two seconds or more occurs when the selector lever is shifted from "N" to "D" range while the engine is idling, the cause is probably abnormal underdrive clutch pressure or a malfunction of the underdrive clutch, valve body or throttle position sensor.

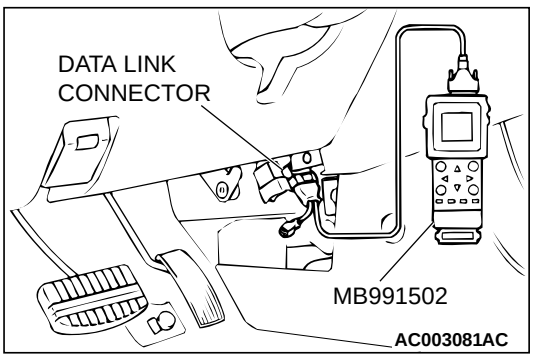
TSB Revision

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

- Abnormal underdrive clutch pressure
- Malfunction of the underdrive solenoid valve
- Malfunction of the underdrive clutch
- Malfunction of the valve body
- Malfunction of the throttle position sensor
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:
MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check actuator test item 02: Underdrive Solenoid Valve.

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 02: Underdrive Solenoid Valve.
  - An operation sound should be heard from solenoid valve when solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 2.
NO : Repair or replace the underdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Check when shift shocks occur.

Q: When the shift shocks occur?

When engaging from N to D : Go to Step 3.
When the vehicle starts moving : Go to Step 6.

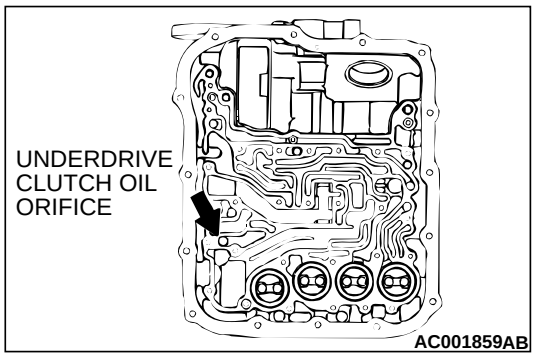
STEP 3. Check the hydraulic pressure (for underdrive clutch).

Measure the hydraulic pressure for underdrive clutch when the selector lever is shifted from "N" to "D" range. Check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

YES : Go to Step 4.
NO : Go to Step 8.

TSB Revision



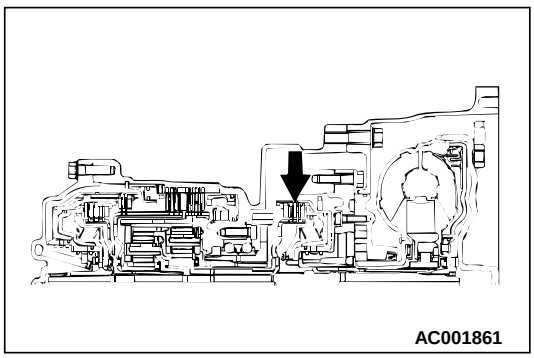
STEP 4. Check the underdrive clutch system.

(1) Remove the valve body cover and valve body. Refer to P.23A-290, Transaxle Assembly and GROUP 23B, Transaxle P.23B-10.

(2) Blow compressed air into the underdrive clutch oil orifice of the transmission case, and check if the underdrive clutch piston moves and air pressure is maintained in that condition.

Q: Is the air pressure maintained?

YES : Go to Step 8.
NO : Go to Step 5.



STEP 5. Check the underdrive clutch.

(1) Remove the transmission assembly.

(2) Check the facing for seizure and the piston seal ring for damage and interference with the retainer. Repair or replace the faulty parts. Refer to GROUP 23B P.23B-51, Underdrive Clutch and Input Shaft. Then check the symptom.

Q: Is the symptom eliminated?

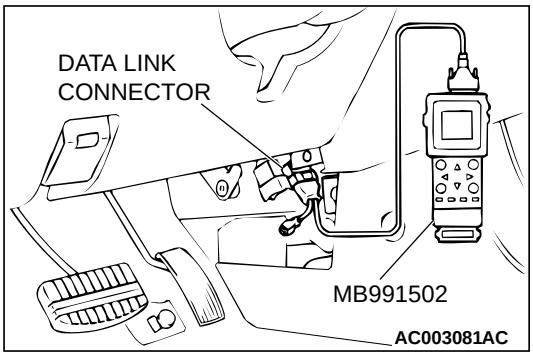
YES : Diagnosis is complete.
NO : Go to Step 9.

STEP 6. Check shift shocks.

Q: Do shift shocks occur?

YES : Go to Step 7.
NO : Go to Step 8.

TSB Revision



STEP 7. Using scan tool MB991502, check data list item 11: Throttle position sensor.

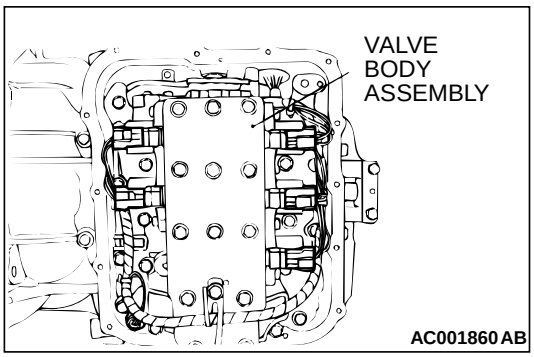
⚠ CAUTION
To prevent damage to scan tool MB991502, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

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

Q: Is the sensor operating properly?

YES : Go to Step 8.
NO : Check the throttle position sensor. Refer to P.23A-39, P.23A-48, P.23A-56, code number 11, 12, 14: Throttle Position Sensor System. Then check the symptom.



STEP 8. Disassemble and clean the valve body.
Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. Go to Step 9.

STEP 9. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 7: Shift Shocks when Shifting from "N" to "R" and Long Delay

COMMENT
If abnormal shocks or delay of two seconds or more occur when the selector lever is shifted from "N" to "R" range while the engine is idling, the cause is probably abnormal reverse clutch pressure or low-reverse brake pressure, or a malfunction of the reverse clutch, low-reverse brake, valve body or throttle position sensor.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Abnormal reverse clutch pressure
- Abnormal low-reverse brake pressure
- Malfunction of the low-reverse solenoid valve
- Malfunction of the reverse clutch
- Malfunction of the low-reverse brake
- Malfunction of the valve body
- Malfunction of the throttle position sensor

TSB Revision

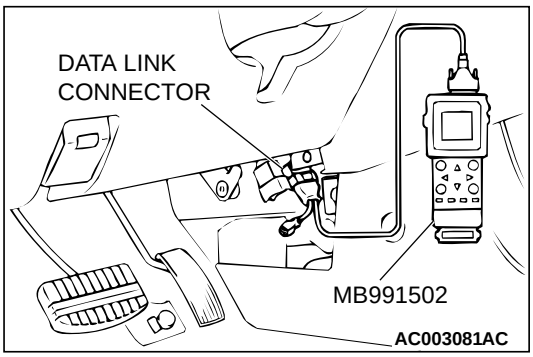
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 01: Low-Reverse Solenoid Valve.

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 01: Low-Reverse Solenoid Valve.
  - An operation sound should be heard from solenoid valve when solenoid valve is operated.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?
YES : Go to Step 2.
NO : Repair or replace the low-reverse solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Check when shift shocks occur.

Q: When the shift shocks occur?
When engaging from N to R : Go to Step 3.
When the vehicle starts moving : Go to Step 7.

STEP 3. Check the hydraulic pressure (for reverse clutch).
Measure the hydraulic pressure for reverse clutch when the selector lever is at the "R" range. Check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?
YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Check the hydraulic pressure (for low-reverse brake).
Measure the hydraulic pressure for low-reverse brake when the selector lever is at the "R" range. Check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

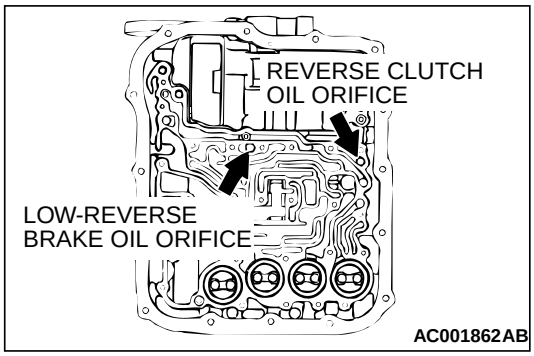
Q: Is the hydraulic pressure within the standard value?
YES : Go to Step 5.
NO : Go to Step 9.

TSB Revision

STEP 5. Check the reverse clutch system and low-reverse brake system.

(1) Remove the valve body cover and valve body. Refer to P.23A-290, Transaxle Assembly and GROUP 23B, Transaxle P.23B-10.

(2) Blow compressed air into the reverse clutch oil orifice of the transaxle case, and check if the reverse clutch piston moves and air pressures are maintained in that condition. Repeat for the low-reverse brake.



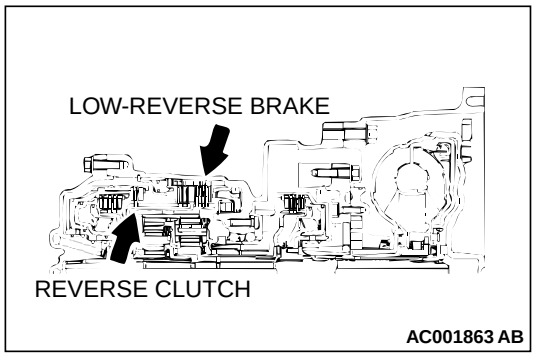
Q: Are both air pressures maintained?

YES : Go to Step 6.
NO : Go to Step 9.

STEP 6. Check the reverse clutch and low-reverse brake.

(1) Remove the transaxle assembly.

(2) Check the facing for seizure and the piston seal ring for damage and interference with the retainer. Repair or replace the faulty parts. Refer to GROUP 23B, Transaxle P.23B-10, Reverse and Overdrive Clutch P.23B-53. Then check for the symptom.



Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 10.

STEP 7. Check shift shocks.

Q: Do shift shocks occur sometimes?

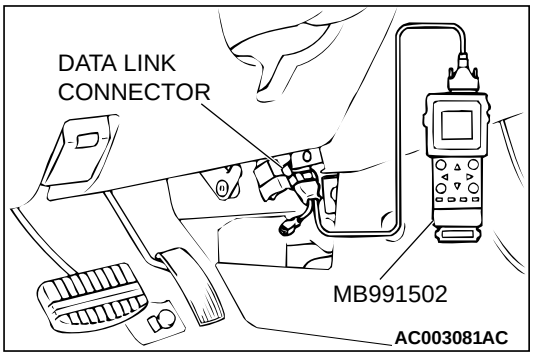
YES : Go to Step 8.
NO : Go to Step 9.

TSB Revision

STEP 8. Using scan tool MB991502, check data list item 11: Throttle position sensor.

⚠ CAUTION

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



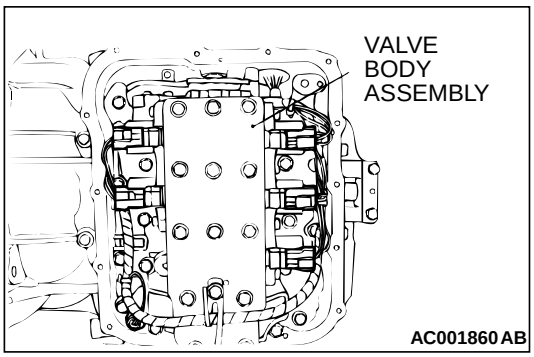
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
- With the throttle valve in idle position, voltage should be between 535 and 735 mV.
- With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

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

Q: Is the sensor operating properly?

YES : Go to Step 9.
NO : Check the throttle position sensor. Refer to P.23A-39, P.23A-48, P.23A-56, code number 11, 12, 14: Throttle Position Sensor System. Then check the symptom.

STEP 9. Disassemble and clean the valve body.



Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. Go to Step 10.

STEP 10. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 8: Shift Shocks when Shifting from "N" to "D," "N" to "R" and Long Delay

COMMENT

If abnormal shocks or delay of two seconds or more occur when the selector lever is shifted from "N" to "D" range and from "N" to "R" range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the oil pump or valve body.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Abnormal line pressure
- Malfunction of the oil pump
- Malfunction of the valve body
- Malfunction of the PCM

TSB Revision

DIAGNOSIS

STEP 1. Check the hydraulic pressure.

(1) Measure the hydraulic pressure of each element when the transmission is in 1st, 2nd or reverse. Check if each hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

(2) If some elements are within the standard value and some are not, recheck the symptom.

Q: Are all hydraulic pressures within the standard value?

YES : Go to Step 3.

NO : Go to Step 2.

STEP 2. Adjust line pressure.

Adjust line pressure. Refer to P.23A-37, Line Pressure Adjustment. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.

NO : Go to Step 3.

STEP 3. Check when shift shocks occur.

Q: When the shift shocks occur?

When engaging from N to D and N to R : Go to Step 4.

When the vehicle starts moving : Go to Step 5.

STEP 4. Replace the oil pump.

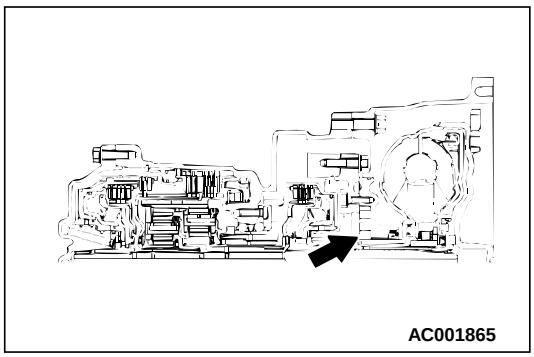
(1) Remove the transaxle.

(2) Replace the oil pump. (Oil pump cannot be repaired). Refer to GROUP 23B, Transaxle P.23B-10. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.

NO : Go to Step 6.


AC001865

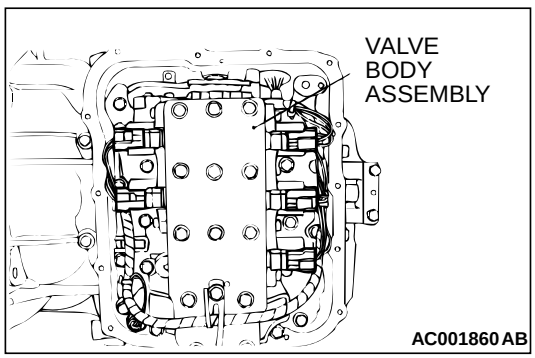
STEP 5. Disassemble and clean the valve body.

Check the installation bolts for looseness and the O-ring, valve and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.

NO : Replace the valve body assembly. Then check the symptom. Go to Step 6.



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TSB Revision

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 9: Shift Shocks and Slipping

COMMENT
If shift shocks when driving due to upshifting or downshifting and the transaxle speed becomes higher than the engine speed, the cause is probably abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

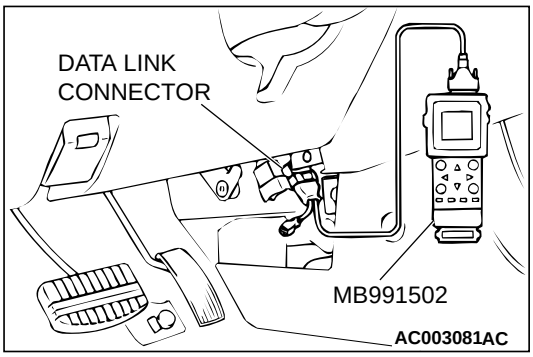
- Abnormal line pressure
- Malfunction of each solenoid valve
- Malfunction of the oil pump
- Malfunction of the valve body
- Malfunction of the each brake or each clutch
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test.

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for following items.
  a. Item 01: Low-reverse solenoid valve
  b. Item 02: Underdrive solenoid valve
  c. Item 03: Second solenoid valve
  d. Item 04: Overdrive solenoid valve
    - An operation sound should be heard from solenoid valve when solenoid valve is operated.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Are the solenoid valves operating properly?

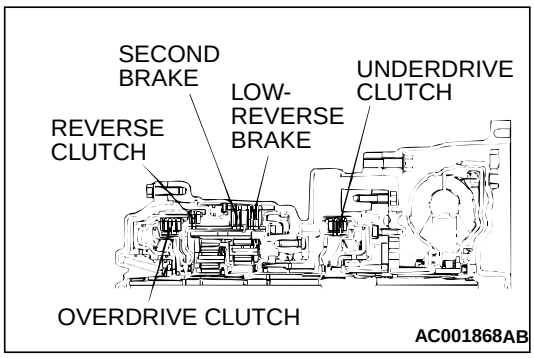
YES : Go to Step 2.
NO : Repair or replace the solenoid valves. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Adjust the line pressure.
Adjust the line pressure. Refer to P.23A-37, Line Pressure Adjustment. Then check the symptom.

Q: Is the symptom eliminated?

YES : Go to Step 3.
NO : Go to Step 4.

TSB Revision

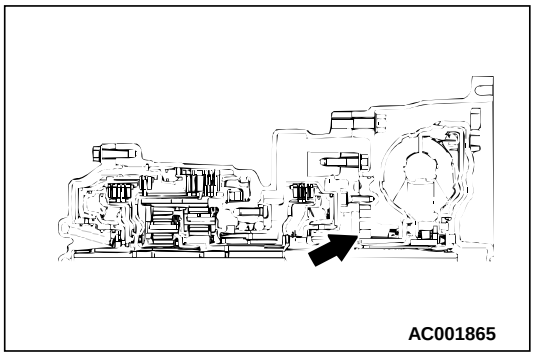


STEP 3. Check each brake and clutch.

(1) Remove the transaxle.
(2) Check the facing for seizure and piston seal ring for damage and interference with retainer. Repair or replace the faulty parts. Refer to GROUP 23B, Transaxle P.23B-10, Underdrive Clutch and Input Shaft P.23B-51, Reverse and Overdrive Clutch P.23B-53. Then check for the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 6.

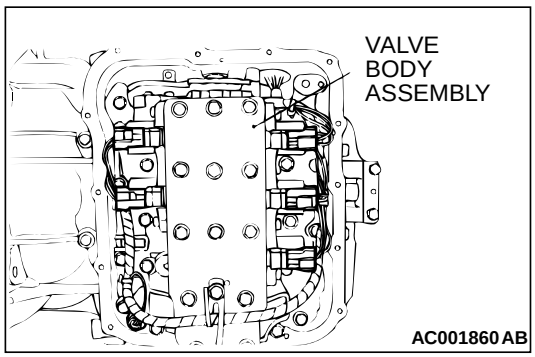


STEP 4. Replace the oil pump.

(1) Remove the transaxle.
(2) Replace the oil pump. (Oil pump can not be repaired). Refer to GROUP 23B, Transaxle P.23B-10. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 5.



STEP 5. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 10: All Points (Early or Late Shift Points)

COMMENT

If all shift points are early or late while driving, the cause is probably a malfunction of the output shaft speed sensor, throttle position sensor or a solenoid valve.

TSB Revision

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

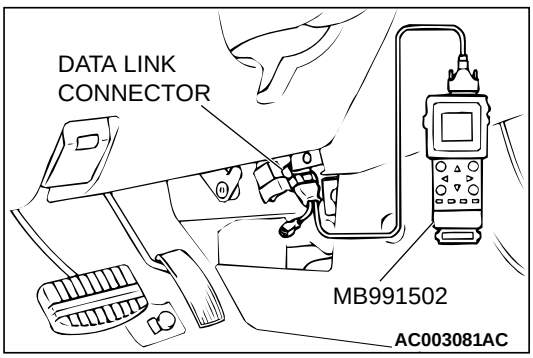
- Malfunction of the output shaft speed sensor
- Malfunction of the throttle position sensor
- Malfunction of each solenoid valve
- Abnormal line pressure
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:
MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 23: Output Shaft Speed Sensor.

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



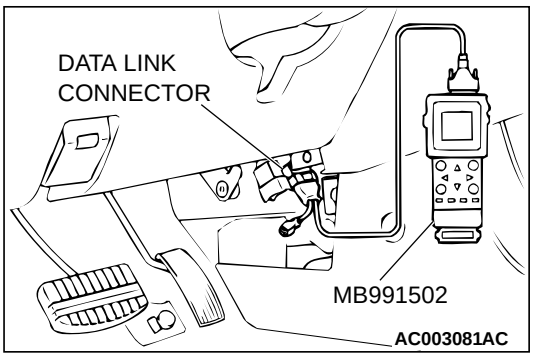
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 23: Output Shaft Speed Sensor.
  - When driving at constant speed of 50km/h (31mph), the display should be 1,600 – 1,900 r/min <2.4L Engine>, 1,300 – 1,600 r/min <3.0L Engine>. (Gear range: 3rd gear)

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

Q: Is the sensor operating properly?

YES : Go to Step 2.
NO : Refer to P.23A-105, code number 23: Output shaft speed sensor system.

STEP 2. Using scan tool MB991502, check data list item 11: Throttle position sensor.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 11: Throttle Position Sensor.
  - With the throttle valve in idle position, voltage should be between 535 and 735 mV.
  - With the throttle valve in full-open position, voltage should be between 4,500 and 5,500 mV.

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

Q: Is the sensor operating properly?

YES : Go to Step 3.
NO : Check the throttle position sensor. Refer to P.23A-39, P.23A-48, P.23A-56, code number 11, 12, 14: Throttle Position Sensor System. Then check the malfunction.

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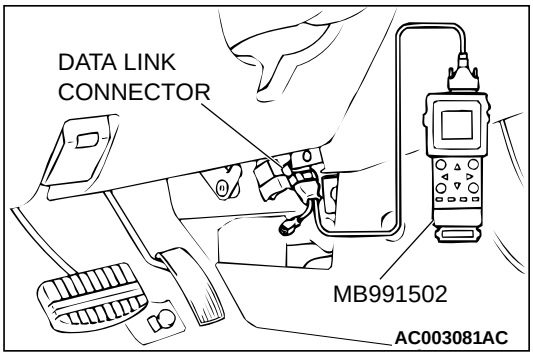


STEP 3. Using scan tool MB991502, check data list.

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for following items.
  a. Item 31: Low-Reverse Solenoid Valve Duty Percent
  b. Item 32: Underdrive Solenoid Valve Duty Percent
  c. Item 33: Second Solenoid Valve Duty Percent
  d. Item 34: Overdrive Solenoid Valve Duty Percent
    - Check that the values shown below are displayed when each data list item is entered.

DRIVING CONDITION	DATA LIST ITEM			
	31	32	33	34
Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	0%	0%	100%	100%
Driving at constant speed of 30 km/h (19 mph) in 2nd gear	100%	0%	0%	100%
Driving at constant speed of 50 km/h (31 mph) in 3rd gear	100%	0%	100%	0%
Driving at constant speed of 50 km/h (31 mph) in 4th gear	100%	100%	0%	0%

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

Q: Are the solenoid valves operating properly?

YES : Go to Step 4.
NO : Go to Step 6.

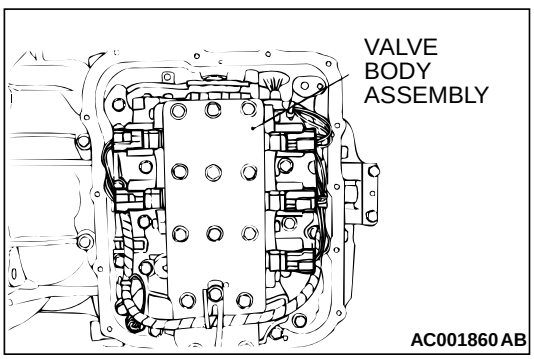
STEP 4. Adjust the line pressure.

Adjust the line pressure. Refer to P.23A-37, Line Pressure Adjustment. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 5.

STEP 5. Disassemble and clean the valve body.

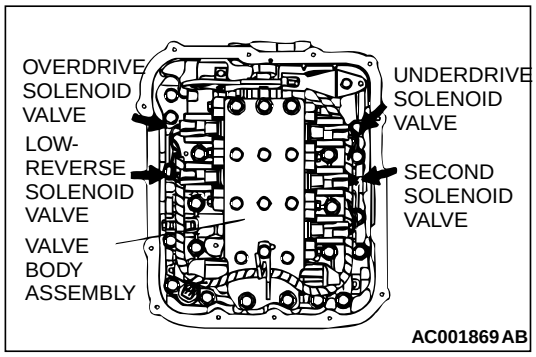


Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. Go to Step 7.

TSB Revision



STEP 6. Replace each solenoid valve.

Replace the faulty solenoid valve with a new one.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.

NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.

NO : Start over at Step 1.

INSPECTION PROCEDURE 11: Some Points (Early or Late Shift Points)

COMMENT

If some of the shift points are early or late when driving, the cause is probably a malfunction of the valve body, or it is due to the characteristics of the INVECS-II system, but is not an abnormality.

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

- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:

MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 14: INVECS-II Cancel Command.

⚠ CAUTION

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

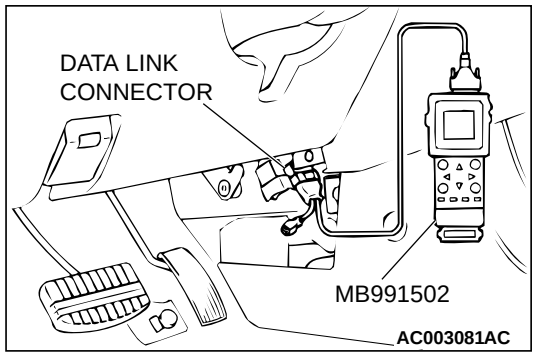
(1) Connect scan tool MB991502 to the data link connector.

(2) Start the engine.

(3) Set scan tool MB991502 to actuator test mode for item14: INVECS-II Cancel Command.

- The gear shifting correspond to the standard shift line of the shift pattern diagram. Refer to P.23A-3.

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



Q: Does the gear shifting correspond to the standard shift line of the shift pattern diagram?

YES : The symptom is due to characteristics of the INVECS-II system, but is not abnormal.

NO : Go to Step 2.

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STEP 2. Check the shift points.

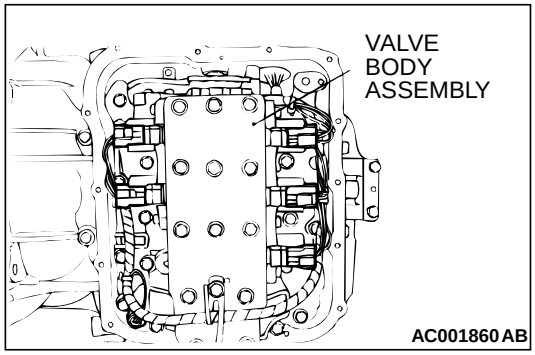
Q: Are the shift points early or late only when A/T fluid is -29°C (84°F) or less, or 125°C (257°F) or more?

YES : The symptom is due to characteristics of the INVECS-II system, but is not abnormal.

NO : Go to Step 3.

STEP 3. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.



Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.

NO : Replace the valve body assembly. Then check the symptom. Go to Step 4.

STEP 4. Replace the PCM.

Q: Is the symptom eliminated?

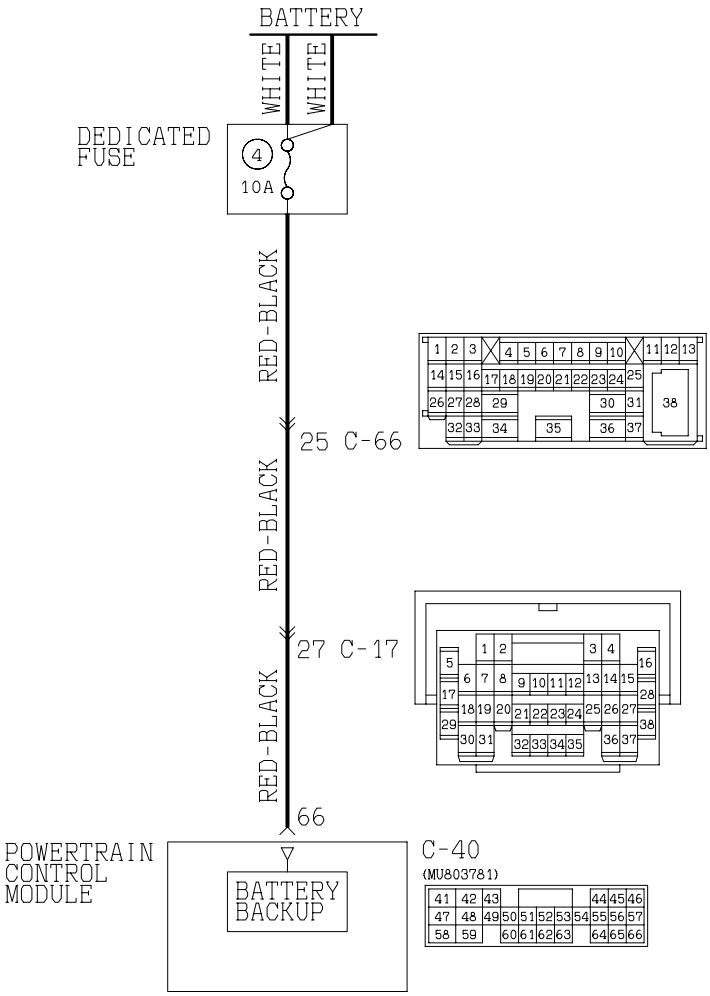
YES : Diagnosis is complete.

NO : Start over at Step 1.

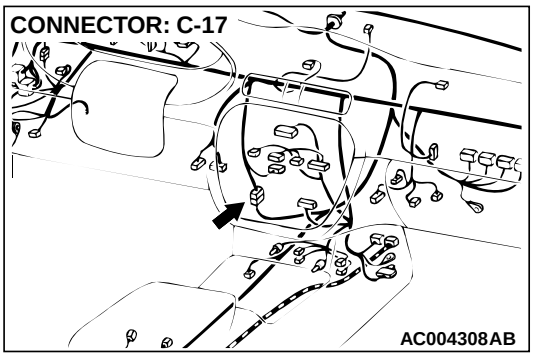
TSB Revision

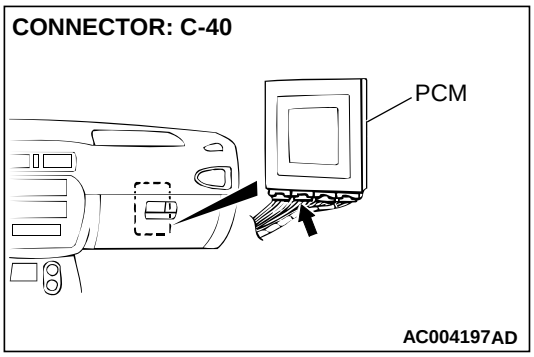
INSPECTION PROCEDURE 12: No Diagnostic Trouble Codes (Does not Shift)

Backup Power Supply System Circuit



W1S15M11AA
AC004621AB





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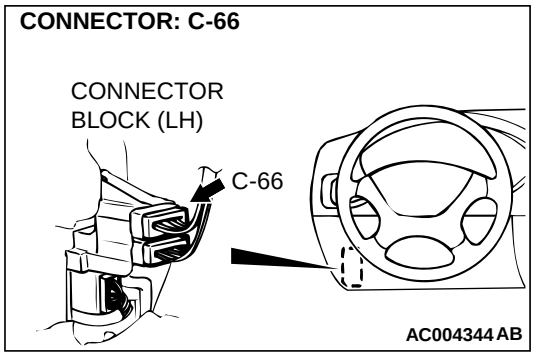


CIRCUIT OPERATION
PCM (terminal number 66) receives battery positive voltage from the battery.

COMMENT
If shifting does not occur while driving and no diagnostic trouble codes are output, a malfunction of the Park/Neutral position switch, or PCM may exist.

TROUBLESHOOTING HINTS (The most likely causes for this case:)
- Malfunction of the A/T control relay
- Malfunction of the Park/Neutral position switch
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)

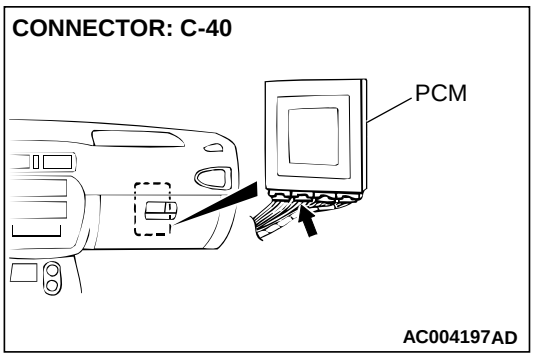
STEP 1. Check the vehicle acceleration.

Q: Does the vehicle accelerate poorly (transaxle stays in 3rd gear) when starting from a stop with the selector lever in "D" range?

YES : Go to Step 2.
NO : Go to Step 5.

STEP 2. Check the backup power supply voltage at PCM connector C-40 by backprobing.

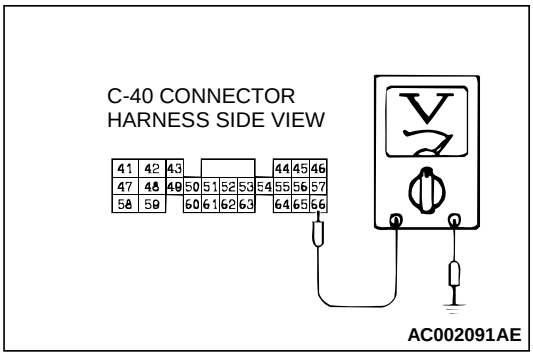
(1) Do not disconnect connector C-40.



(2) Measure the voltage between terminal 66 and ground by backprobing.
- Voltage should be battery positive voltage.

Q: Is the voltage normal?

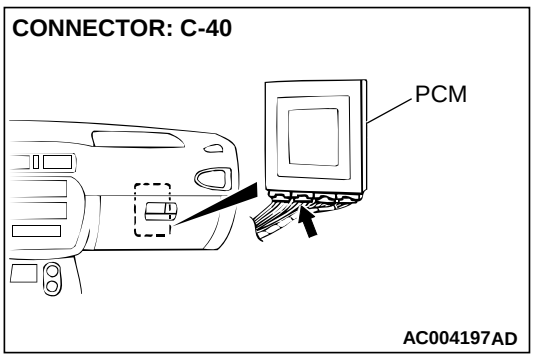
YES : Go to Step 4.
NO : Go to Step 3.

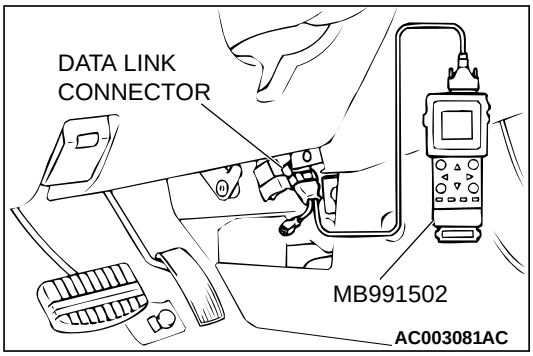


STEP 3. Check connector C-40 at PCM for damage.

Q: Is the connector in good condition?

YES : Repair it because of harness open circuit between PCM connector C-40 terminal 66 and battery.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then check for the symptom.





STEP 4. Using scan tool MB991502, read the A/T diagnostic trouble code.

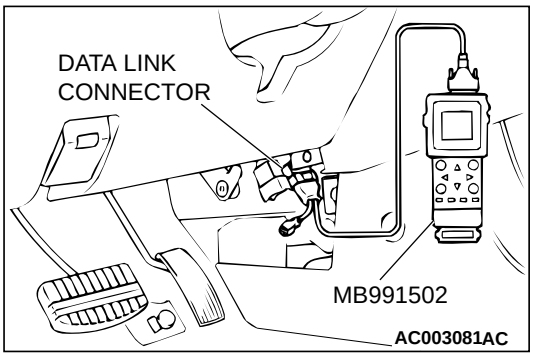
⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the A/T diagnostic trouble code.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the A/T diagnostic trouble code number "54" output?

YES : Refer to P.23A-208, code number 54: A/T control relay system.
NO : Go to Step 5.



STEP 5. Using scan tool MB991502, check data list item 61: Park/Neutral Position Switch.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 61: Park/Neutral Position Switch.
- Move the selector lever to "P," "R," "N," "D," "3," "2," "L" positions to confirm whether the MUT-II.

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

Q: Is the switch operating properly?

YES : Check for the symptom. If the symptom is not eliminated, replace the PCM.
NO : Refer to P.23A-124, P.23A-143, code number 27, 28: Park/Neutral position switch system.

INSPECTION PROCEDURE 13: Poor Acceleration

COMMENT

If acceleration is poor when downshifting occurs while driving, a malfunction of the engine system or a brake or clutch may exist.

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

- Malfunction of the engine system
- Malfunction of the each clutch system and each brake system
- Abnormal line pressure
- Malfunction of the PCM

TSB Revision

DIAGNOSIS

STEP 1. Check the engine system.

(1) Refer to GROUP 13A <2.4L Engine>, Diagnosis – Symptom Chart – Poor acceleration P.13A-357, or GROUP 13B <3.0L Engine>, Diagnosis – Symptom Chart – Poor acceleration P.13B-440.

Q: Is the inspection result good?

YES : Go to Step 2.
NO : Repair or replace the engine component(s).

STEP 2. Check each brake and clutch.

Perform the torque converter stall test. Refer to P.23A-22, Torque Converter Stall Test. Then check for the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 3.

STEP 3. Perform the hydraulic pressure test.

Perform the hydraulic pressure test. Refer to P.23A-23, Hydraulic Pressure Test. Then check for the symptom.

Q: Is the symptom eliminated?

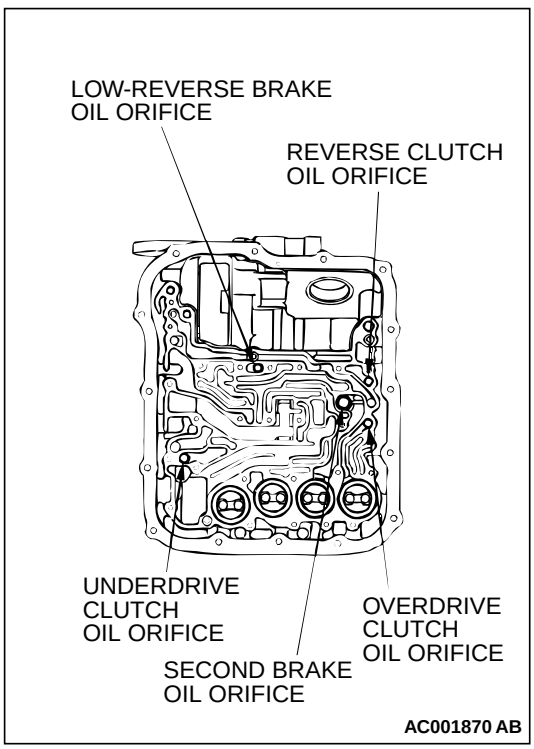
YES : Diagnosis is complete.
NO : Go to Step 4.

STEP 4. Check each brake system and each clutch system.

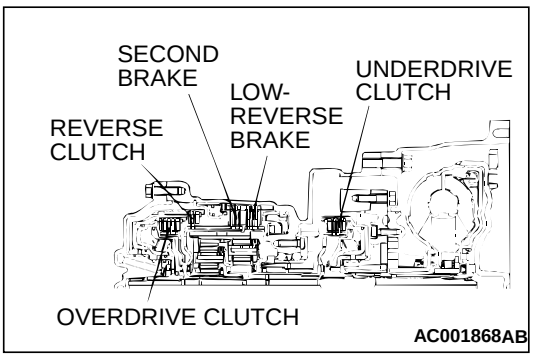
(1) Remove the valve body cover and valve body. Refer to GROUP 23B, Transaxle P.23B-10.
(2) Blow compressed air into the each brake oil orifice and clutch oil orifice of the transaxle case, and check if the each brake and each clutch piston move and air pressure is maintained.

Q: Is the air pressure maintained?

YES : Diagnosis is complete.
NO : Go to Step 5.



TSB Revision



STEP 5. Check each brake system and clutch system.

(1) Remove the transaxle.
(2) Check the facings for seizure and piston seal ring for damage and interference with retainer. Repair or replace the faulty parts. Refer to GROUP 23B, Transaxle P.23B-10, Underdrive Clutch and Input Shaft P.23B-51, Reverse and Overdrive Clutch P.23B-53. Then check for the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 14: Vibration

COMMENT

If vibration occurs when driving at constant speed or when accelerating in 4th gear, abnormal torque converter clutch pressure or a malfunction of the engine system, torque converter clutch solenoid, torque converter or valve body may exist.

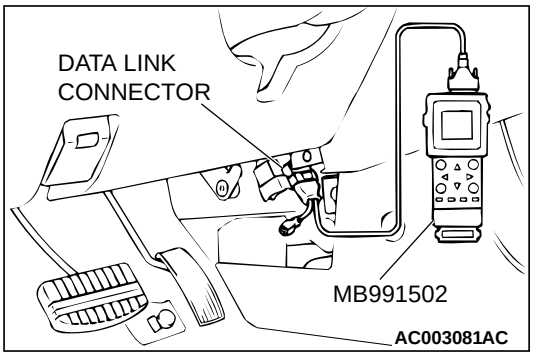
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Abnormal torque converter clutch pressure
- Malfunction of the engine system
- Malfunction of the torque converter clutch solenoid
- Malfunction of the torque converter
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

REQUIRED SPECIAL TOOL:

MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06: Torque Converter Clutch Solenoid Valve.
- An operation sound should be heard from solenoid valve when the torque converter clutch solenoid valve is operated.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 2.
NO : Repair or replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-68. Then confirm that the symptom is eliminated.

STEP 2. Check the vibration.

Q: Does the vibration occur when the transmission fluid temperature sensor connector has been disconnected?

YES : Check the engine system. Refer to GROUP 13A <2.4L Engine>, Diagnosis – Symptom Chart – Driving P.13A-22, or GROUP 13B <3.0L Engine>, Diagnosis – Symptom Chart – Driving P.13B-22. If the inspection result is not good, diagnose, repair, and/or replace the engine component(s).
NO : Go to Step 3.

STEP 3. Check the torque converter hydraulic pressure.

Measure the torque converter hydraulic pressure. Then check if the torque converter hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the torque converter hydraulic pressure within the standard value?

YES : Go to Step 4.
NO : Go to Step 5.

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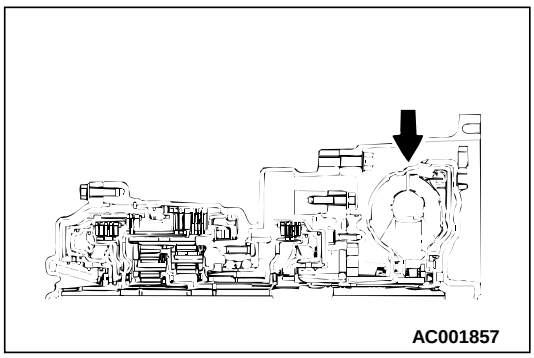
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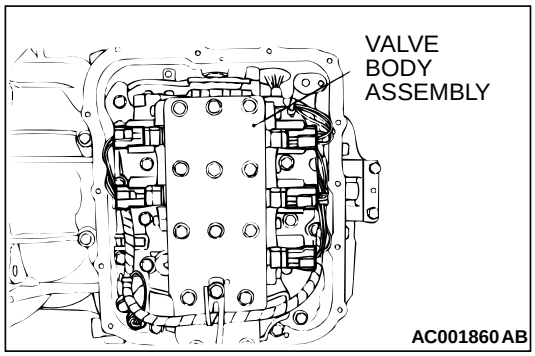
STEP 4. Replace the torque converter assembly.

(1) Remove the transaxle.
(2) Replace the torque converter assembly. Refer to GROUP 23B, Transaxle P.23B-10. Then check the symptom.

Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Go to Step 6.



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STEP 5. Disassemble and clean the valve body.

Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23B, Valve Body P.23B-68.

Q: Is the repair possible and the symptom eliminated?

YES : Diagnosis is complete.
NO : Replace the valve body assembly. Then check the symptom. Go to Step 6.

STEP 6. Replace the PCM.

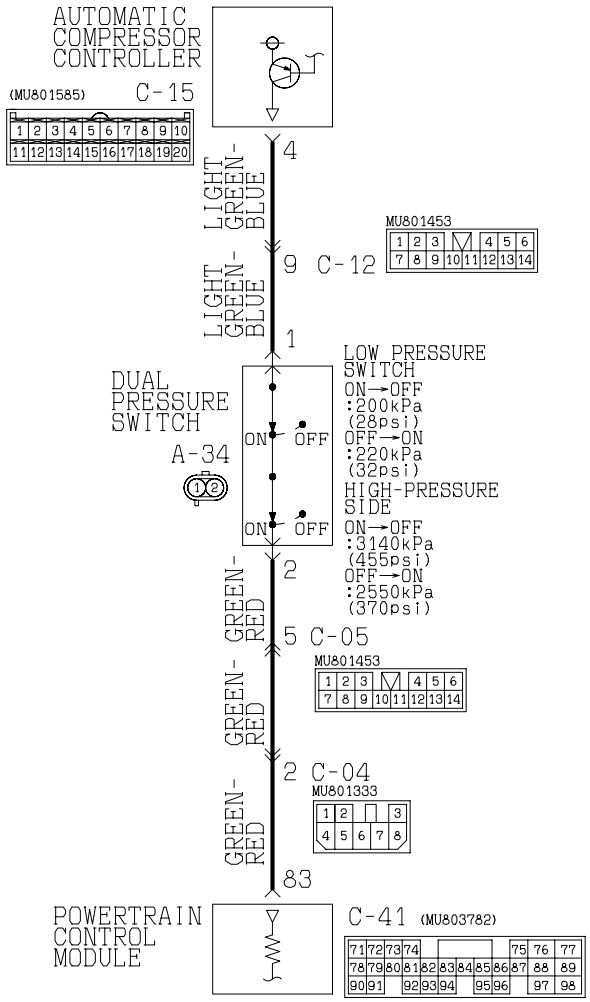
Q: Is the symptom eliminated?

YES : Diagnosis is complete.
NO : Start over at Step 1.

TSB Revision

INSPECTION PROCEDURE 15: Vehicle Shifts Differently with A/C Engaged

Dual Pressure Switch System Circuit



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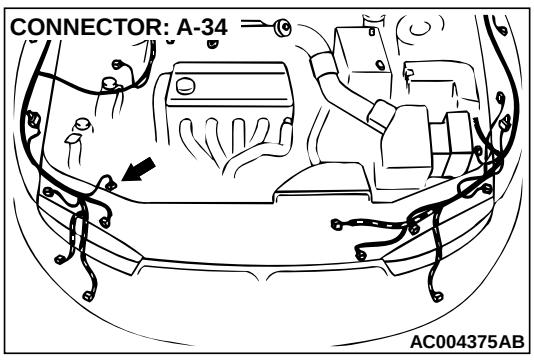

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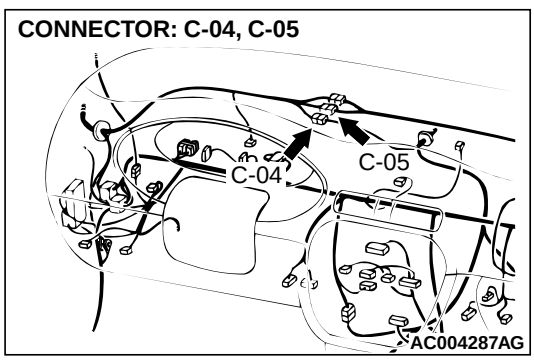

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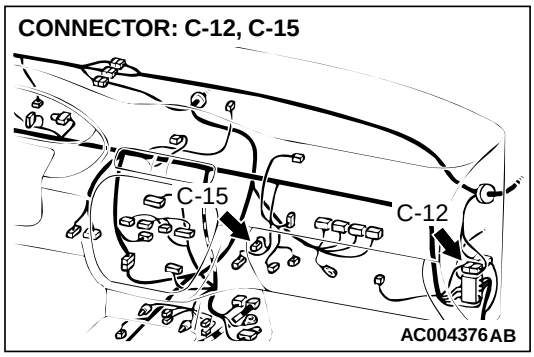
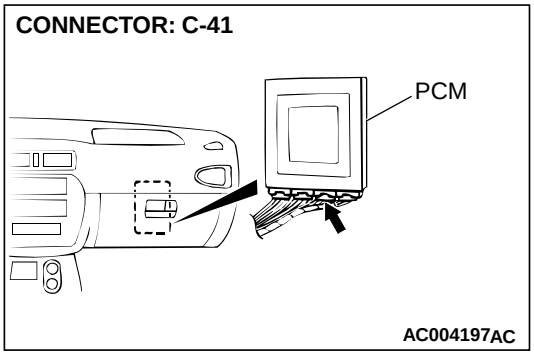




CIRCUIT OPERATION

- When the A/C is turned ON and the dual pressure switch is closed, PCM (terminal number 83) receives battery voltage and then determines the A/C compressor has been signaled to engage.
- When the A/C compressor is engaged, the PCM increases line pressure and shift points to compensate for the additional engine load.

COMMENT

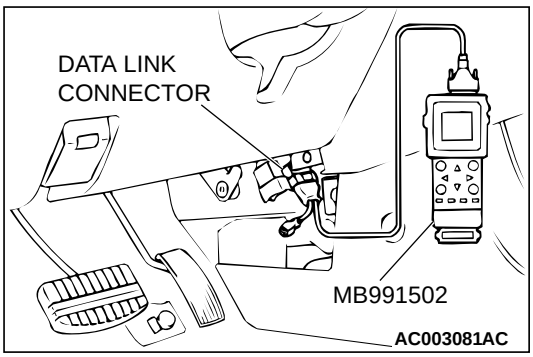
The cause is probably a faulty dual pressure switch circuit or a defective PCM.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Malfunction of the dual pressure switch
- Damaged harness, connector
- Malfunction of A/C system
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
MB991502: Scan Tool (MUT-II)



STEP 1. Using scan tool MB991502, check data list item 65: Dual Pressure Switch.

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item 65: Dual Pressure Switch.
- When the A/C is in operation, the scan tool display should be "ON."
- When the A/C is not in operation, the scan tool display should be "OFF."

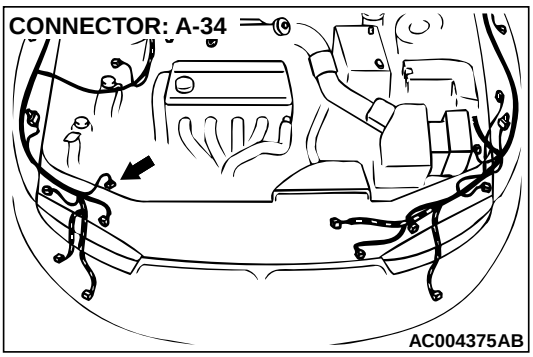
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 2.

TSB Revision

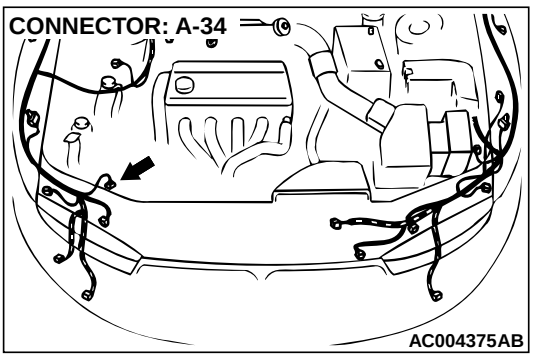


STEP 2. Check connector A-34 at dual pressure switch for damage.

Q: Is the connector in good condition?

YES : Go to Step 3.

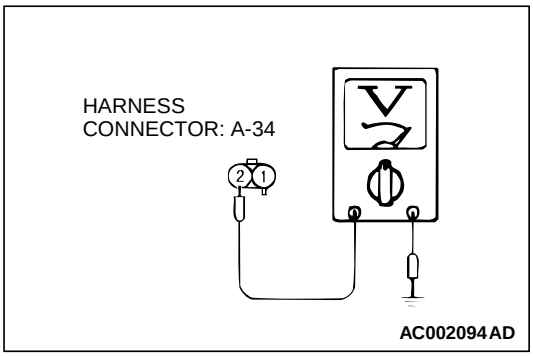
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 3. Check the power supply voltage at dual pressure switch connector A-34.

(1) Disconnect the connector A-34 and measure at the harness side.

(2) Start the engine and run at idle.



(3) Measure the voltage between terminal 1 and ground.
- Voltage should be battery positive voltage.

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

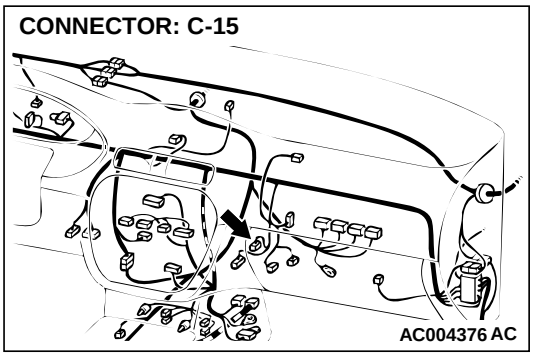
Q: Is the voltage normal?

YES : Go to Step 9.

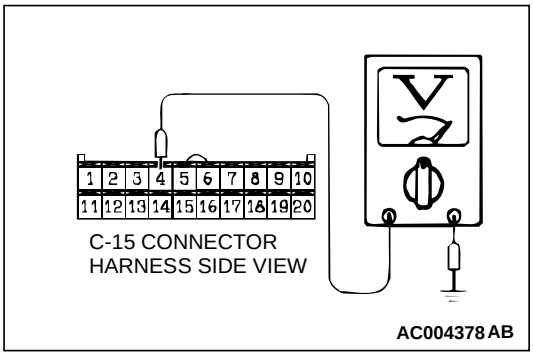
NO : Go to Step 4.

TSB Revision

STEP 4. Check the power supply voltage at automatic compressor controller connector C-15 by backprobing.



(1) Do not disconnect connector C-15.
(2) Start the engine and run at idle.
(3) Operate the A/C.



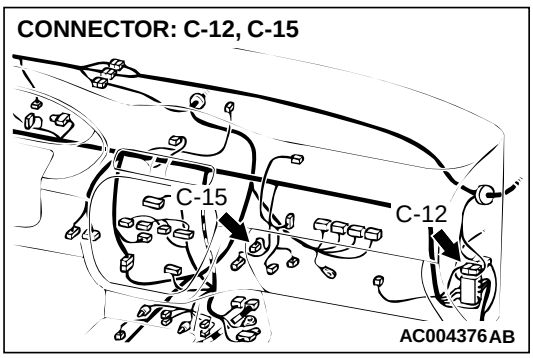
(4) Measure the voltage between terminal 4 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

YES : Go to Step 8.
NO : Go to Step 5.

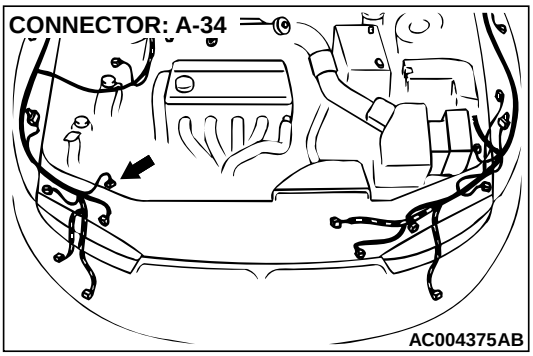
STEP 5. Check connectors C-15 at automatic compressor controller and C-12 at intermediate connector for damage.

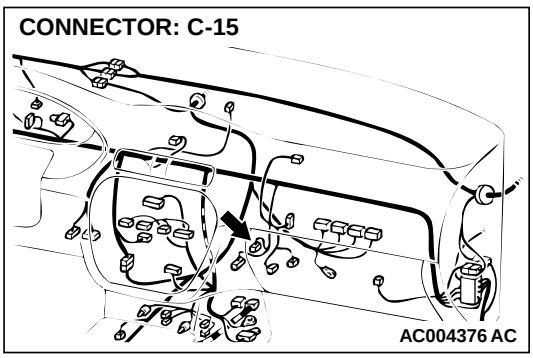


Q: Are the connectors in good condition?

YES : Go to Step 6.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

TSB Revision



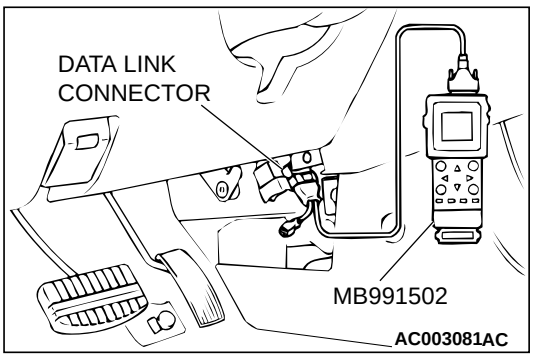


STEP 6. Check harness for short circuit to ground between dual pressure switch connector A-34 terminal 1 and automatic compressor controller connector C-15 terminal 4.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it.



STEP 7. Using scan tool MB991502, check data list item 65: Dual Pressure Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item65: Dual Pressure Switch.
- When the A/C is in operation, the scan tool display should be "ON."
- When the A/C is not in operation, the scan tool display should be "OFF."

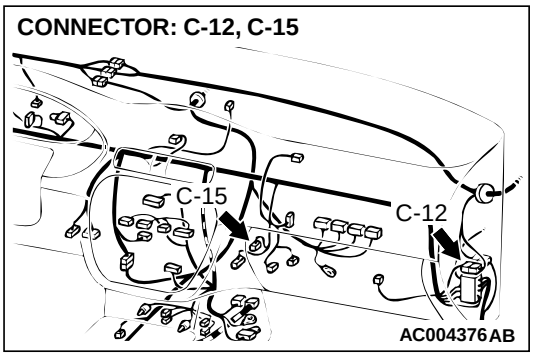
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Check the air conditioning system. Refer to GROUP 55A, Troubleshooting Strategy P.55-5.

TSB Revision

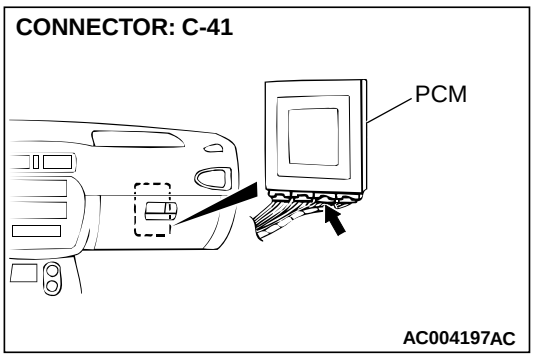


STEP 8. Check connectors C-15 at automatic compressor controller and C-12 at intermediate connector for damage.

Q: Are the connectors in good condition?

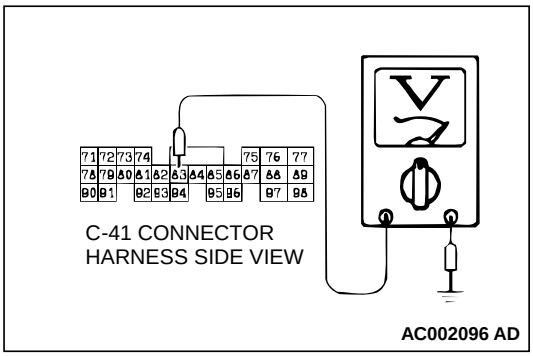
YES : Repair it because of harness open circuit between automatic compressor controller connector C-15 terminal 4 and dual pressure switch connector A-34 terminal 1.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 9. Check the switch output voltage at PCM connector C-41 by backprobing.

(1) Do not disconnect connector C-41.
(2) Start the engine and run at idle.
(3) Operate the A/C.



(4) Measure the voltage between terminal 83 and ground by backprobing.
- When the A/C is in operation, the voltage should be battery positive voltage.
- When the A/C is not in operation, the voltage should be 0.5 volt or less.

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

Q: Is the voltage normal?

YES : Go to Step 14.

NO : Go to Step 10.

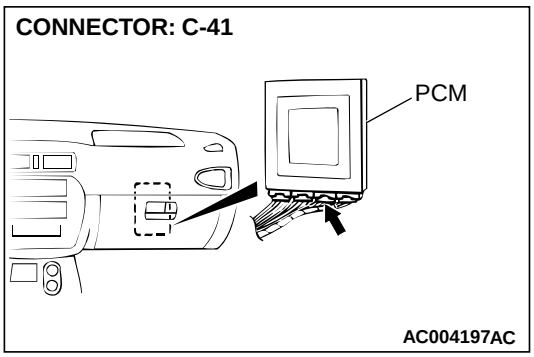
TSB Revision

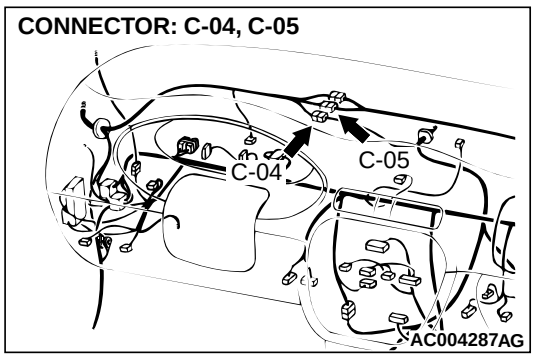
STEP 10. Check connectors C-41 at PCM and C-04, C-05 at intermediate connector for damage.

Q: Are the connectors in good condition?

YES : Go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



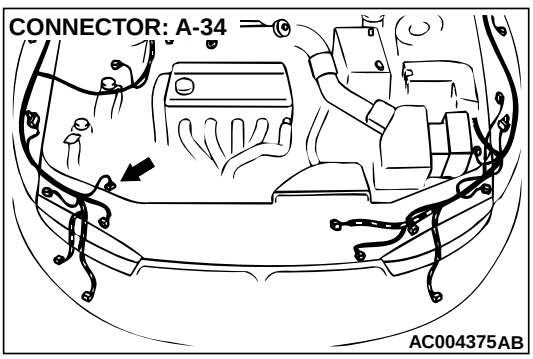


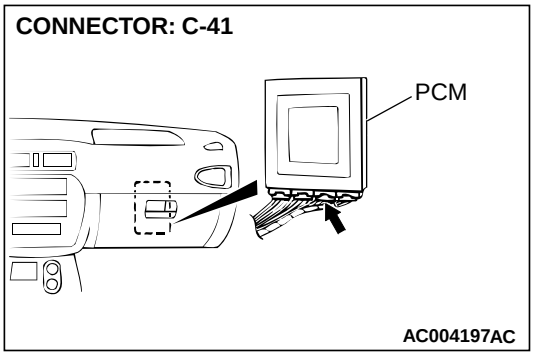
STEP 11. Check harness for short circuit to ground or open circuit between dual pressure switch connector A-34 terminal 2 and PCM connector C-41 terminal 83.

Q: Is the harness wire in good condition?

YES : Go to Step 12.

NO : Repair it.





TSB Revision

STEP 12. Check the dual pressure switch.
Refer to GROUP 55A, Dual Pressure Switch Check P.55-21.

Q: Is the switch operating properly?

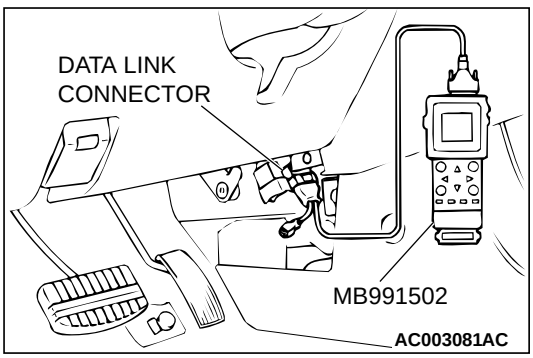
YES : Go to Step 13.

NO : Replace the dual pressure switch. Refer to GROUP 55A, Refrigerant Line P.55-41.

STEP 13. Using scan tool MB991502, check data list item 65: Dual Pressure Switch.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item65: Dual Pressure Switch.
- When the A/C is in operation, the scan tool display should be "ON."
- When the A/C is not in operation, the scan tool display should be "OFF."

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

Q: Is the switch operating properly?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

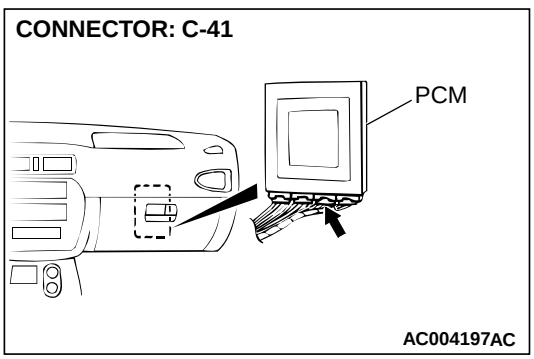
NO : Replace the PCM.

STEP 14. Check connector C-41 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 13.

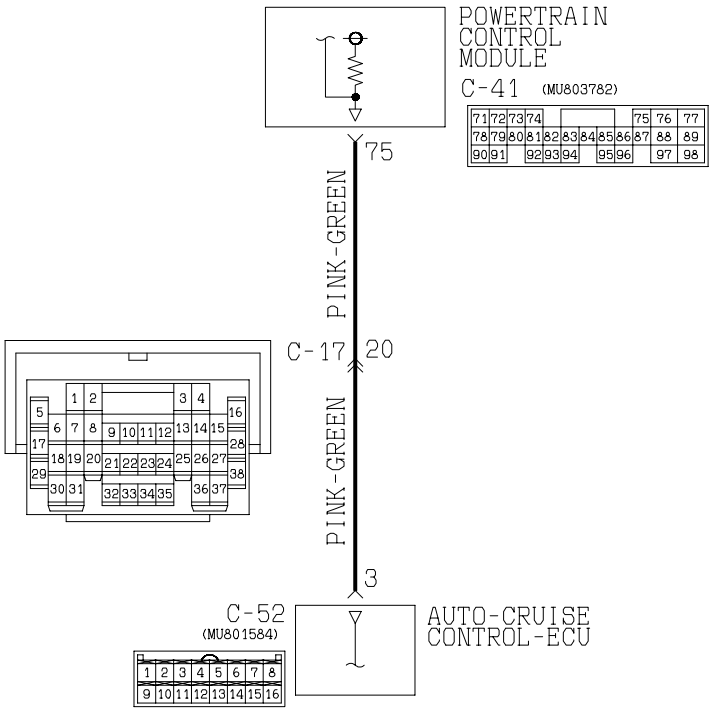
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



TSB Revision

INSPECTION PROCEDURE 16: Transaxle won't Downshift under Load with Auto-cruise Engaged.

Auto-cruise Signal Line System Circuit



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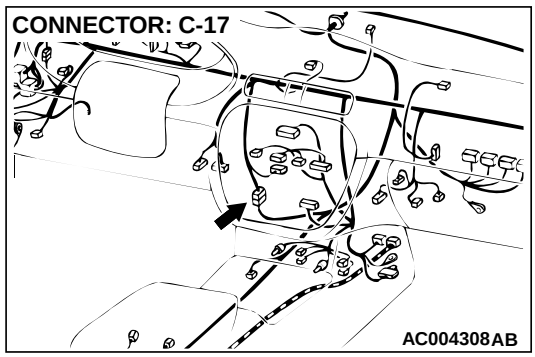
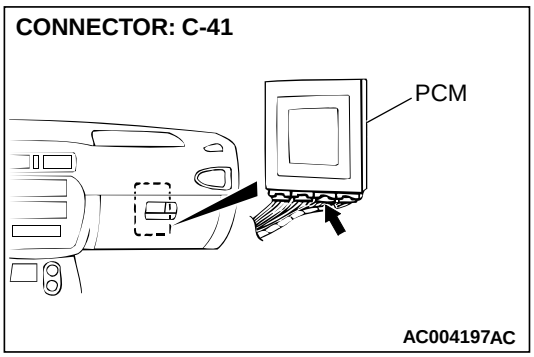
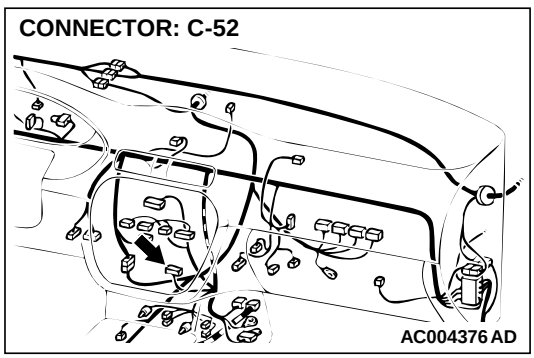






CIRCUIT OPERATION

When the battery positive voltage from PCM (terminal number 75) is grounded at auto-cruise control-ECU (terminal number 3), the auto-cruise control-ECU emits a overdrive cancel signal. When a malfunction of the auto-cruise control circuit occurs, the transmission may downshift harshly with the auto-cruise control engaged.

TSB Revision

COMMENT

A malfunction may be present on the auto-cruise signal line circuit, auto-cruise control ECU or the PCM.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

- Damaged harness, connector
- Malfunction of the PCM
- Malfunction of the auto-cruise control ECU

DIAGNOSIS

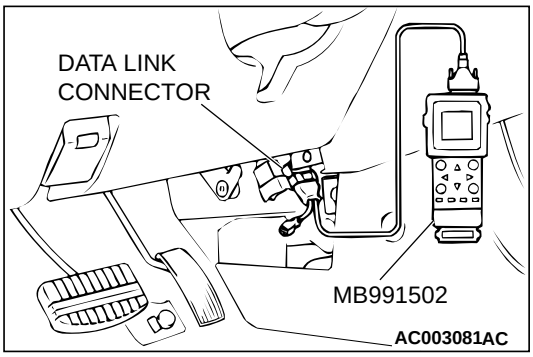
Required Special Tool:

MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 66: Overdrive Off Signal (Auto-cruise ECM Signal).

⚠ CAUTION

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine. (Operate the auto-cruise)
(3) Set scan tool MB991502 to data reading mode for item 66: Overdrive Off Signal (Auto-cruise ECM Signal).
- When driving at level road, the display should be "OFF."
- When driving at uphill road, the display should be "ON."

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

Q: Is the sensor operating properly?

YES : This malfunction can be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-8.

NO : Go to Step 2.

STEP 2. Check the auto-cruise system.

Check the auto-cruise system. Refer to GROUP 17, Auto-cruise Control System Diagnostic Troubleshooting Strategy P.17-7.

Q: Is the auto-cruise system operating properly?

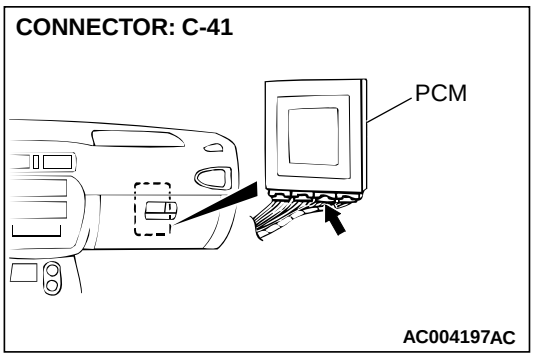
YES : Go to Step 3.

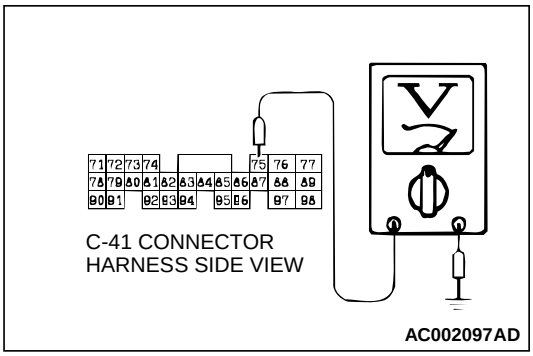
NO : Repair it, then check the symptom.

TSB Revision

STEP 3. Check the signal voltage at PCM connector C-41 by backprobing.

(1) Do not disconnect connector C-41.
(2) Turn the ignition switch to "ON" position.





(3) Measure the voltage between terminal 75 and ground by backprobing.
- Voltage should be battery positive voltage.

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

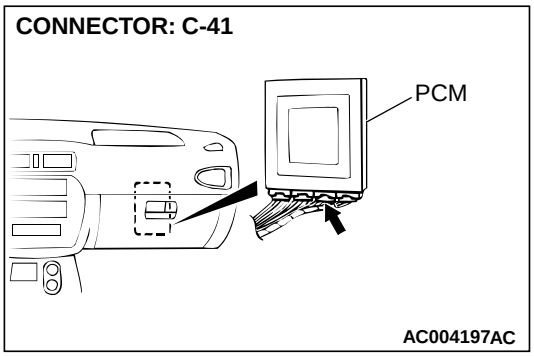
Q: Is the voltage normal?

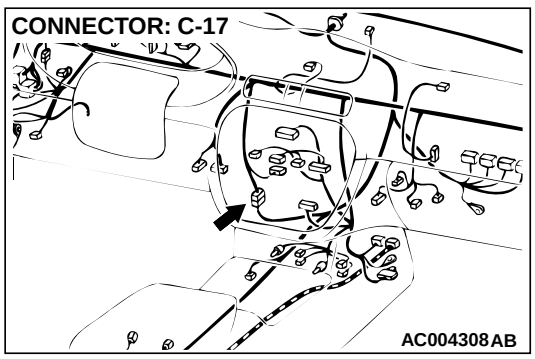
YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check connectors C-41 at PCM and C-17 at inter mediate connector for damage.

Q: Are the connectors in good condition?

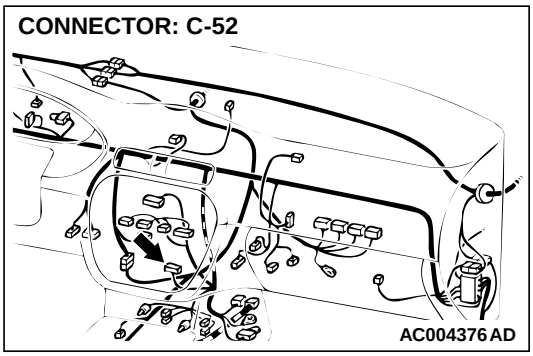
YES : Replace the PCM.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



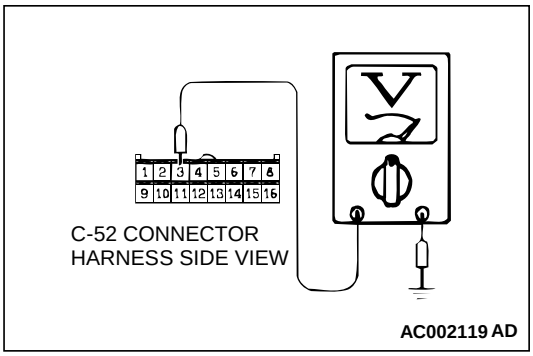


TSB Revision

STEP 5. Check the signal voltage at auto-cruise control-ECU connector C-52 by backprobing.



(1) Do not disconnect connector C-52.
(2) Turn the ignition switch to "ON" position.



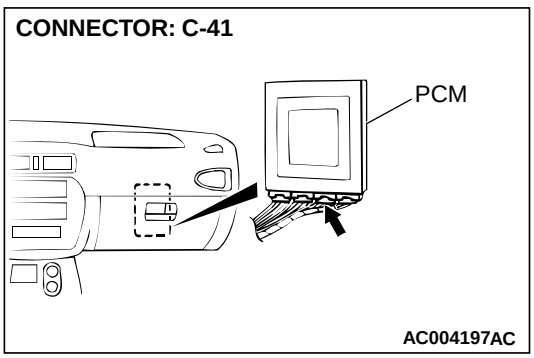
(3) Measure the voltage between terminal 3 and ground by backprobing.
- Voltage should be battery positive voltage.

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

Q: Is the voltage normal?

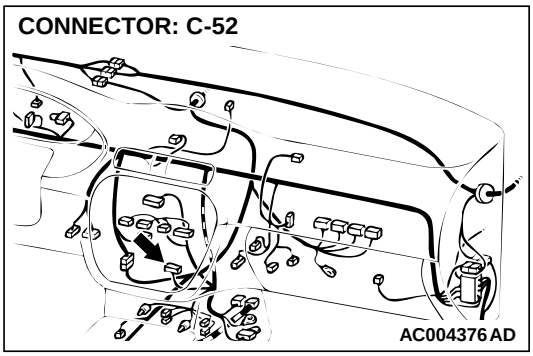
YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check harness for short circuit to ground, open circuit or damage between PCM connector C-41 terminal 75 and auto-cruise control-ECU connector C-52 terminal 3.

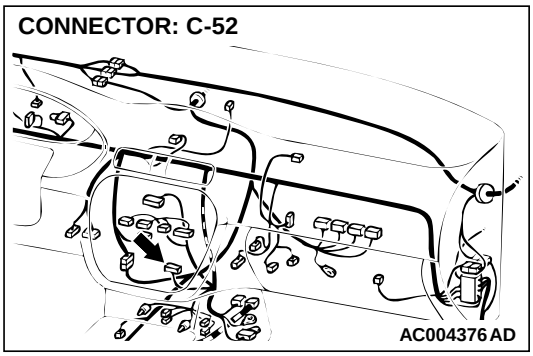


Q: Is the harness wire in good condition?

YES : Go to Step 7.
NO : Repair it.



TSB Revision



STEP 7. Check connector C-52 at auto-cruise control-ECU connector for damage.

Q: Is the connector in good condition?

YES : Replace the auto-cruise control-ECU.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

DATA LIST REFERENCE TABLE

M1231008100058

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
2ND SOL DUTY	33	Second solenoid valve duty %	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	100 %
				Driving at constant speed of 30 km/h (19 mph) in 2nd gear	0 %
				Driving at constant speed of 50 km/h (31 mph) in 3rd gear	100 %
				Driving at constant speed of 50 km/h (31 mph) in 4th gear	0 %
A/T CONT RLY	54	A/T control relay output voltage	Ignition switch: ON		Battery positive voltage
A/T TMP SNSR	15	A/T fluid temperature sensor	Warming up	Drive for 15 minutes or more so that the A/T fluid temperature becomes 70 – 80 °C (158 – 176 °F)	Gradually rises to 70 – 80 °C (158 – 176 °F)
CRANK SENSOR	21	Crankshaft position sensor	Engine: Idling Selector lever position: P	Accelerator pedal: Fully closed	600 – 900 r/min
				Accelerator pedal: Depressed	Gradually rises from the above value
DUAL PRESS SW	65	Dual pressure switch	Engine: Idling	A/C switch: ON (While the A/C compressor is in operation)	ON
				A/C switch: OFF	OFF

TSB Revision

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
ENGINE LOAD	57	Engine load (volumetric efficiency)	Engine: Idling Selector lever position: N	Accelerator pedal: fully closed → de-pressed	Data changes
INP SHFT SNSR	22	Input shaft speed sensor	Gear range: 3rd gear	Driving at constant speed of 50 km/h (31 mph)	1,600 – 1,900 r/min <2.4L Engine> 1,300 – 1,600 r/min <3.0L Engine>
L/R SOL DUTY	31	Low-reverse solenoid valve duty %	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	0 %
				Driving at constant speed of 30 km/h (19 mph) in 2nd gear	100 %
				Driving at constant speed of 50 km/h (31 mph) in 3rd gear	100 %
				Driving at constant speed of 50 km/h (31 mph) in 4th gear	100 %
O/D SOL DUTY	34	Overdrive solenoid valve duty %	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	100 %
				Driving at constant speed of 30 km/h (19 mph) in 2nd gear	100 %
				Driving at constant speed of 50 km/h (31 mph) in 3rd gear	0 %
				Driving at constant speed of 50 km/h (31 mph) in 4th gear	0 %
OD OFF SIGNAL	66	Overdrive off signal (Auto-cruise ECM signal)	While auto-cruise is engaged	Level road	OFF
				Uphill grade	ON
OUT SHFT SNSR	23	Output shaft speed sensor	Gear range: 3rd gear	Driving at constant speed of 50 km/h (31 mph)	1,600 – 1,900 r/min <2.4L Engine> 1,300 – 1,600 r/min <3.0L Engine>

TSB Revision

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
PNP SWITCH	61	Park/Neutral position switch	Ignition switch: ON	Selector lever position: P	P
				Selector lever position: R	R
				Selector lever position: N	N
				Selector lever position: D	D
				Selector lever position: 3	3
				Selector lever position: 2	2
				Selector lever position: L	L
SHIFT POS	63	Shift position	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	1st
				Driving at constant speed of 30 km/h (19 mph) in 2nd gear	2nd
				Driving at constant speed of 50 km/h (31 mph) in 3rd gear	3rd
				Driving at constant speed of 50 km/h (31 mph) in 4th gear	4th
STOPLIGHT SW	26	Stoplight switch	Ignition switch: ON	Brake pedal: Depressed	ON
				Brake pedal: Released	OFF
TCC SLIP-PAGE	52	Torque converter clutch amount of slippage	Warming up Selector lever position: 3 Driving at speed of 50 km/h (31 mph) in 3rd gear	Driving at constant speed of 50 km/h (31 mph)	–10 to 10 r/min
				Release accelerator pedal (at less than 50 km/h (31 mph))	–300 to –100 or 100 to 300 r/min
TCC SOL DUTY	36	Torque converter clutch solenoid valve duty %	Warming up Selector lever position: 3 Driving at speed of 50 km/h (31 mph) in 3rd gear	Driving at constant speed of 50 km/h (31 mph)	70 – 90 %
				Release accelerator pedal (at less than 50 km/h (31 mph))	70 – 90 % → 0 % Decreases gradually as the vehicle speed decreases

TSB Revision

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
TP SENSOR	11	Throttle position sensor	Ignition switch: ON Engine: Stopped Selector lever position: P	Accelerator pedal: Fully closed	535 – 735 mV
				Accelerator pedal: Depressed	Gradually rises from the above value
				Accelerator pedal: Fully open	4,500 – 5,500 mV
U/D SOL DUTY	32	Underdrive solenoid valve duty %	Selector lever position: L, 2, 3, D	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	0 %
				Driving at constant speed of 30 km/h (19 mph) in 2nd gear	0 %
				Driving at constant speed of 50 km/h (31 mph) in 3rd gear	0 %
				Driving at constant speed of 50 km/h (31 mph) in 4th gear	100 %
VSS	29	Vehicle speed sensor	Selector lever position: 3	Idling with 1st gear (Vehicle stopped)	0 km/h (0 mph)
				Driving at constant speed of 50 km/h (31 mph)	50 km/h (31 mph)

ACTUATOR TEST REFERENCE TABLE

M1231008200055

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	TEST CONTENT	INSPECTION REQUIREMENT	NORMAL CONDITION
2ND SOL	03	Second solenoid valve	Drive the solenoid valve specified by the scan tool (MUT-II) at 50 % duty for five seconds. No other solenoid valve should be energized.	• Ignition switch: ON • Selector lever position: P • Engine: stopped • Throttle opening voltage: Less than one volts	The solenoid should click when activated
A/T RELAY	12	A/T control relay	Control relay is OFF for three seconds.		Data list No. 54 • During test: 0 V • Normal: Battery positive voltage [12 V]

TSB Revision

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	TEST CONTENT	INSPECTION REQUIREMENT	NORMAL CONDITION
L/R SOL	01	Low-reverse solenoid valve	Drive the solenoid valve specified by the scan tool (MUT-II) at 50 % duty for five seconds. No other solenoid valve should be energized.		The solenoid should click when activated
O/D SOL	04	Overdrive solenoid valve			
TCC SOL	06	Torque converter clutch solenoid valve			
U/D SOL	02	Underdrive solenoid valve			

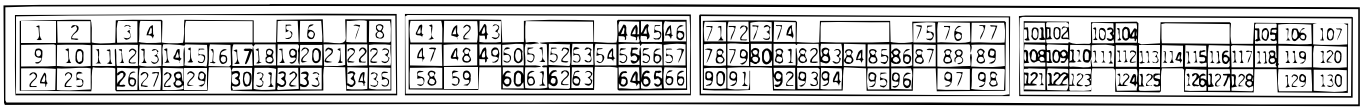
INVECS-II CANCEL COMMAND

M1231009500059

MUT-II SCAN TOOL DISPLAY	ITEM NO.	ITEM	CONTENT	REMARKS
Std. SHIFT PATN	14	Standard shift pattern	Stops the INVECS-II control and shifts gears according to the standard shift pattern.	Use this function when performing procedure 8 in the road tests. (Refer to P.23A-17) If the ignition switch is turned from "LOCK" (OFF) to "ON," this function restores the INVECS-II control.

PCM TERMINAL VOLTAGE REFERENCE CHART FOR TRANSAXLE OPERATION

M1231008400059



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TERMINAL NO.	INSPECTION ITEMS	INSPECTION REQUIREMENT		NORMAL CONDITION
45	Crankshaft position sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idling		1.5 – 2.5 V
46	Throttle position sensor supplied voltage	Ignition switch: ON		4.8 – 5.2 V
50	A/T control relay	Ignition switch: LOCK (OFF)		0 V
		Ignition switch: ON		10 – 12 V
57	Throttle position sensor ground	Always		0.5 V or less
75	Auto-cruise signal	Ignition switch: ON		Battery positive voltage
76	Ground	Always		1 V or less
77	Solenoid valve power supply	Ignition switch: LOCK (OFF)		0 V
		Ignition switch: ON		Battery positive voltage
78	Throttle position sensor	Ignition switch: ON (check for smooth voltage increase as throttle is moved from idle position to wide open throttle	Idle	0.6 – 0.8 V
			Wide open throttle	4.5 – 5.5 V

TSB Revision

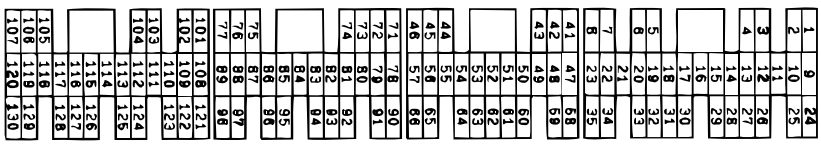
TERMINAL NO.	INSPECTION ITEMS	INSPECTION REQUIREMENT	NORMAL CONDITION
88	Ground	Always	1 V or less
89	Solenoid valve power supply	Ignition switch: LOCK (OFF)	0 V
		Ignition switch: ON	Battery positive voltage
97	Ground	Always	1 V or less
101	Park/Neutral position switch: P	• Ignition switch: ON • Selector lever position: P	Battery positive voltage
		• Ignition switch: ON • Selector lever position: Other than above	0 V
102	Park/Neutral position switch: D	• Ignition switch: ON • Selector lever position: D	Battery positive voltage
		• Ignition switch: ON • Selector lever position: Other than above	0 V
103	Input shaft speed sensor	• Measure between terminals 57 and 103 with an oscilloscope. • Engine: 2,000 r/min • Gear range: 3rd gear	Refer to P.23A-266, Inspection Procedure Using an Oscilloscope.
104	Output shaft speed sensor	• Measure between terminals 57 and 104 with an oscilloscope. • Engine: 2,000 r/min • Gear range: 3rd gear	Refer to P.23A-266, Inspection Procedure Using an Oscilloscope.
106	Second solenoid valve	• Engine: Idling • Gear range: 2nd gear	Battery positive voltage
		• Engine: Idling • Selector lever position: P	7 – 9 V
107	Torque converter clutch solenoid valve	• Engine: Idling • Gear range: 1st gear	Battery positive voltage
108	Park/Neutral position switch: R	• Ignition switch: ON • Selector lever position: R	Battery positive voltage
		• Ignition switch: ON • Selector lever position: Other than above	0 V
109	Park/Neutral position switch: 3	• Ignition switch: ON • Selector lever position: 3	Battery positive voltage
		• Ignition switch: ON • Selector lever position: Other than above	0 V
110	Park/Neutral position switch: L	• Ignition switch: ON • Selector lever operation: L	Battery positive voltage
		• Ignition switch: ON • Selector lever operation: Other than above	0 V

TSB Revision

TERMINAL NO.	INSPECTION ITEMS	INSPECTION REQUIREMENT	NORMAL CONDITION
120	Under drive solenoid valve	• Engine: Idling • Gear range: 1st gear	Battery positive voltage
		• Engine: Idling • Selector lever position: P	7 – 9 V
121	Park/Neutral position switch: N	• Ignition switch: ON • Selector lever position: N	Battery positive voltage
		• Ignition switch: ON • Selector lever position: Other than above	0 V
122	Park/Neutral position switch: 2	• Ignition switch: ON • Selector lever operation: 2	Battery positive voltage
		• Ignition switch: ON • Selector lever operation: Other than above	0 V
123	Stoplight switch	• Ignition switch: ON • Brake pedal: Depressed	Battery positive voltage
		• Ignition switch: ON • Brake pedal: Released	0 V
124	A/T fluid temperature sensor	A/T fluid temperature: 20°C (68°F)	3.8 – 4.0 V
		A/T fluid temperature: 40°C (104°F)	3.2 – 3.4 V
		A/T fluid temperature: 80°C (176°F)	1.7 – 1.9 V
129	Low-reverse solenoid valve	• Engine: Idling • Selector lever position: P	Battery positive voltage
		• Engine: Idling • Gear range: 2nd gear	7 – 9 V
130	Overdrive solenoid valve	• Engine: Idling • Gear range: 3rd gear	Battery positive voltage
		• Engine: Idling • Selector lever position: P	7 – 9 V

PCM TERMINAL RESISTANCE AND CONTINUITY INSPECTION CHART

M1231013400044



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TSB Revision

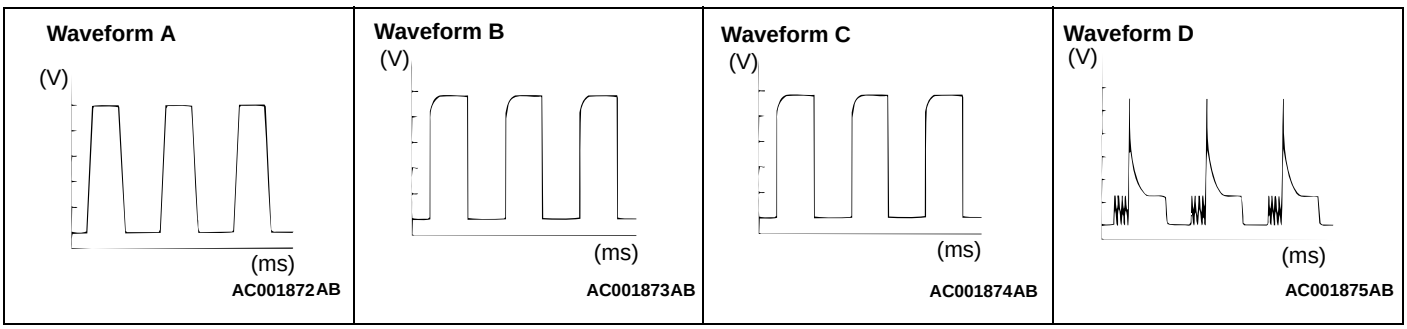
TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (CHECK CONDITION)
57 – 124	A/T fluid temperature sensor	16.7 – 20.5 kW [at 0 °C (32 °F)]
		7.3 – 8.9 kW [at 20 °C (68 °F)]
		3.4 – 4.2 kW [at 40 °C (104 °F)]
		1.9 – 2.2 kW [at 60 °C (140 °F)]
		1.0 – 1.2 kW [at 80 °C (176 °F)]
		0.57 – 0.69 kW [at 100 °C (212 °F)]

INSPECTION PROCEDURE USING AN OSCILLOSCOPE

M1231008500056

TERMINAL NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION (WAVEFORM SAMPLE)
45	Crankshaft position sensor	Selector lever position: N	Idling (Vehicle stopped)	Waveform A
103	Input shaft speed sensor	Selector lever position: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear (2.4L Engine: 1,600 – 1,900 r/min, 3.0L Engine: 1,300 – 1,600 r/min)	Waveform B
104	Output shaft speed sensor			
80	Vehicle speed sensor			Waveform C
129	Low-reverse solenoid valve	• Ignition switch: ON • Selector lever position: P • Engine: Stopped • Throttle (Accelerator) opening angle: Less than 1 Volt	Force drive each solenoid valve (Actuator test)	Waveform D
120	Underdrive solenoid valve			
106	Second solenoid valve			
130	Overdrive solenoid valve			
107	Torque converter clutch control solenoid			

Waveform sample



TSB Revision

A/T FAULTY OPERATION PREVENTION MECHANISM DIAGNOSIS

INTRODUCTION TO A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS

M1232001600055

If the key interlock and shift lock mechanisms indicates a malfunction, the key interlock cable, the shift lock cable or the selector lever assembly may be defective. In this case, follow troubleshooting below.

A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS DIAGNOSTIC TROUBLE SHOOTING STRATEGY

M1232001700041

Use these steps to plan your diagnostic strategy. If your follow then carefully, you will be sure that you have exhausted most of the possible ways to find Automatic Transaxle key interlock and shift lock mechanisms fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by follows the Symptom Chart.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1232001800101

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Selector lever can be moved from "P" to "R" without depressing brake pedal when ignition key is at position other than "LOCK" (OFF).	1	P.23A-267
Selector lever cannot be moved from "P" to "R" with brake pedal depressed when ignition key is at position other than "LOCK" (OFF).	2	P.23A-268
Selector lever can be moved from "P" to "R" with brake pedal depressed when ignition key is at "LOCK" (OFF) position.	3	P.23A-268
Selector lever cannot be moved from "P" to "R" smoothly.	4	P.23A-268
Selector lever cannot be moved from "P" to "R".	5	P.23A-268
Ignition key cannot be turned to "LOCK" (OFF) position when selector lever is at "P" position.	6	P.23A-269
Ignition key can be turned to "LOCK" (OFF) position when selector lever is at positions other than "P".	7	P.23A-269-

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Selector Lever can be Moved from "P" to "R" without Depressing Brake Pedal when Ignition Key is at Positions Other than "LOCK" (OFF).

TECHNICAL DESCRIPTION (COMMENT)

- Lock cam or shift lock cable may be defective.

TROUBLESHOOTING HINTS

- Malfunction of lock cam
- Malfunction of shift lock cable

DIAGNOSIS

Check items described in the column "Troubleshooting Hints." When the brake pedal is released with the ignition key at other positions than "LOCK" (OFF), check that the selector lever can not be moved from "P" position to "R" position.

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INSPECTION PROCEDURE 2: Selector Lever cannot be Moved from "P" to "R" with Brake Pedal Depressed when Ignition Key is at Positions Other than "LOCK" (OFF).

TECHNICAL DESCRIPTION (COMMENT)
- Selector lever assembly, shift lock cable, key interlock cable, transmission control cable or lock cam may be defective.

TROUBLESHOOTING HINTS
- Malfunction of selector lever assembly
- Malfunction of shift lock cable
- Malfunction of key interlock cable
- Malfunction of transmission control cable
- Malfunction of lock cam

DIAGNOSIS
Check items described in the column "Troubleshooting Hints." When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF), check that the selector lever can be moved from "P" position to "R" position.

INSPECTION PROCEDURE 3: Selector Lever can be Moved from "P" to "R" with Brake Pedal Depressed when Ignition Key is at "LOCK" (OFF) Position.

TECHNICAL DESCRIPTION (COMMENT)
- Key interlock cable or lock cam may be defective.

TROUBLESHOOTING HINTS
- Malfunction of lock cam
- Malfunction of shift lock cable

DIAGNOSIS
Check items described in the column "Troubleshooting Hints." When the brake pedal is depressed with the ignition key at the "LOCK" (OFF), check that the selector lever can not be moved from "P" position to "R" position.

INSPECTION PROCEDURE 4: Selector Lever cannot be Moved from "P" to "R" Smoothly.

TECHNICAL DESCRIPTION (COMMENT)
- Key interlock cable, shift lock cable, lock cam or selector lever assembly may be defective.

TROUBLESHOOTING HINTS
- Malfunction of key interlock cable
- Malfunction of shift lock cable
- Malfunction of lock cam
- Malfunction of selector lever assembly

DIAGNOSIS
Check items described in the column "Troubleshooting Hints." Check that the selector lever can be moved from "P" position to "R" position smoothly.

INSPECTION PRICEDURE 5: Selector Lever cannot be Moved from "R" to "P".

TECHNICAL DESCRIPTION (COMMENT)
- Selector lever assembly or transmission control cable may be defective.

TROUBLESHOOTING HINTS
- Malfunction of selector lever assembly
- Malfunction of transmission control cable

TSB Revision

DIAGNOSIS

Check items described in the column "Troubleshooting Hints." Check that the selector lever can be moved from "R" position to "P" position.

INSPECTION PROCEDURE 6: Ignition Key cannot be Turned to "LOCK" (OFF) Position when Selector Lever is at "P" Position.

TECHNICAL DESCRIPTION (COMMENT)

- Lock cam, key cylinder cover or key interlock cable may be defective.

TROUBLESHOOTING HINTS

- Malfunction of lock cam
- Malfunction of key interlock cable
- Malfunction of key cylinder slider

DIAGNOSIS

Check items described in the column "Troubleshooting Hints." Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

INSPECTION PROCEDURE 7: Ignition Key can be Turned to "LOCK" (OFF) Position when Selector Lever is at Positions Other than "P."

TECHNICAL DESCRIPTION (COMMENT)

- Lock cam, key cylinder cover or key interlock cable may be defective.

TROUBLESHOOTING HINTS

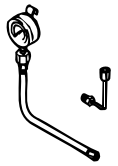
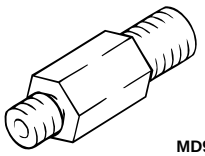
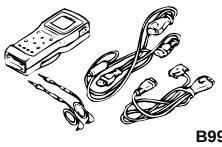
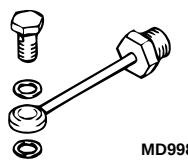
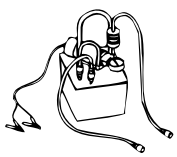
- Malfunction of lock cam
- Malfunction of key cylinder cover
- Malfunction of key interlock cable

DIAGNOSIS

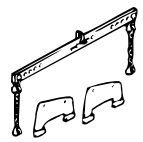
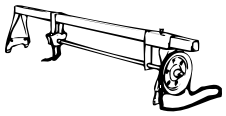
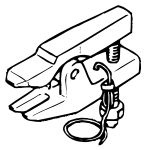
Check items described in the column "Troubleshooting Hints." Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P."

SPECIAL TOOLS

M1231000600048

TOOL	TOOL NUMBER AND NAME	SUPERSES-SION	APPLICATION
 MD998330	MD998330 (Includes MD998331) Oil pressure gauge (2,942 kPa, 427 psi)	MD998330-01	Measurement of hydraulic pressure
 MD998332	MD998332 Adapter	MD998332-01	Connection for oil pressure gauge
	MD998478 Test harness (3 pin, triangle)	MD998478-01	Inspection using an oscilloscope
 B991502	MB991502 Scan tool (MUT-II)	MB991496-OD	Checking diagnostic trouble codes
	MB991709 Test harness set	Tool not avail-able	Inspection using an oscilloscope
 MD998900	MD998900 Adapter	MD998900-01	Connection for oil pressure gauge
	MB995062 Flushing tool	–	Flushing cooler and tube

TSB Revision

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB991453	MB991453 Engine hanger assembly	MZ203827-01	Supporting the engine assembly during removal and installation of the transaxle
 MZ203827	GENERAL SERVICE TOOL MZ203827 Engine lifter	MZ203827-01	Supporting the engine assembly during removal and installation of the transaxle
 MB990635	MB991113 or MB990635 Steering linkage puller	MB991113-01 or MB990635	Removal of the tie rod end and the lower arm

ON-VEHICLE SERVICE

A/T CONTROL COMPONENT LAYOUT

M1231008600053

NAME	SYMBOL	NAME	SYMBOL
A/T control relay	F	Park/Neutral position (PNP) switch	G
A/T fluid temperature sensor	E		
Crankshaft position sensor <2.4L Engine>	B	Power train control module (PCM)	J
Crankshaft position sensor <3.0L Engine>	B	Solenoid valves	E
Date link connector	I	Stoplight switch	H
Dual pressure switch	A	Throttle position sensor <2.4L Engine>	C
Input shaft speed sensor	D	Throttle position sensor <3.0L Engine>	C
Output shaft speed sensor	D	Vehicle speed sensor	D

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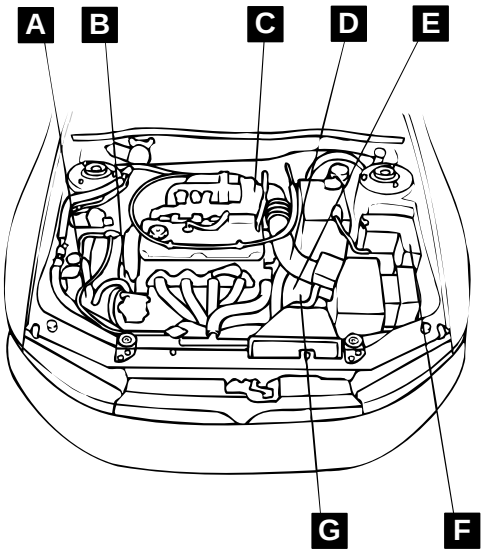

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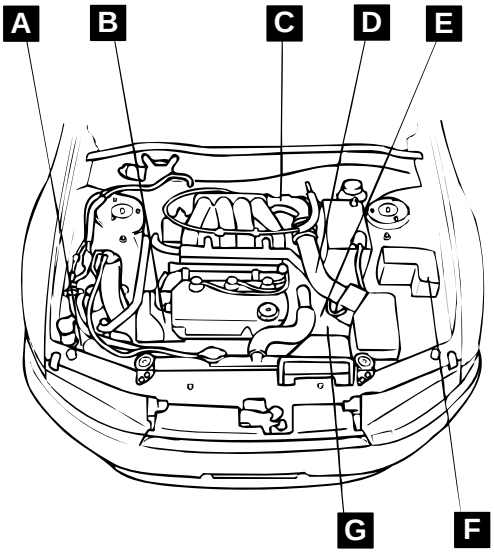

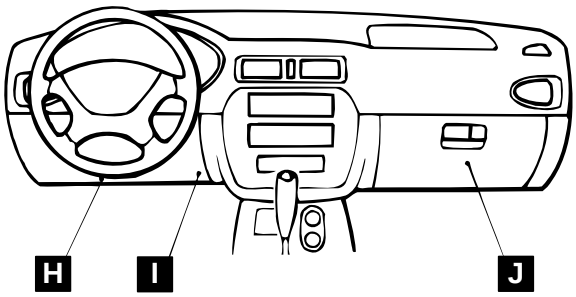

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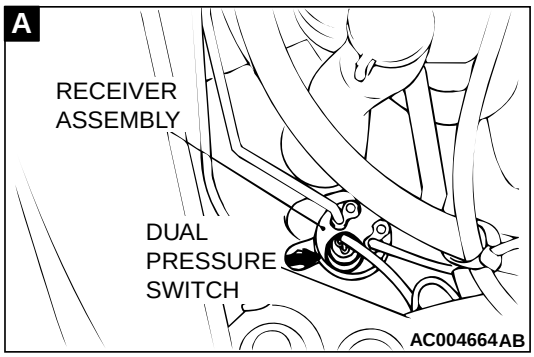

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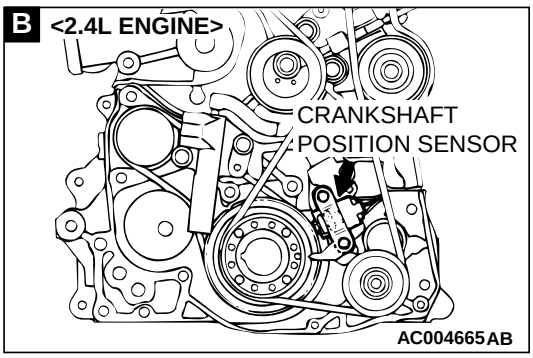

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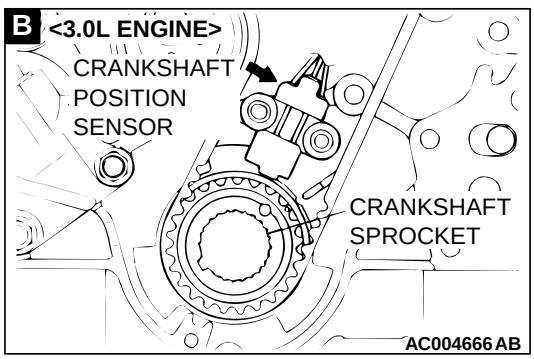

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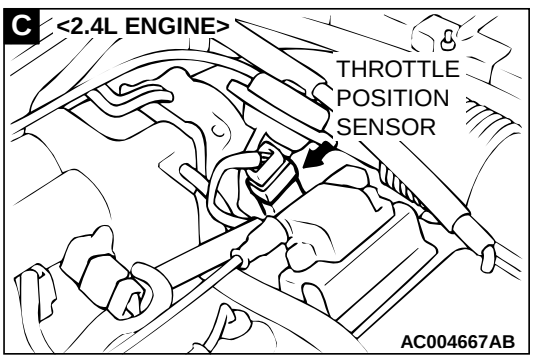

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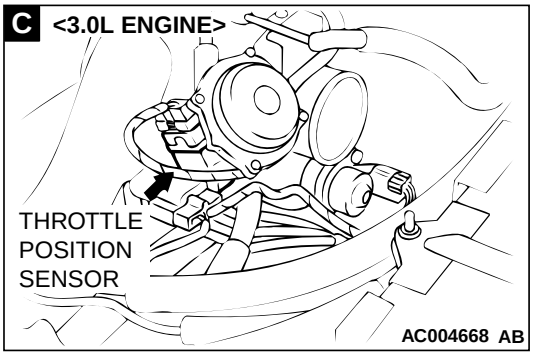

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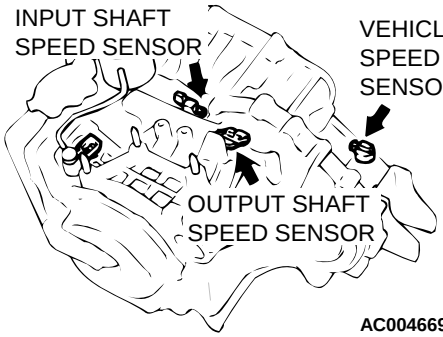

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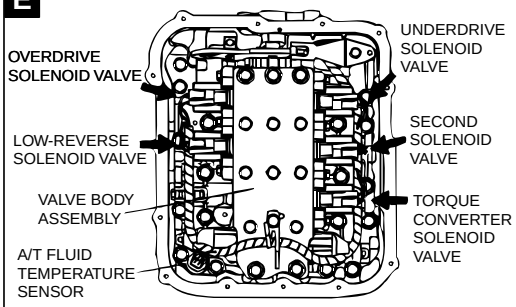

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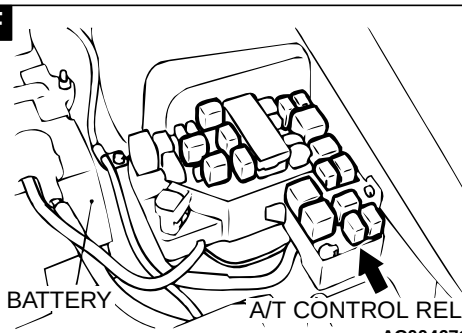

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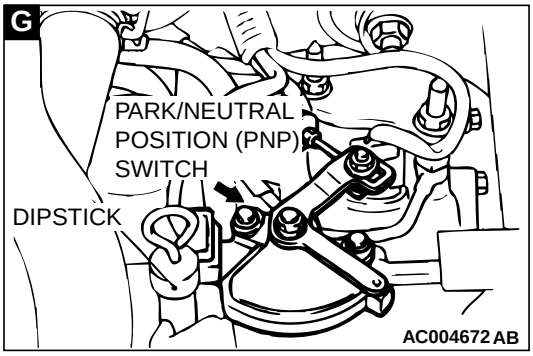

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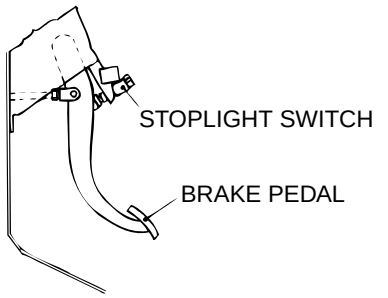

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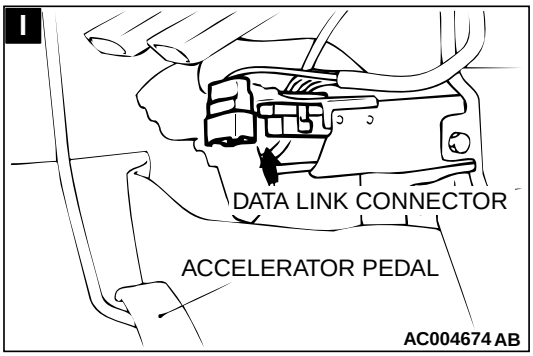

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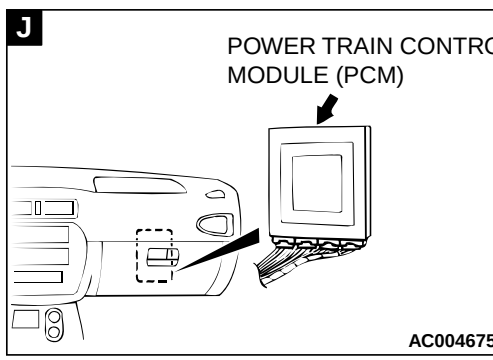


AC004675 AB

ESSENTIAL SERVICE

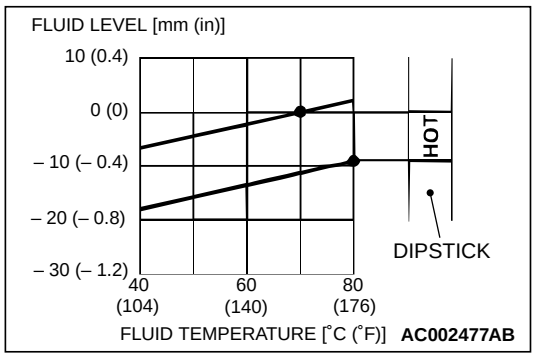
A/T FLUID CHECK

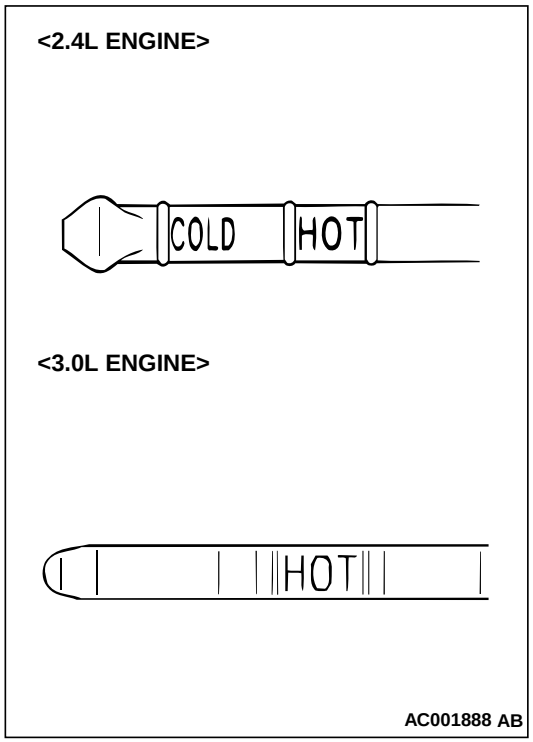
M1231000900049

1. Drive the vehicle until the A/T fluid temperature rises to the normal temperature [70 – 80°C (158 – 176°F)].

   NOTE: The A/T fluid temperature is measured with scan tool (MUT-II).

TSB Revision





NOTE: If it takes some amount of time until the A/T fluid reaches its normal operating temperature [70 – 80°C (158 - 176°F)], check the A/T fluid level by referring to the left diagram.

2. Park the vehicle on a level surface.
3. Move the selector lever through all positions to fill the torque converter and the hydraulic circuits with fluid, and then move the selector lever to the "N" position.
4. After wiping off any dirt around the dipstick, remove the dipstick and check the condition of the A/T fluid.

   NOTE: If the A/T fluid smells as if it is burnt, it means that the A/T fluid has been contaminated by fine particles from the bushings and friction materials, a transaxle overhaul and flashing the cooler line flushing may be necessary.
5. Check that the A/T fluid level is at the "HOT" mark on the dipstick. If the A/T fluid level is lower than this, pour in more DIAMOND ATF SP III, ATF SP II M or equivalent until the level reaches the "HOT" mark.

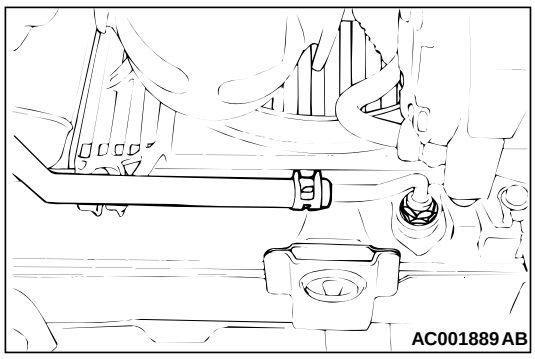
   NOTE: If the A/T fluid level is too low, the oil pump will draw in air along with the A/T fluid, which will cause bubbles to form. This will in turn cause the hydraulic pressure to drop, which will result in late shifting and slipping of the clutches and brakes.

   NOTE: In either case, air bubbles can interfere with normal valve, clutch, and brake operation. Foaming can cause A/T fluid to escape from the transaxle vent, in which case it may be mistake for a leak.
6. Securely insert the dipstick.

   NOTE: The A/T fluid should always be replaced in the following conditions:
   - *When trouble shooting the transaxle*
   - *When overhauling the transaxle*
   - *When the A/T fluid is noticeably dirty or burnt (driving under severe conditions)*

A/T FLUID REPLACEMENT

M1231001000038



If you have a A/T fluid changer, use this changer to replace the A/T fluid. If you do not have a A/T fluid changer, replace the A/T fluid by the following procedure.

1. Disconnect the hose shown in the illustration which connects the transaxle and the oil cooler (inside the radiator). Place a container under the hose to collect the discharge.

⚠ CAUTION

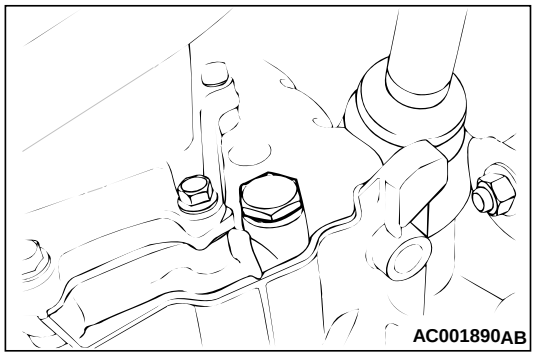
The engine should be stopped within one minute after it is started. If the A/T fluid has all drained out before then, the engine should be stopped at that point.

Discharge volume: Approximately 3.5 dm^3 (3.7 quarts)

2. Start the engine and let the A/T fluid drain out.

   Running conditions: "N" range with engine idling

TSB Revision


AC001890AB

3. Remove the drain plug from the bottom of the transaxle case to drain the A/T fluid.

Discharge volume: Approximately 2.0 dm^3 (2.1 quarts)

4. Install the drain plug with a new gasket, and tighten it to the specified torque.

Tightening torque: 32 ± 2 N·m (24 ± 1 ft-lb)

⚠ CAUTION
Stop pouring if the full volume of A/T fluid cannot be poured in.

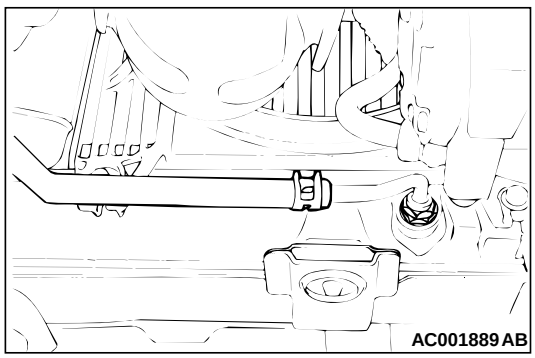
5. Pour new A/T fluid in through the oil filter tube.

Adding volume: Approximately 5.5 dm^3 (5.8 quarts)

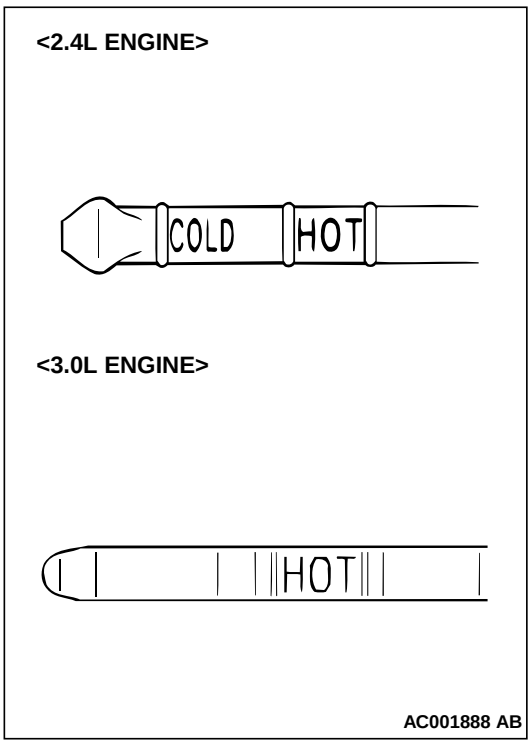
6. Repeat the procedure in Step 2. (to pump out the rest of the contaminated A/T fluid)
7. Pour the new A/T fluid in through the oil filler tube.

Adding volume: Approximately 3.5 dm^3 (3.7 quarts)

NOTE: Check the A/T fluid for contamination or burnt smell. If fluid is still contaminated or burnt, repeat Steps 6 and 7 before proceeding to Step 8.


AC001889 AB

8. Reconnect the hose which was disconnected in step 1 above, and firmly replace the dipstick.
9. Start the engine and run it at idle for one to two minutes.
10. Move the selector lever through all positions, and then move it to the "N" position.

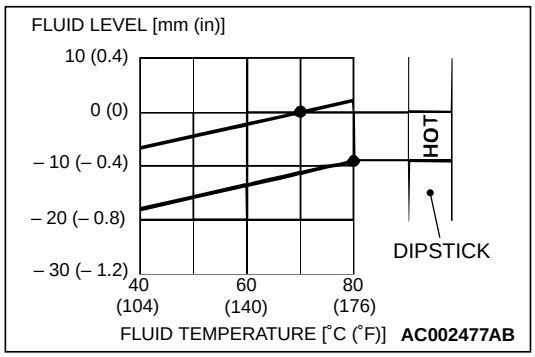


11. Check that the A/T fluid level is at the "COLD" mark on the dipstick. If the level is lower than this, pour in more A/T fluid.
12. Drive the vehicle until the A/T fluid temperature rises to the normal temperature [70 – 80°C (158 – 176°F)], and then check the A/T fluid level again. The A/T fluid level must be at the "HOT" mark.

NOTE: The A/T fluid temperature is measured with scan tool (MUT-II).

NOTE: The "COLD" level is for reference only; the "HOT" level should be regarded as the standard level.

TSB Revision



NOTE: If it takes some amount of time until the A/T fluid reaches its normal operating temperature [70 – 80°C (158 - 176°F)], check the A/T fluid level by referring to the left diagram.

13. Firmly insert the dipstick into the oil filler tube.

FLUSHING COOLERS AND TUBES

M1231013000046

Required Special Tool:
MB995062: Flushing Tool

⚠ WARNING

- ***Wear protective eye wear that meets the requirements of OSHA and ANSI Z87.1 – 1968. Wear standard industrial rubber gloves.***
- ***Keep lighted cigarettes, sparks, flames, and other ignition sources away from the area to prevent the ignition of combustible liquids and gases. Keep a class (B) fire extinguisher in the area where the flushing tool will be used. Keep the area well ventilated. Do not let flushing solvent come in contact with water for 15 to 20 seconds. Remove contaminated clothing and wash affected skin with soap and water. Seek medical attention.***

When a transaxle failure has contaminated the A/T fluid, the oil cooler(s) must be flushed. The cooler by-pass valve in the transaxle must also be replaced. The torque converter must also be replaced with an exchange unit. This will ensure that metal particles or sludged A/T fluid are not later transferred back into the reconditioned (or replaced) transaxle. There are two different procedures for flushing coolers and lines. The recommended procedure is to use Tool MB995062 Cooler Flusher. The other procedure is to use a hand suction gun and mineral spirits.

1. Remove the cover plate filler plug on special tool MB995062. Fill the reservoir 1/2 to 3/4 full of fresh flushing solution. Flushing solvents are petroleum based solutions generally used to clean transaxle components. Do not use solvents containing acids, water, gasoline, or any other corrosive liquids.
2. Reinstall filler plug on special tool MB995062.
3. Verify the pump power switch is turned "OFF." Connect the red alligator clip to the positive battery terminal. Connect the black alligator clip to a good ground.
4. Disconnect the cooler lines at the transaxle.

   NOTE: When flushing the transaxle cooler and lines, always reverse flush.

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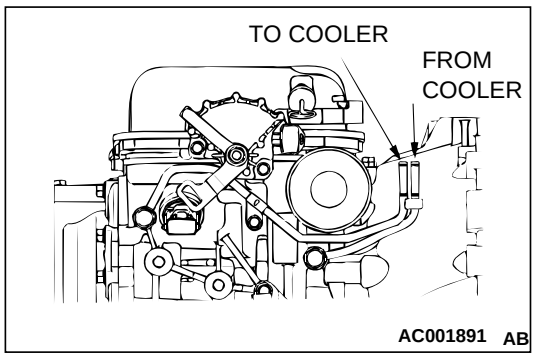
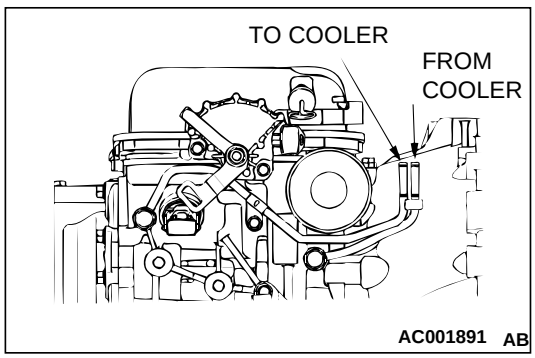


5. Connect the BLUE pressure line to the OUTLET (From) cooler line.
6. Connect the CLEAR return line to the INLET (To) cooler line.
7. Turn the pump "ON" for two to three minutes to flush the cooler(s) and lines. Monitor pressure readings and clear the return lines. Pressure readings should stabilize below 138 kPa (20 psi) for vehicles equipped with a single cooler and 208 kPa (30 psi) for vehicles equipped with dual coolers. If flow is intermittent or exceeds these pressures, replace the cooler.
8. Turn the pump "OFF."
9. Disconnect the CLEAR suction line from the reservoir at cover plate. Disconnect the CLEAR return line at the cover plate, and place it in a drain pan.
10. Turn the pump "ON" for 30 seconds to purge flushing solution from the cooler and lines. Turn the pump "OFF."
11. Place the CLEAR suction line into a one quart container of DIAMOND ATF SP III, ATF SP II M or equivalent A/T fluid.
12. Turn the pump "ON" until all A/T fluid is removed from the one quart container and lines. This purges any residual cleaning solvent from the transaxle cooler and lines. Turn the pump "OFF."
13. Disconnect the alligator clips from the battery. Reconnect the flusher lines to the cover plate, and remove the flushing adapters from the cooler lines. Reconnect the cooler lines.

OIL COOLER FLOW CHECK

M1231013100043



After the new or repaired transaxle has been installed, fill to the proper level with DIAMOND ATF SP III, ATF SP II M or equivalent A/T fluid. The flow should be checked using the following procedure:

⚠ CAUTION

With the fluid set at the proper level, A/T fluid collection should not exceed one quart or internal damage to the transaxle may occur.

1. Disconnect the OUTLET (From) cooler line at the transaxle and place a collecting container under the disconnected line.
2. Run the engine at curb idle speed, with the shift selector in neutral.
3. If A/T fluid flow is intermittent or it takes more than 20 seconds to collect one quart of A/T fluid, replace the cooler.
4. If flow is found to be within acceptable limits, reconnect the cooler line. Then fill the transaxle to the proper level, using the approved type of A/T fluid.

THROTTLE POSITION SENSOR ADJUSTMENT

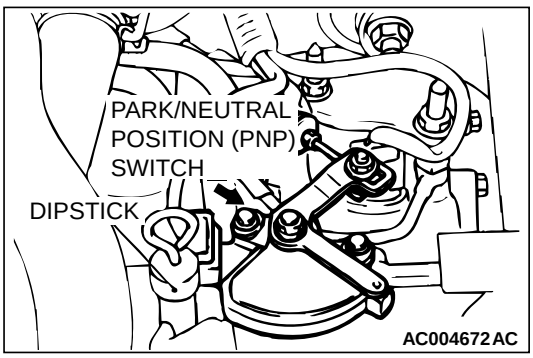
M1231001900053

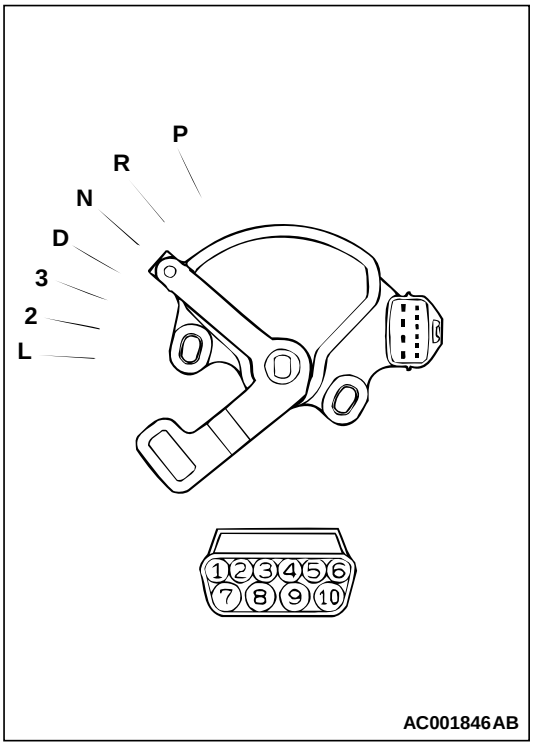
Refer to GROUP 13A <2.4L Engine>, On-vehicle Service P.13A-437.
Refer to GROUP 13B <3.0L Engine>, On-vehicle Service P.13B-519.

TSB Revision

PARK/NEUTRAL POSITION SWITCH CONTINUITY CHECK

M1231001400081

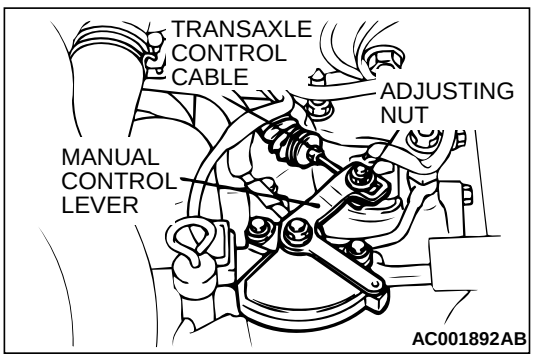




ITEMS	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohm.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

PARK/NEUTRAL POSITION SWITCH AND CONTROL CABLE ADJUSTMENT

M1231010300037



1. Set the selector lever to the "N" position.
2. Loosen the control cable to the manual control lever coupling nut to free the cable and lever.
3. Set the manual control lever to the neutral position.

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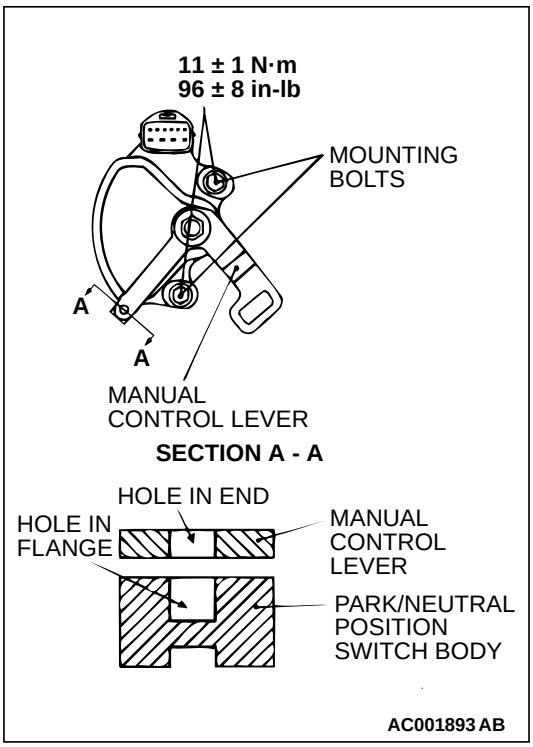
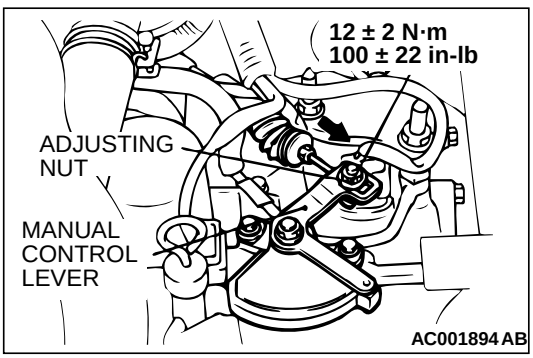


4. Loosen the park/neutral position switch body mounting bolts and turn the park/neutral position switch body so the hole in the end of the manual control lever and the hole (section A – A in the figure on the left) in the flange of the park/neutral position switch body flange are aligned.
5. Tighten the park/neutral position switch body mounting bolts to the specified torque. Be careful at this time that the switch body does not move.

   Tightening torque: 11 ± 1 N·m (96 ± 8 in-lb)



6. Gently pull the transaxle control cable in the direction of the arrow, until the cable is taut. Tighten the adjusting nut.

   Tightening torque: 12 ± 2 N·m (100 ± 22 in-lb)
7. Check that the selector lever is in the "N" position.
8. Check that each position of the manual control lever matches each position of the selector lever.

AUTOMATIC TRANSAXLE CONTROL COMPONENT CHECK

CRANKSHAFT POSITION SENSOR CHECK

M1231009000054

Refer to GROUP 13A <2.4L Engine>, Diagnosis – Inspection Procedure Using an Oscilloscope P.13A-422.
Refer to GROUP 13B <3.0L Engine>, Diagnosis – Inspection Procedure Using an Oscilloscope P.13B-504.

THROTTLE POSITION SENSOR CHECK

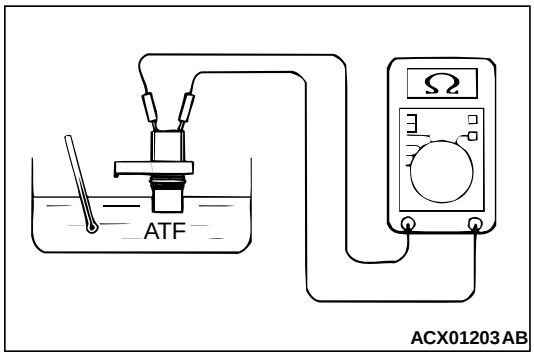
M1231003900059

Refer to GROUP 13A <2.4L Engine>, On-vehicle Service – Throttle Position Sensor Check P.13A-444.
Refer to GROUP 13B <3.0L Engine>, On-vehicle Service – Throttle Position Sensor Check P.13B-524.

TSB Revision

A/T FLUID TEMPERATURE SENSOR CONTINUITY CHECK

M1231004500043



1. Remove the A/T fluid temperature sensor.
2. Measure the resistance between terminals 1 and 2 of the A/T fluid temperature sensor connector.

Standard value:

A/T FLUID TEMPERATURE	RESISTANCE
0°C (32°F)	16.7 – 20.5 kΩ
20°C (68°F)	7.3 – 8.9 kΩ
40°C (104°F)	3.4 – 4.2 kΩ
60°C (140°F)	1.9 – 2.2 kΩ
80°C (176°F)	1.0 – 1.2 kΩ
100°C (212°F)	0.57 – 0.69 kΩ

3. Replace the sensor if not within the standard value.

PARK/NEUTRAL POSITION SWITCH CHECK

M1231001400092

Refer to P.23A-278.

STOPLIGHT SWITCH CHECK

M1231009100051

Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check P.35A-18.

VEHICLE SPEED SENSOR CHECK

M1231004600051

Refer to GROUP 54A, Combination Meters Assembly and Vehicle Speed Sensor – Combination Meters Assembly and Vehicle Speed Sensor P.54A-65.

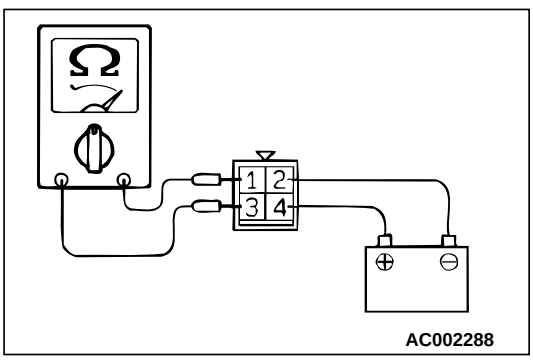
DUAL PRESSURE SWITCH CHECK

M1231004700058

Refer to GROUP 55A, On-vehicle Service – Dual Pressure Switch Check P.55-21.

A/T CONTROL RELAY CHECK

M1231009300044



1. Remove the A/T control relay.
2. Use jumper wires to connect the A/T control relay terminal 2 to the negative battery terminal and terminal 4 to the positive battery terminal.
3. Check the continuity between terminal 1 and terminal 3 of the A/T control relay when the jumper wires are connected to and disconnected from the battery.

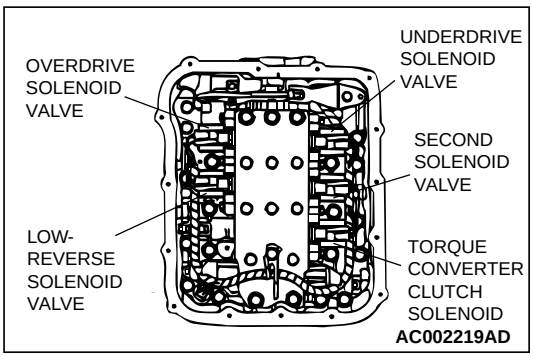
JUMPER WIRE	CONTINUITY BETWEEN TERMINALS NO.1 AND NO.3
Connected	Continuity
Disconnected	No continuity

TSB Revision

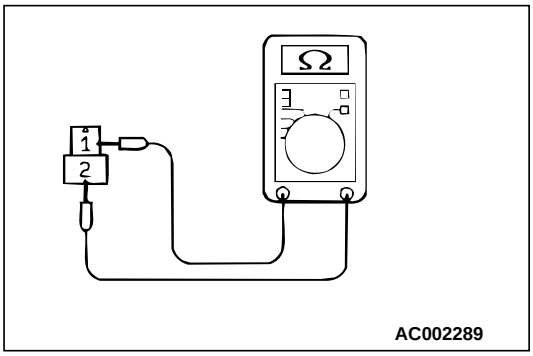
4. If there is any problem with the A/T control relay, replace it.

SOLENOID VALVE CHECK

M1231009400041



1. Remove the valve body cover.
2. Disconnect the connectors of each solenoid valve.



3. Measure the resistance between terminals 1 and 2 of each solenoid valve.

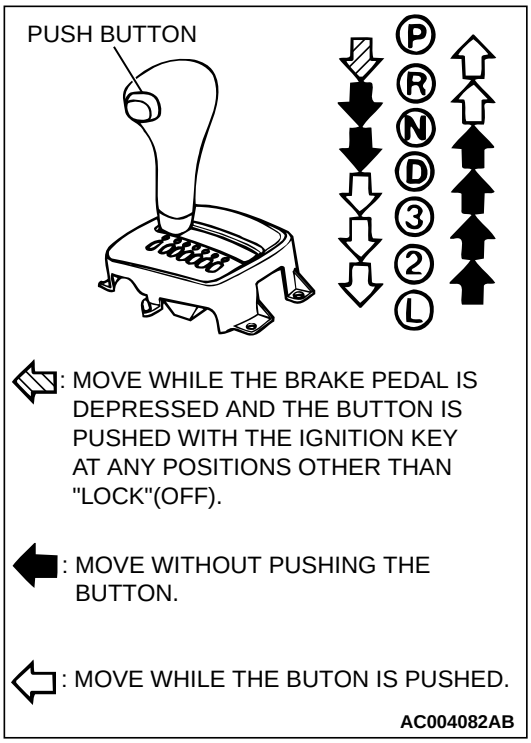
Standard value:

NAME	RESISTANCE
Torque converter clutch solenoid valve	2.7 – 3.4 Ω [at 20°C (68°F)]
Low-reverse solenoid valve	
Second solenoid valve	
Underdrive solenoid valve	
Overdrive solenoid valve	

4. If the resistance is not within the standard value, replace the solenoid valve.

SELECTOR LEVER OPERATION CHECK

M1231001300062



1. Apply the parking brake, and check that the selector lever moves smoothly and accurately to each range position.
2. Check that the engine starts when the selector lever is at the N or P position, and that it does not start when the selector lever is in any other position.
3. Start the engine, release the parking brake, and check that the vehicle moves forward when the selector lever is moved from N range to D, 3, 2 or L range, and that the vehicle reverses when the selector lever is moved to R range.
4. Stop the engine.
5. Turn the ignition switch to the ON position, and check that the backup lamp illuminates and the buzzer sounds when the selector lever is shifted from P to R range.

   NOTE: The A/T mis-operation prevention mechanism is provided so that the selector lever cannot be moved from the P position if the ignition switch is at a position other than the LOCK (OFF) position and the brake pedal is not depressed.

KEY INTERLOCK MECHANISM CHECK

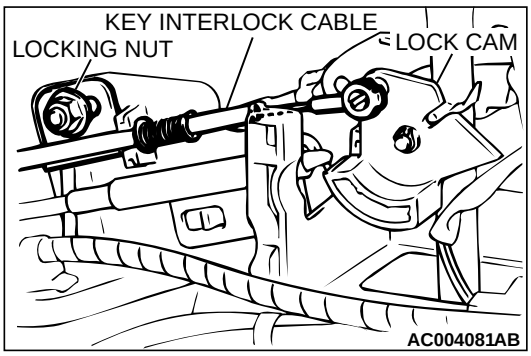
M1232000900075

1. Carry out the following inspection.

INSPECTION PROCEDURE	INSPECTION REQUIREMENTS	INSPECTION ITEM (NORMAL CONDITION)	
1	Brake pedal: Depressed	Ignition key position: "LOCK" (OFF) or removed	Push in the selector lever push button. Shifting from "P" to other positions is not possible.
2		Ignition key position: "ACC"	Push in the selector lever push button. Shifting from "P" to other positions is possible.
3	Brake pedal: Not depressed	Selector lever: Other than "P"	Turning the ignition key to "LOCK" (OFF) position is not possible.
4		Selector lever: "P"	Turning the ignition key to "LOCK" (OFF) position smoothly is possible.

2. When any of the above checks are not normal, adjust the key interlock cable in following procedure.
   (1) Remove the floor console. (Refer to GROUP 52A – Floor console P.52A-11.)
   (2) Shift selector lever to "P."
   (3) Turn the ignition key to "LOCK" (OFF) position.

TSB Revision



(4) Loosen the locking nut of the key interlock cable.
(5) Push the cable joint on the lock cam gently toward the arrow until the cable stops. Tighten the locking nut.
(6) Install the floor console.

3. After adjusting, check the operation once more. If the operation is still incorrect, replace the key interlock cable. (Refer to P.23A-288.)

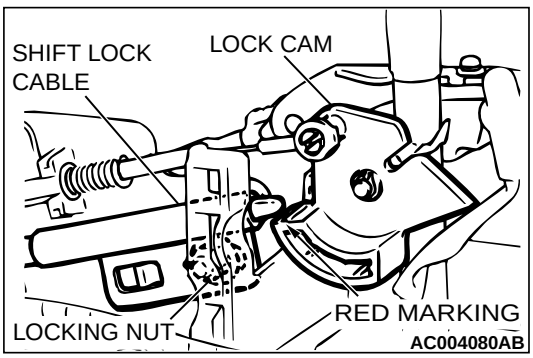
SHIFT LOCK MECHANISM CHECK

M1232001000075

1. Carry out the following inspections.

INSPECTION PROCEDURE	INSPECTION CONTENTS		CHECK DETAILS (NORMAL CONDITION)
1	Brake pedal: Not depressed	Ignition key position: "ACC"	Push in the selector lever push button. Shifting from "P" to other positions is not possible.
2	Brake pedal: Depressed		Push in the selector lever push button. Shifting from "P" to other positions smoothly is possible.
3	Brake pedal: Not depressed		Push in the selector lever push button. Shifting from "R" to "P" smoothly is possible.

2. When the above operations are defective, adjust the shift lock cable as follows:
(1) Remove the floor console. (Refer to GROUP 52A – Floor console P.52A-11.)
(2) Shift selector lever to "P."
(3) Loosen the locking nut of shift lock cable.
(4) Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.
(5) Install the floor console.
3. After adjusting, check the operation once more. If the operation is still incorrect, replace the shift lock cable. (Refer to P.23A-288.)



TSB Revision

TRANSAXLE CONTROL

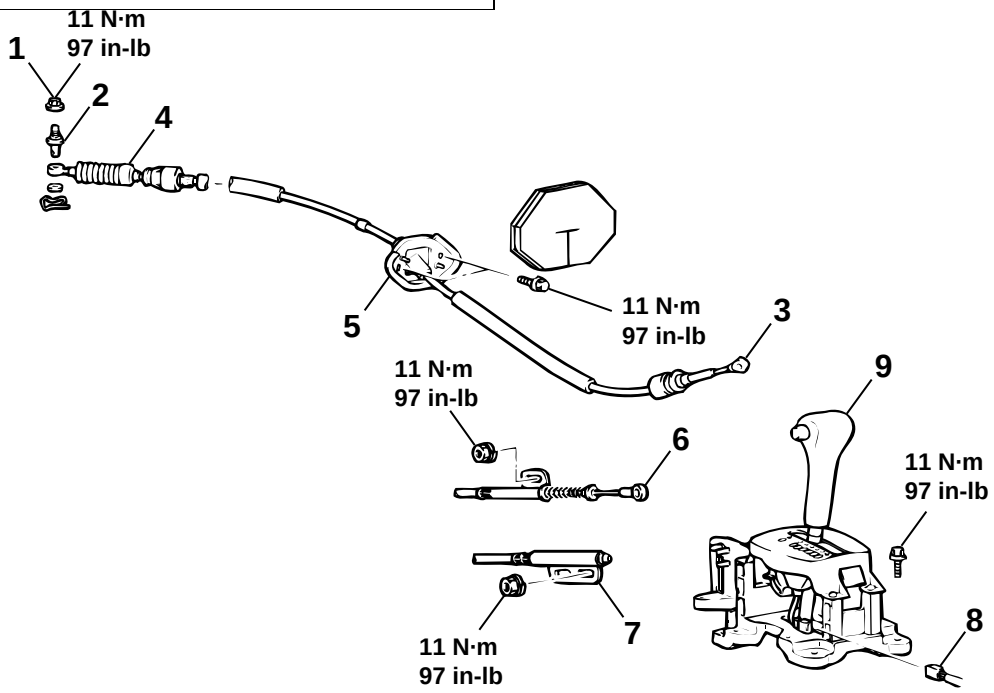
REMOVAL AND INSTALLATION

M1231006600079

⚠ CAUTION

When removing and installing the transmission control cable and shift lock cable unit, be careful not to impact the SRS-ECU.

Pre-removal and Post-installation Operation
- Air Cleaner Assembly Removal and Installation (Refer to GROUP 15 P.15-4.)
- Battery and Battery Tray Removal and Installation (Refer to GROUP 54A P.54A-8.)
- Front Driver's Side Under Cover Removal and Installation (Refer to GROUP 52A, Instrument Panel P.52A-4.)
- Floor Console Box Removal and Installation (Refer to GROUP 52A P.52A-4.)
- Selector Lever Operation Check (Refer to P.23A-282.) <Post-installation>
- Key Interlock Mechanism Check (Refer to P.23A-282.) <Post-installation>
- Shift Lock Mechanism Check (Refer to P.23A-283.) <Post-installation>



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TRANSAXLE CONTROL CABLE ASSEMBLY REMOVAL STEPS

>>C<< 1. NUT
2. ADJUSTER
3. TRANSAXLE CONTROL CABLE ASSEMBLY CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)
4. TRANSAXLE CONTROL CABLE ASSEMBLY (TRANSAXLE SIDE)

TRANSAXLE CONTROL CABLE ASSEMBLY REMOVAL STEPS

- HEATER/COOLER UNIT (REFER TO GROUP 55, HEATER/COOLER UNIT, HEATER CORE AND EVAPORATOR P.55-30.)

5. TRANSAXLE CONTROL CABLE ASSEMBLY

TSB Revision

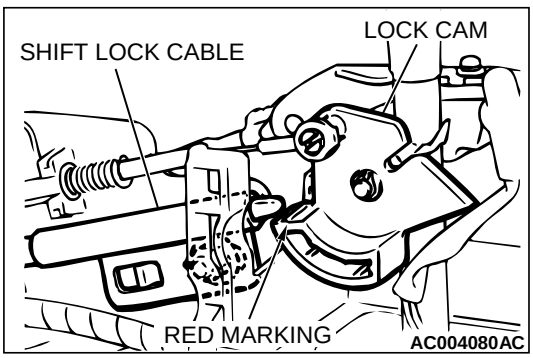
SELECTOR LEVER ASSEMBLY
REMOVAL STEPS

3. TRANSAXLE CONTROL CABLE ASSEMBLY CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)
6. KEY INTERLOCK CABLE
>>B<< CONNECTION (SELECTOR LEVER SIDE)
7. SHIFT LACK CABLE
>>A<< CONNECTION (SELECTOR LEVER SIDE)
8. A/T SELECTOR LEVER POSITION ILLUMINATION LIGHT CONNECTOR
9. SELECTOR LEVER ASSEMBLY

INSTALLATION SERVICE POINT

>>A<< SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

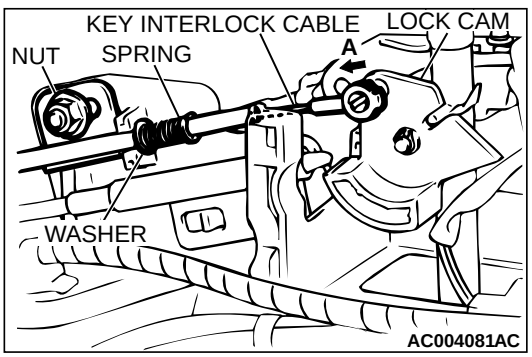
1. Place the selector lever in position "P."
2. Fasten the shift lock cable at the position where the end of the shift lock cable is positioned above the red marking.



>>B<< KEY INTERLOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

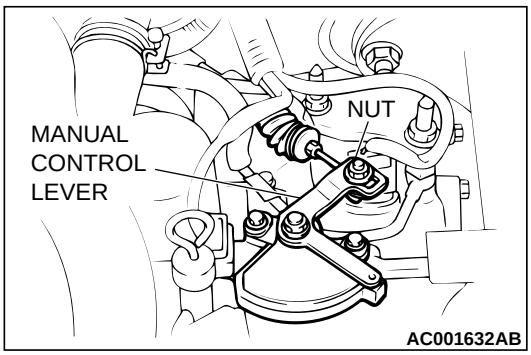
1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction A, tighten the nut to the specified torque.

Tightening torque: 11 N·m (97 in-lb)



>>C<< NUT INSTALLATION

1. Put the selector lever in the "N" position.



2. Loosen the nut. Gently pull the transaxle control cable in the direction of the arrow until the cable is taut. Tighten the nut at the specified torque.

   Tightening torque: 11 N· m (97 in-lb)

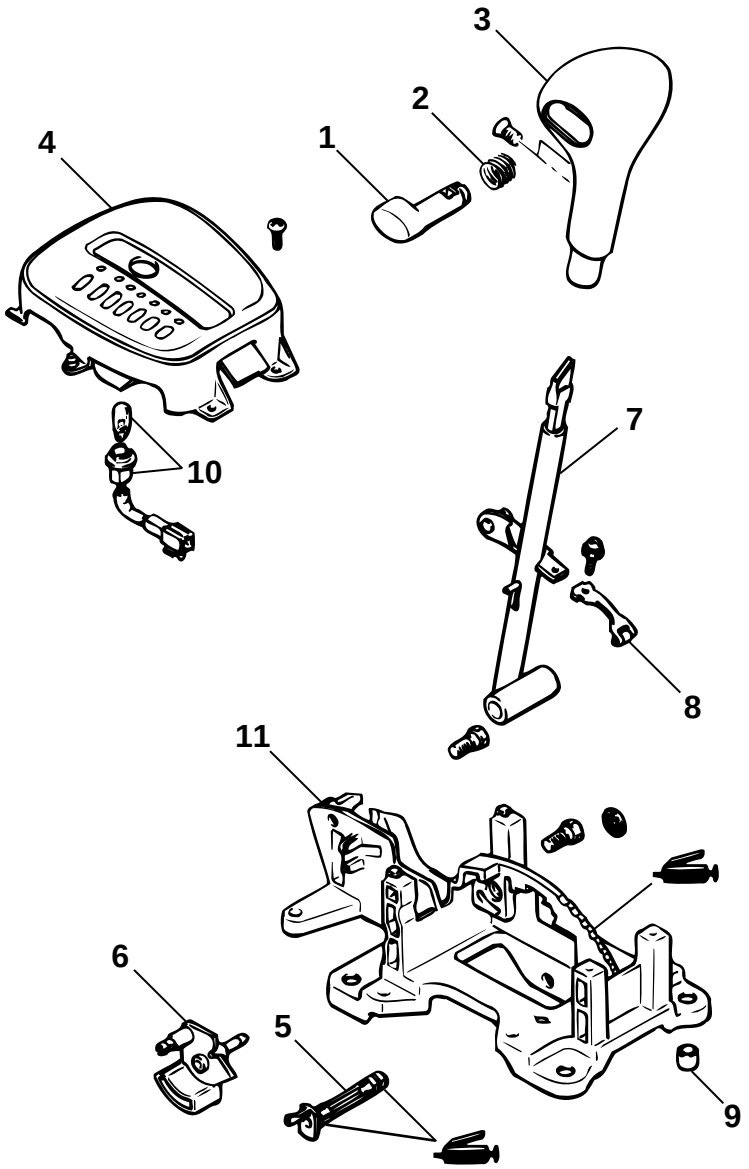
INSPECTION

M1231006700065

Check the cable assembly for function and for damage.

DISASSEMBLY AND ASSEMBLY

M1231006800073



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REMOVAL STEPS

1. PUSH BUTTON
2. SPRING
3. SHIFT KNOB
4. INDICATOR PANEL ASSEMBLY
5. SHAFT
6. LOCK CAM

REMOVAL STEPS (Continued)

7. LEVER SUB ASSEMBLY
8. DETENT SPRING
9. PIPE
10. POSITION INDICATOR LAMP ASSEMBLY
11. BASE BRACKET

TSB Revision

A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS

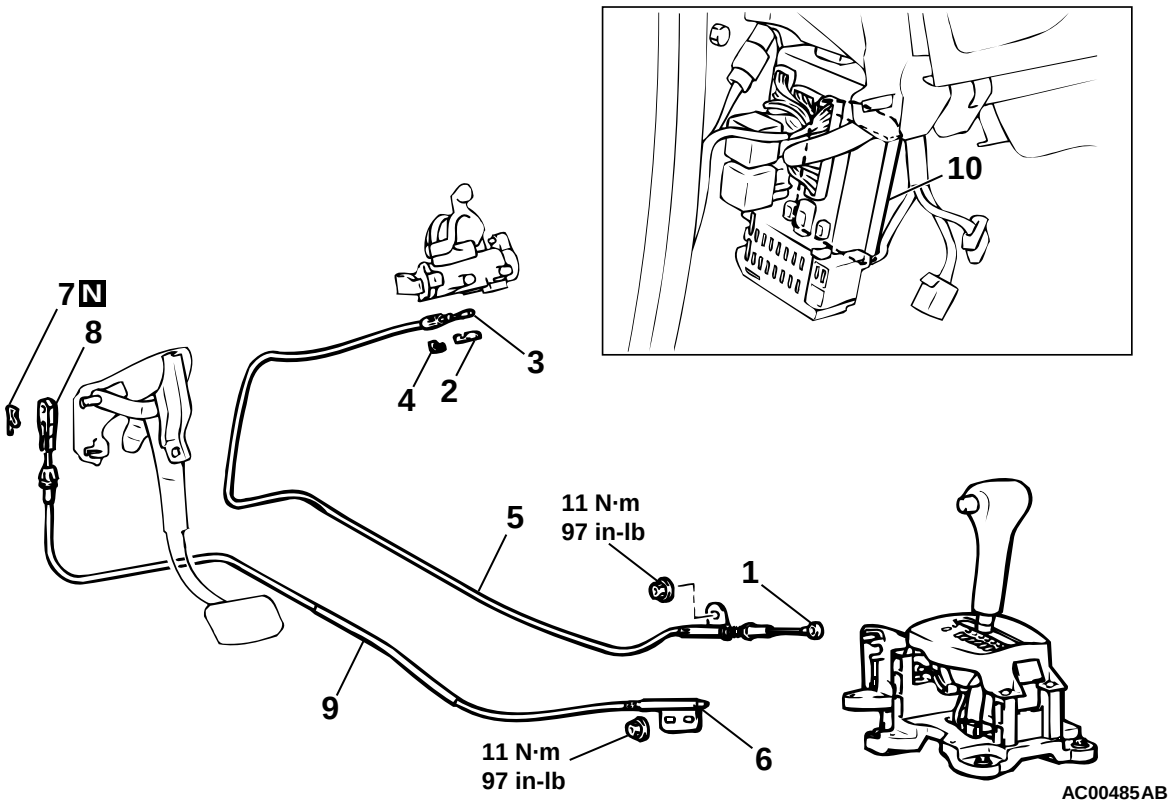
REMOVAL AND INSTALLATION

M1232001200068

⚠ CAUTION

When removing and installing the transmission control cable and shift lock cable unit, be careful not to impact the SRS-ECU.

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to GROUP 52A, Floor Console P.52A-11.)
- ² Key Interlock Mechanism Check (Refer to P.23A-282.) <Post-installation>
- ² Shift Lock Mechanism Check (Refer to P.23A-283.) <Post-installation>



KEY INTERLOCK CABLE REMOVAL STEPS

>>C<<
1. KEY INTERLOCK CABLE CONNECTION (SELECTOR LEVER SIDE)
   - LOWER COLUMN COVER (REFER TO GROUP 37A, STEERING WHEEL AND SHAFT P.37A-20.)
2. COVER
3. KEY INTERLOCK CABLE CONNECTION (STEERING LOCK CYLINDER SIDE)

>>B<<
4. SLIDER
5. KEY INTERLOCK CABLE

SHIFT LOCK CABLE REMOVAL STEPS

>>A<<
6. SHIFT LOCK CABLE CONNECTION (SELECTOR LEVER SIDE)
7. COTTER PIN
8. SHIFT LOCK CABLE CONNECTION (BRAKE PEDAL SIDE)
9. SHIFT LOCK CABLE

ETACS-ECU REMOVAL

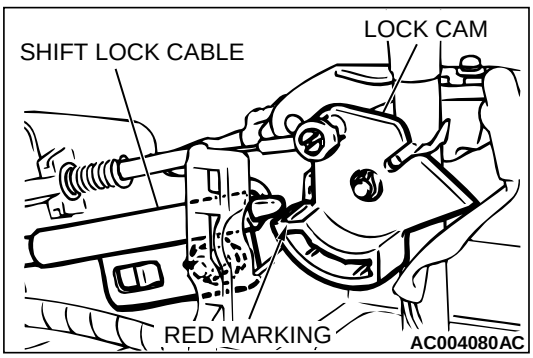
10. ETACS-ECU

TSB Revision

INSTALLATION SERVICE POINTS

>>A<< SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Place the selector lever in position "P."
2. Fasten the shift lock cable at the position where the end of the shift lock cable is positioned above the red marking.



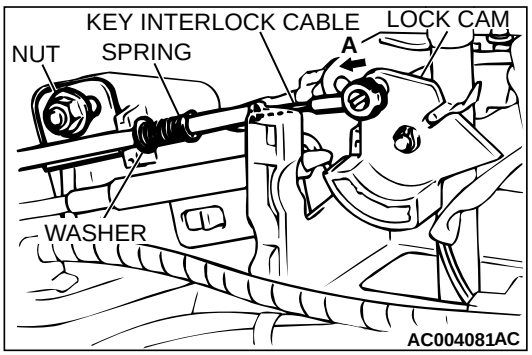
>>B<< KEY INTERLOCK CABLE (STEERING LOCK CYLINDER SIDE) INSTALLATION

Turn the ignition key to the "LOCK" (OFF) position and install the key interlock cable.

>>C<< KEY INTERLOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction A, tighten the locking nut to the specified torque.

   Tightening torque: 11 N·m (97 in-lb)



INSPECTION

M1232001300065

Check the cable assembly for function and for damage.

TSB Revision

TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

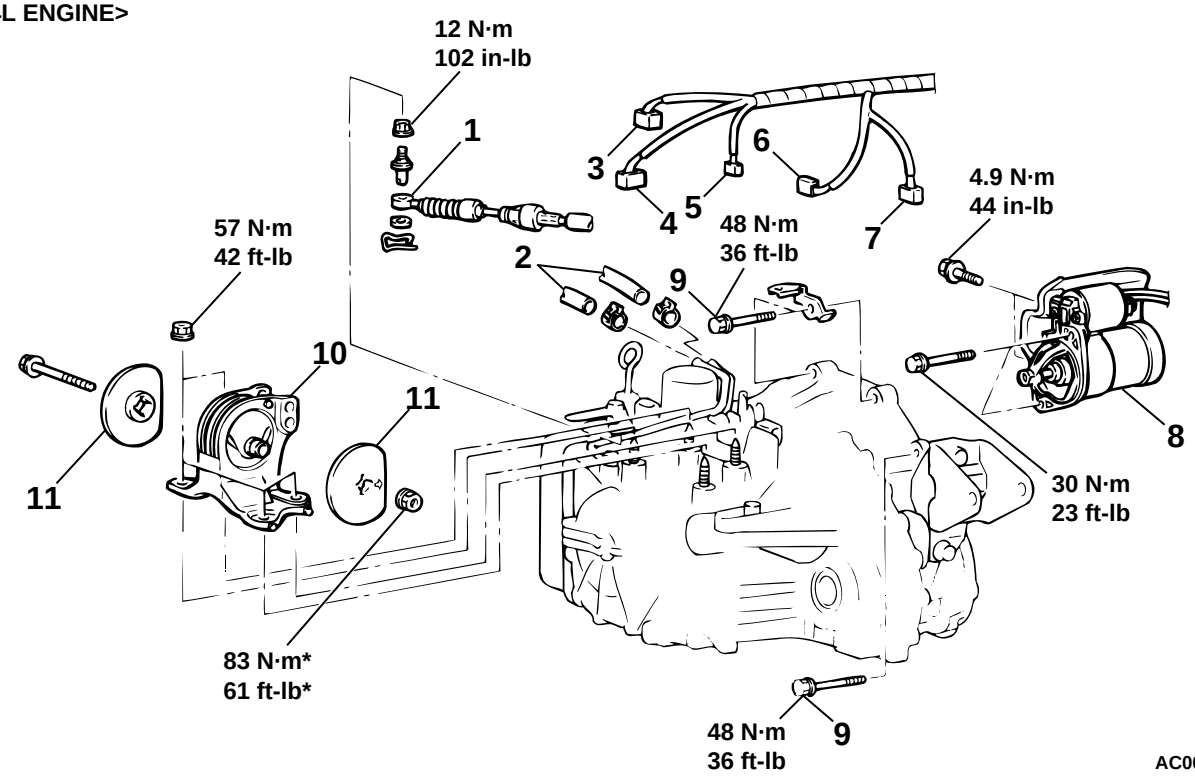
M1231005700084

⚠ CAUTION

***: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.**

Pre-removal Operation	Post-installation Operation
• Transmission Fluid Draining (Refer to GROUP 00, Maintenance Service – Automatic Transmission Fluid P.54A-8.) • Under Cover Removal • Battery and Battery Tray Removal (Refer to GROUP 54A, Battery P.54A-8.) • Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-4.)	• Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-4.) • Battery and Battery Tray Installation (Refer to GROUP 54A, Battery P.54A-8.) • Under Cover Installation • Transmission Fluid Supplying (Refer to GROUP 00, Maintenance Service – Automatic Transmission Fluid P.15-4.) • Selector Lever Operation Check (Refer to P.23A-282.) • Speedometer Operation Check (Refer to GROUP 54A, Combination Meter – On-vehicle Service – Speedometer Check P.54A-62.)

<2.4L ENGINE>



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REMOVAL STEPS

1. TRANSAXLE CONTROL CABLE CONNECTION
2. TRANSAXLE OIL COOLER HOSES CONNECTION
3. PARK/NEUTRAL SOLENOID VALVE ASSEMBLY CONNECTOR
4. A/T CONTROL SOLENOID VALVE ASSEMBLY CONNECTOR
5. INPUT SHAFT SPEED SENSOR CONNECTOR

<<A>>

<<B>>

>>B<<

<<C>>

REMOVAL STEPS (Continued)

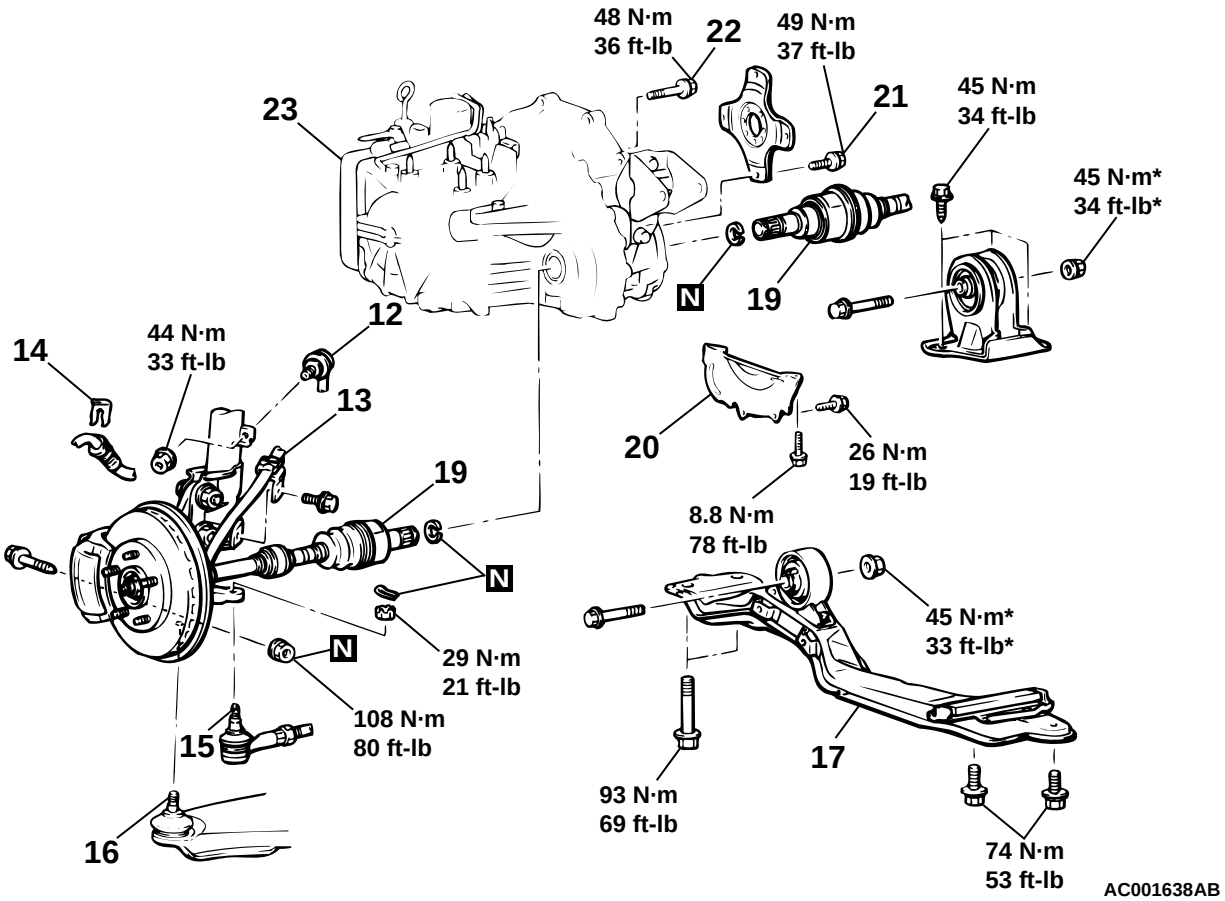
6. OUTPUT SHAFT SPEED SENSOR CONNECTOR
7. VEHICLE SPEED SENSOR CONNECTOR
8. STARTER MOTOR
9. TRANSAXLE ASSEMBLY UPPER PART COUPLING BOLTS
10. TRANSAXLE MOUNT BRACKET
11. TRANSAXLE MOUNT STOPPER

• ENGINE ASSEMBLY SUPPORTING

TSB Revision

⚠ CAUTION

***: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.**



REMOVAL STEPS

- LIFTING UP OF THE VEHICLE

12. STABILIZER LINK CONNECTION <STRUT SIDE>
13. SPEED SENSOR CABLE CONNECTION <VEHICLES WITH ABS>
14. BRAKE HOSE CLAMP

<<D>> 15. TIE ROD END CONNECTION

REMOVAL STEPS (Continued)

<<D>> 16. LOWER ARM CONNECTION
17. CENTERMEMBER ASSEMBLY
18. REAR ROLL STOPPER
<<E>> 19. DRIVE SHAFT CONNECTION
20. BELL HOUSING COVER
<<F>> 21. DRIVE PLATE BOLTS
<<F>> 22. TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLTS
<<F>> >>A<< 23. TRANSAXLE ASSEMBLY

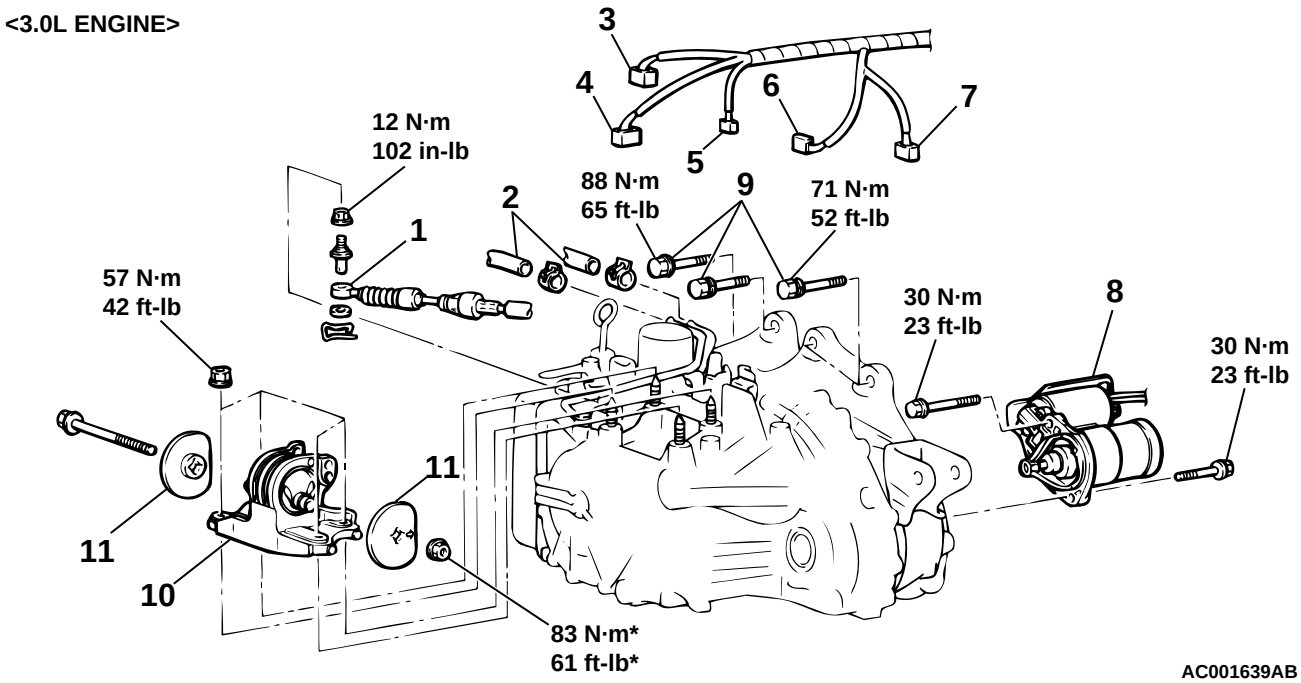
Required Special Tools:

- MB991113: Steering Linkage Puller
- MB991453: Engine Hanger Assembly
- MZ203827: Engine Lifter

TSB Revision

⚠ CAUTION

***: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.**



REMOVAL STEPS

1. TRANSAXLE CONTROL CABLE CONNECTION
2. TRANSAXLE OIL COOLER HOSES CONNECTION
3. PARK/NEUTRAL POSITION SWITCH CONNECTION
4. A/T CONTROL SOLENOID VALVE ASSEMBLY CONNECTOR
5. INPUT SHAFT SPEED SENSOR CONNECTOR

<<A>>

<<B>>

<<C>>

REMOVAL STEPS (Continued)

6. OUTPUT SHAFT SPEED SENSOR CONNECTOR
7. VEHICLE SPEED SENSOR CONNECTOR
8. STARTER MOTOR
9. TRANSAXLE ASSEMBLY UPPER PART COUPLING BOLTS
10. TRANSAXLE MOUNT BRACKET

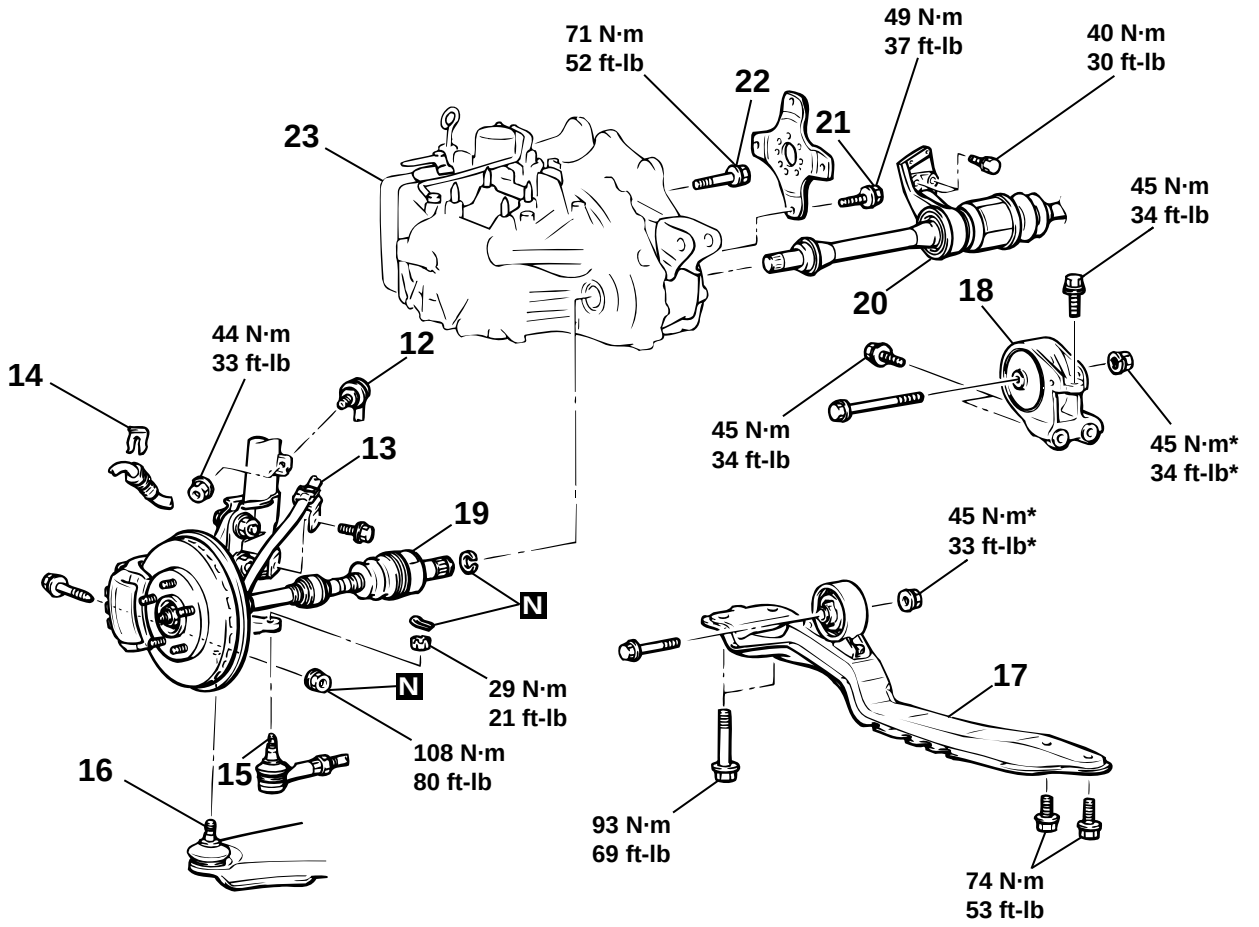
>>B<<

11. TRANSAXLE MOUNT STOPPER
- ENGINE ASSEMBLY SUPPORTING

TSB Revision

⚠ CAUTION

***: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.**



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REMOVAL STEPS

- LIFTING UP OF THE VEHICLE

12. STABILIZER LINK CONNECTION <STRUT SIDE>
13. SPEED SENSOR CABLE CONNECTION <VEHICLES WITH ABS>
14. BRAKE HOSE CLAMP

<<D>> 15. TIE ROD END CONNECTION

<<D>> 16. LOWER ARM CONNECTION

REMOVAL STEPS (Continued)

<<E>> 17. CENTERMEMBER ASSEMBLY

18. REAR ROLL STOPPER

<<E>> 19. DRIVE SHAFT CONNECTION

20. DRIVESHAFT AND INNER SHAFT CONNECTION

<<F>> 21. DRIVE PLATE BOLTS

<<F>> 22. TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLTS

<<F>> >>A<< 23. TRANSAXLE ASSEMBLY

Required Special Tools:

- MB991113: Steering Linkage Puller
- MB991453: Engine Hanger Assembly
- MZ203827: Engine Lifter

REMOVAL SERVICE POINTS

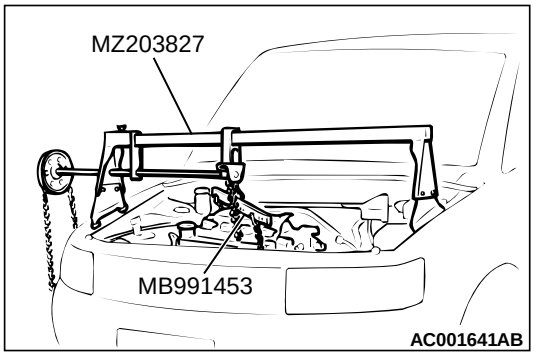
<<A>> STARTER MOTOR REMOVAL

Remove the starter motor with the starter motor harness still connected, and secure it inside the engine compartment.

<<B>> TRANSAXLE MOUNT BRACKET REMOVAL

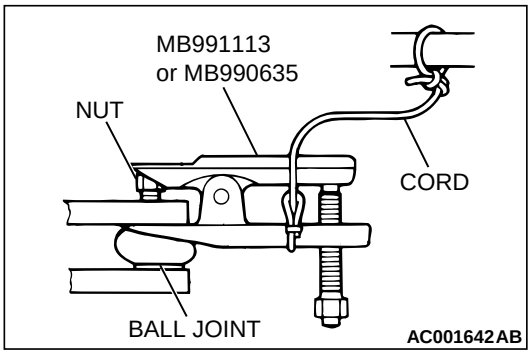
Jack up the transaxle assembly gently and then remove the transaxle mounting.

TSB Revision



<<C>> ENGINE ASSEMBLY SUPPORTING

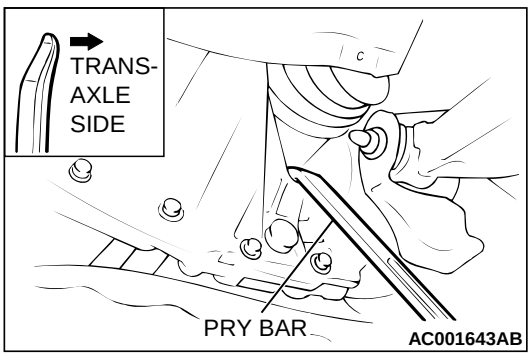
Set special tools MB991453 and MZ203827 to the vehicle to support the engine assembly.



<<D>> TIE ROD END/LOWER ARM DISCONNECTION

⚠ CAUTION

- **Before using special tool MB991113 or MB990635, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.**
- **Support special tool MB991113 or MB990635 with a cord, etc. to prevent it from coming off.**



<<E>> DRIVE SHAFT/DRIVE SHAFT AND INNER SHAFT DISCONNECTION

⚠ CAUTION

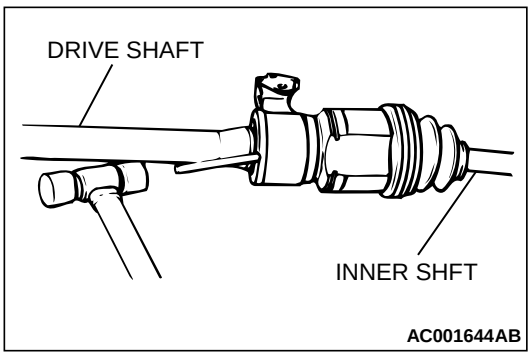
- **Do not pull on the driveshaft; doing so will damage the TJ; be sure to use a pry bar.**
- **Do not insert the pry bar so deep as to damage the oil seal.**
- **Do not damage the transaxle oil seal with the spline of the driveshaft.**

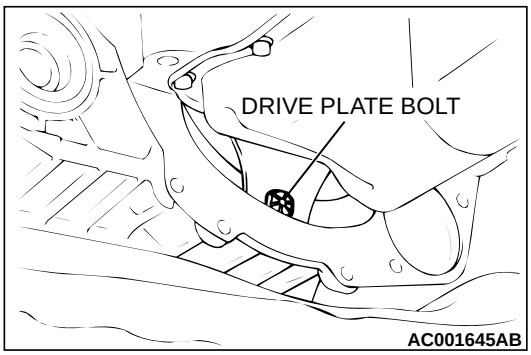
1. Insert the pry bar between the transaxle case and the driveshaft as shown to remove the driveshaft. <2.4L ENGINE, 3.0L ENGINE-LH>

⚠ CAUTION

Do not damage the transaxle oil seal with the spline of the inner shaft.

2. If the inner shaft and transaxle are tightly joined, tap the center bearing bracket lightly with a plastic hammer, etc. to remove the drive shaft and inner shaft from the transaxle. <3.0L ENGINE-RH>
3. Cover the transaxle case with a shop towel to prevent foreign material from entering it.

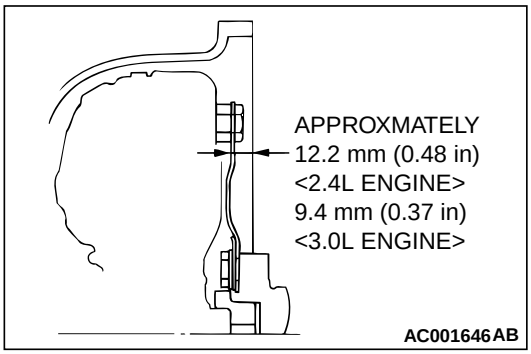




<<F>> DRIVE PLATE BOLTS/TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLTS/TRANSAXLE ASSEMBLY REMOVAL

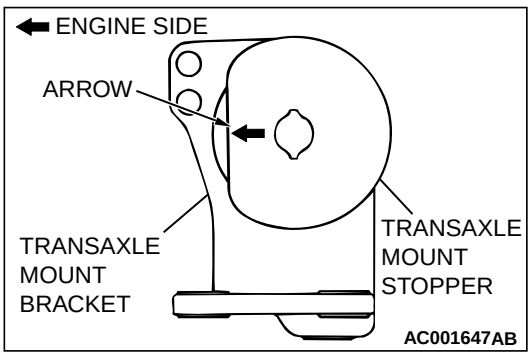
1. Support the transaxle assembly by using a transaxle jack.
2. Remove the drive plate bolts while turning the crank shaft.
3. Press in the torque converter to the transaxle side so that the torque converter does not stay engaged to the drive plate.
4. Remove the transaxle assembly lower bolts and lower the transaxle assembly.

INSTALLATION SERVICE POINTS



>>A<< TRANSAXLE ASSEMBLY INSTALLATION

Inserting the torque converter into the transaxle oil pump so that the shown dimension is approximately. 12.2 mm (0.48 inch) <2.4L ENGINE>, approximately 9.4 mm (0.37 inch) <3.0L ENGINE>. Install the transaxle assembly to the engine.



>>B<< TRANSAXLE MOUNT STOPPER INSTALLATION

Install the transaxle mount stopper so that the arrow mark points as shown in the illustration.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1231012400063

ITEMS		SPECIFICATIONS
Key interlock cable		11 N·m (97 in-lb)
Shift lock cable		11 N·m (97 in-lb)
Transaxle assembly		
Bell housing cover <2.4L engine>	To engine	8.8 N·m (78 in-lb)
	To transaxle	26 N·m (19 ft-lb)

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ITEMS			SPECIFICATIONS
Centermember assembly		Front	93 N·m (69 ft-lb)
		Front roll stopper	45 N·m (33 ft-lb)
		Rear	74 N·m (53 ft-lb)
Drive plate bolt			49 N·m (37 ft-lb)
Drive shaft and inner shaft <3.0L engine>			40 N·m (30 ft-lb)
Lower arm connection			108 N·m (80 ft-lb)
Rear roll stopper bracket			45 N·m (34 ft-lb)
Transaxle control cable connection			11 N·m (97 in-lb)
Starter motor			30 N·m (23 ft-lb)
Starter cover mounting bolt <2.4L engine>			4.9 N·m (44 in-lb)
Stabilizer link connection			44 N·m (33 ft-lb)
Tie rod end connection			29 N·m (21 ft-lb)
Transaxle assembly lower part coupling bolt	2.4L engine		48 N·m (36 ft-lb)
	3.0L engine		71 N·m (52 ft-lb)
Transaxle assembly upper part coupling bolt	2.4L engine		48 N·m (36 ft-lb)
	3.0L engine	Bolt, flange	71 N·m (52 ft-lb)
		Bolt, washer assembled	88 N·m (65 ft-lb)
Transaxle mount bracket			57 N·m (42 ft-lb)
Transaxle mount stopper			83 N·m (61 ft-lb)
Transaxle control			
Detent spring			1.5 N·m (14 in-lb)
Indicator panel assembly			1.5 N·m (14 in-lb)
Key interlock cable connection			11 N·m (97 in-lb)
Lever assembly			11 N·m (97 in-lb)
Nut			11 N·m (97 in-lb)
Shift lock cable connection			11 N·m (97 in-lb)
Shift knob			1.8 N·m (16 in-lb)
Selector lever assembly			11 N·m (97 in-lb)
Transaxle control cable assembly			11 N·m (97 in-lb)

SERVICE SPECIFICATIONS

M1231000300047

ITEMS		STANDARD VALUE
Line pressure kPa (psi)		1,010 – 1,050 (147 – 152)
A/T fluid temperature sensor kΩ	at 0°C (32°F)	16.7 – 20.5
	at 20°C (68°F)	7.3 – 8.9
	at 40°C (104°F)	3.4 – 4.2
	at 60°C (140°F)	1.9 – 2.2
	at 80°C (176°F)	1.0 – 1.2
	at 100°C (212°F)	0.57 – 0.69
Resistance of torque converter clutch control solenoid valve coil [at 20°C (68°F)] Ω		2.7 – 3.4

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ITEMS	STANDARD VALUE
Resistance of low-reverse solenoid valve coil [at 20°C (68°F)] Ω	2.7 – 3.4
Resistance of second solenoid valve coil [at 20°C (68°F)] Ω	2.7 – 3.4
Resistance of underdrive solenoid valve coil [at 20°C (68°F)] Ω	2.7 – 3.4
Resistance of overdrive solenoid valve coil [at 20°C (68°F)] Ω	2.7 – 3.4
Stall speed r/min	2,100 – 2,600

LUBRICANTS

M1231000400055

ITEMS		SPECIFIED LUBRICANTS	QUANTITY
A/T fluid dm^3 (qt)	F4A42	DIAMOND ATF SP III, ATF SP II M or equivalent	7.8 (8.2)
	F4A51		8.5 (9.0)

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NOTES