GROUP 23A

AUTOMATIC TRANSAXLE <2.0L ENGINE>

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ WARNING

- ***Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).***
- ***Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.***
- ***MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.***

NOTE
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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GENERAL DESCRIPTION

M1231000100430

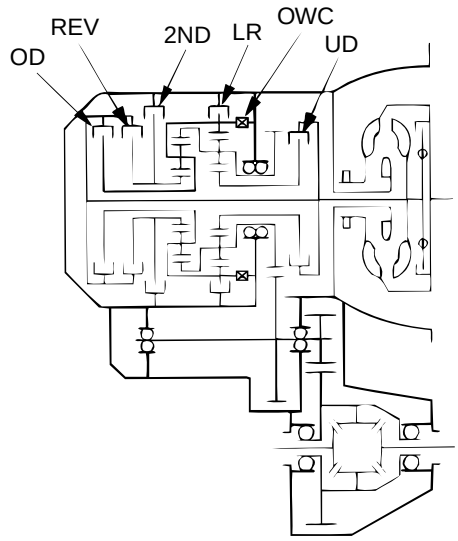
F4A4B model have been established.

ITEM		SPECIFICATION
Transaxle model		F4A4B-1-J1Z
Engine model		4G94-MPI (2.0L ENGINE)
Torque converter	Type	3-element, 1-stage, 2-phase type
	Lock-up	Provided
	Stall torque ratio	2.1
Transaxle type		4 forward speeds, 1 reverse speed, fully automatic
Transaxle gear ratio	1st	2.842
	2nd	1.529
	3rd	1.000
	4th	0.712
	Reverse	2.480
Final reduction ratio (Differential gear ratio)		4.041
Clutch		Multi-disc type 3 sets
Brake		Multi-disc type 2 sets
Manual control system		P-R-N-D-3-2-L (7 positions)
Shift pattern control		Electronic control
Hydraulic control during shifting		Electronic control (Each clutch hydraulically independently controlled)
Torque converter clutch control		Electronic control
Transmission fluid	Specified lubricants	DIAMOND ATF SP III
	Quantity dm^3 (qt)	7.7 (8.1)

TRANSAXLE

The transaxle is made up of the torque converter and gear train. A 3-element, 1-stage, 2-phase torque converter with built-in torque converter clutch is used. The gear train is made up of four sets of multi-disc clutches, two sets of multi-plate brakes, one set of one-way clutches and two sets of planetary gears. The planetary gears are made up of sun gears, carriers, pinion gears and annulus gears.

TRANSAXLE CONFIGURATION DRAWING



AC001813 AB

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.

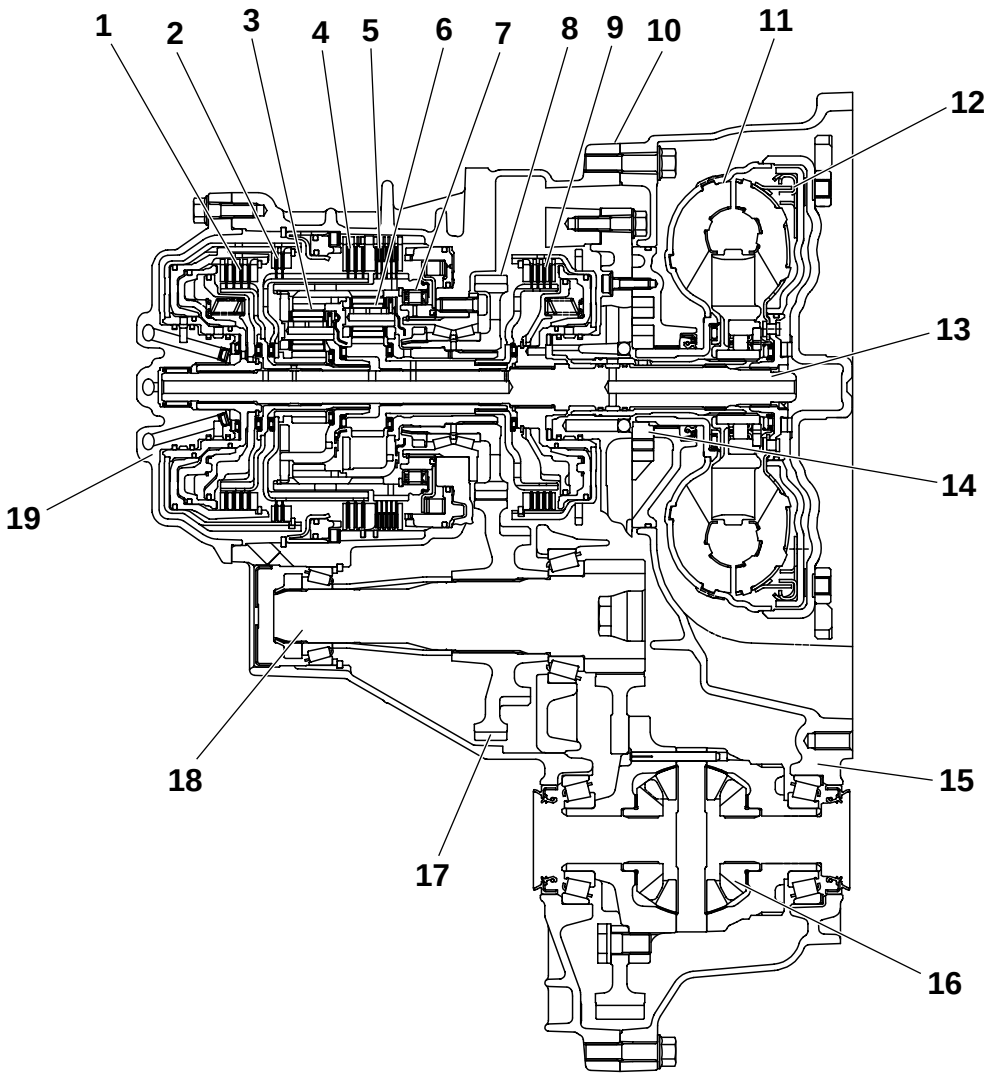
FUNCTION ELEMENT TABLE

OPERATING ELEMENT / TRANSMISSION RANGE		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	–	–	–	–	×	–
Sport mode	1st	–	–	×	–	–	×*	–
	2nd	–	–	×	–	–	–	×
	3rd	–	–	×	–	×	–	–
	4th	–	–	–	–	×	–	×

×: Function element –: Not applicable

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

SECTIONAL VIEW



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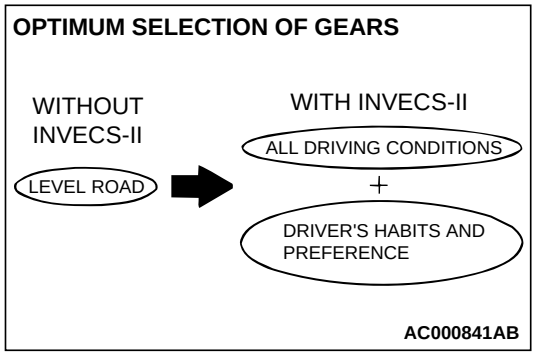
TSB Revision

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

ELECTRONICALLY-CONTROLLED SYSTEM

INVECS-II

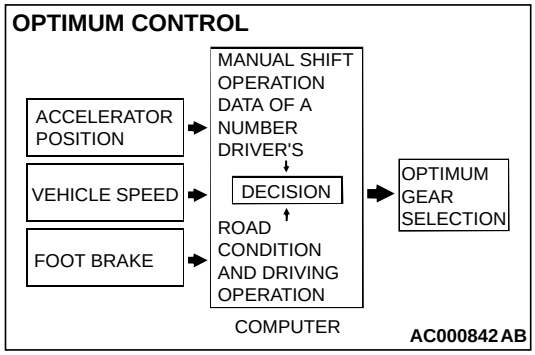
- When in drive ("D" range), the new automatic transaxle employs an innovative shift schedule to provide a high level of comfort and "easy driving style" that matches all driving conditions as well as the driver's driving style.
- INVECS-II features "Optimum Shift Control," which provides shift timing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



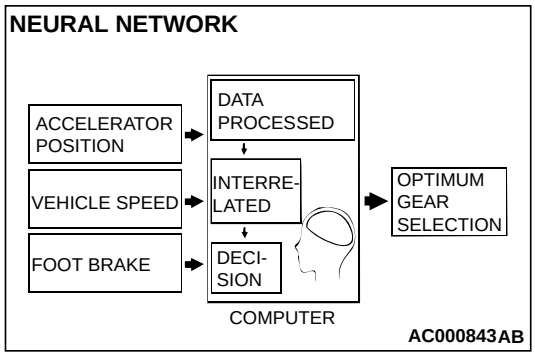
FEATURES

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 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.

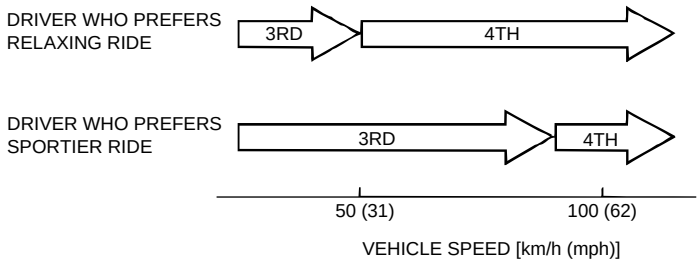


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ADAPTIVE SHIFT CONTROL

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.

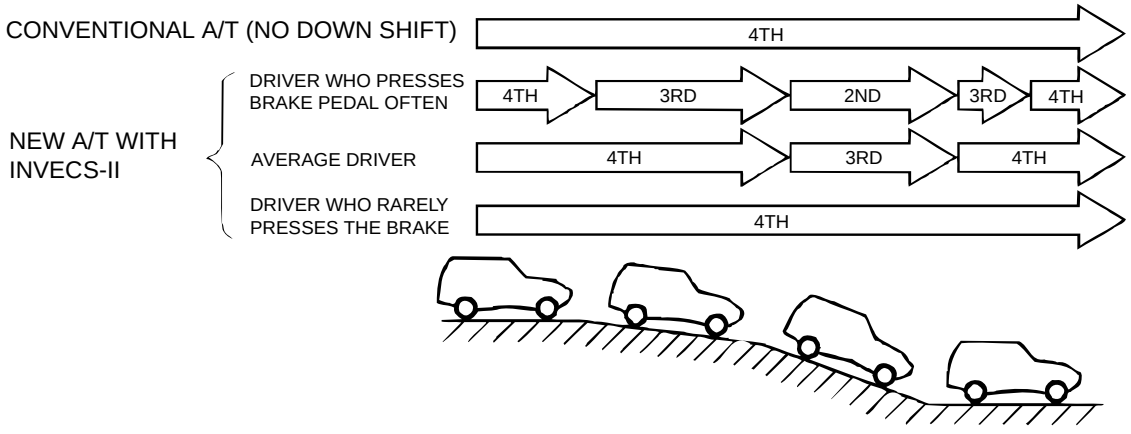
ADAPTIVE SHIFT CONTROL DURING ACCELERATION



AC000844 AB

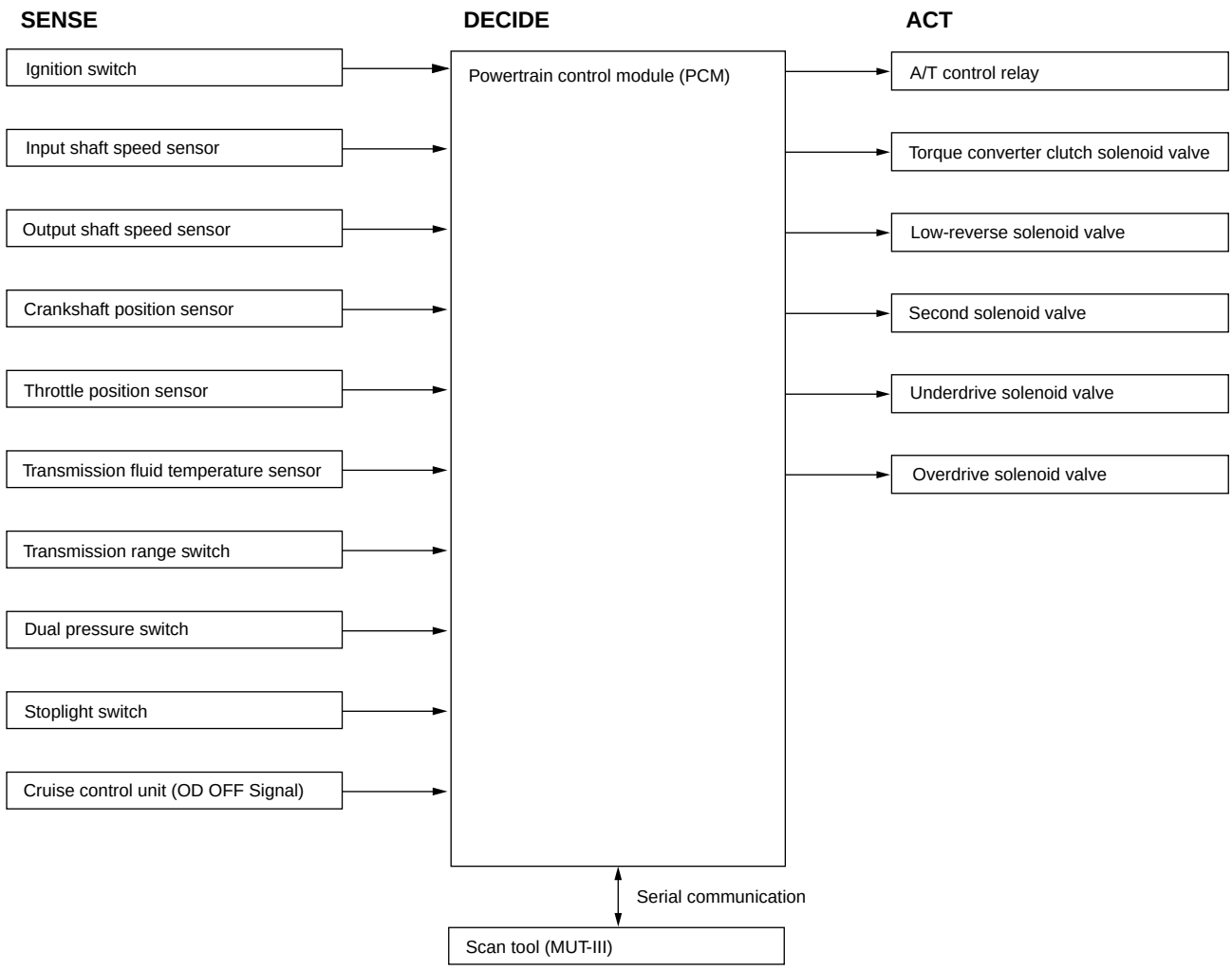
3. If the computer determines that the driver tends to apply the brakes often on a descending roadway, it adjusts timing to down shift sooner so that engine braking is more effectively applied. Conversely, if the computer determines that the driver does not brake much while driving downhill, it delays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

ADAPTIVE SHIFT CONTROL ON DOWNGRADES



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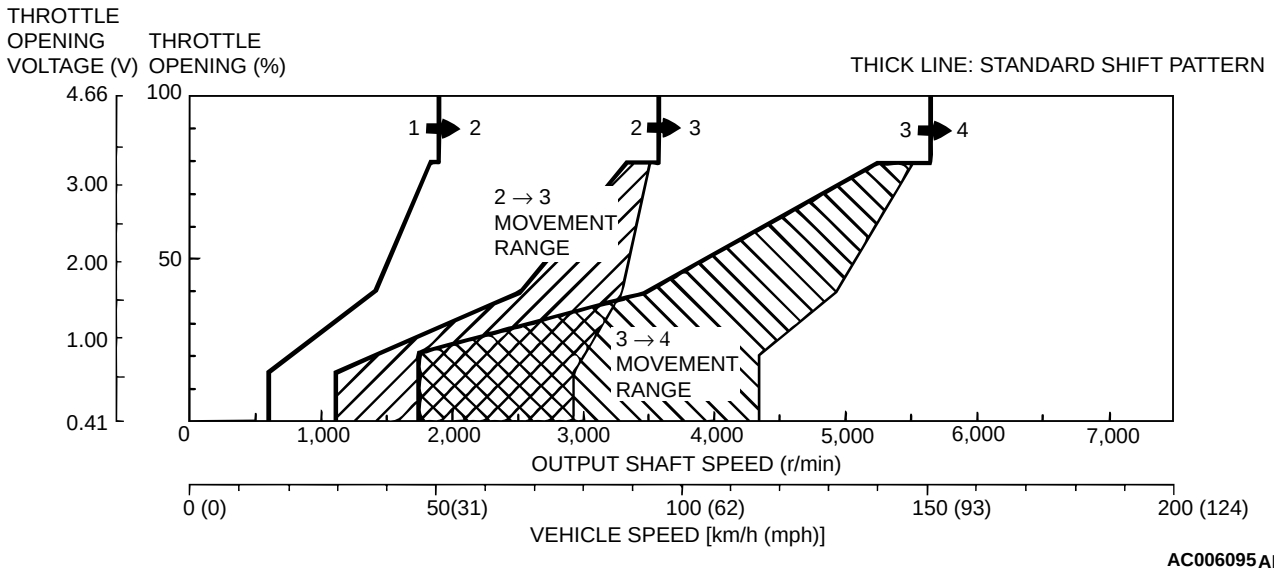
SYSTEM CONSTRUCTION DIAGRAM



AC006183AD

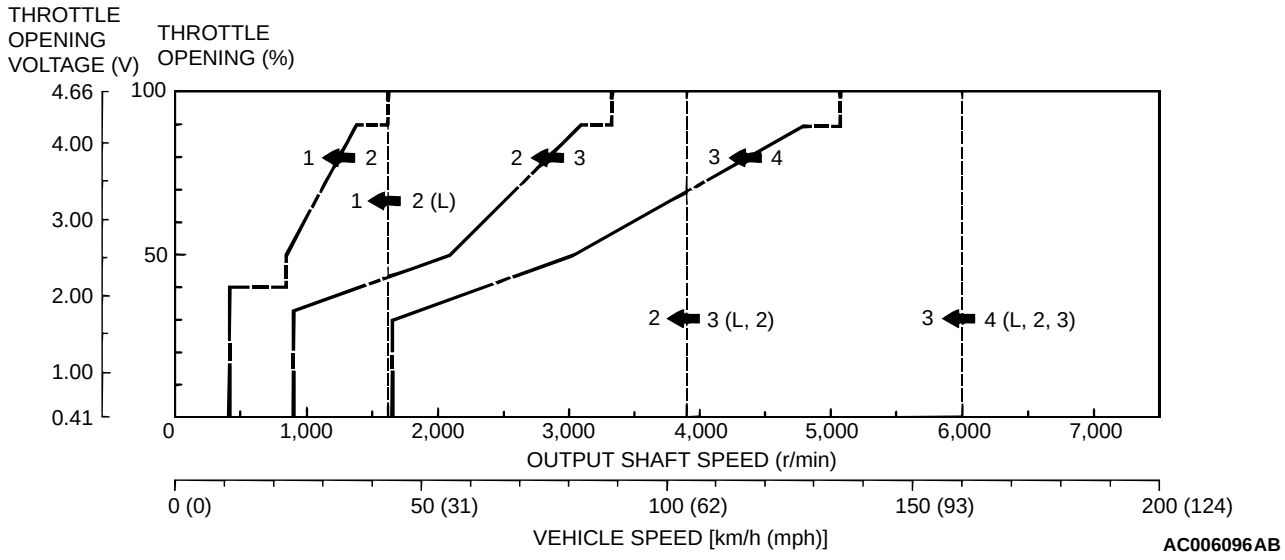
SHIFT PATTERN CONTROL

UPSHIFT PATTERN

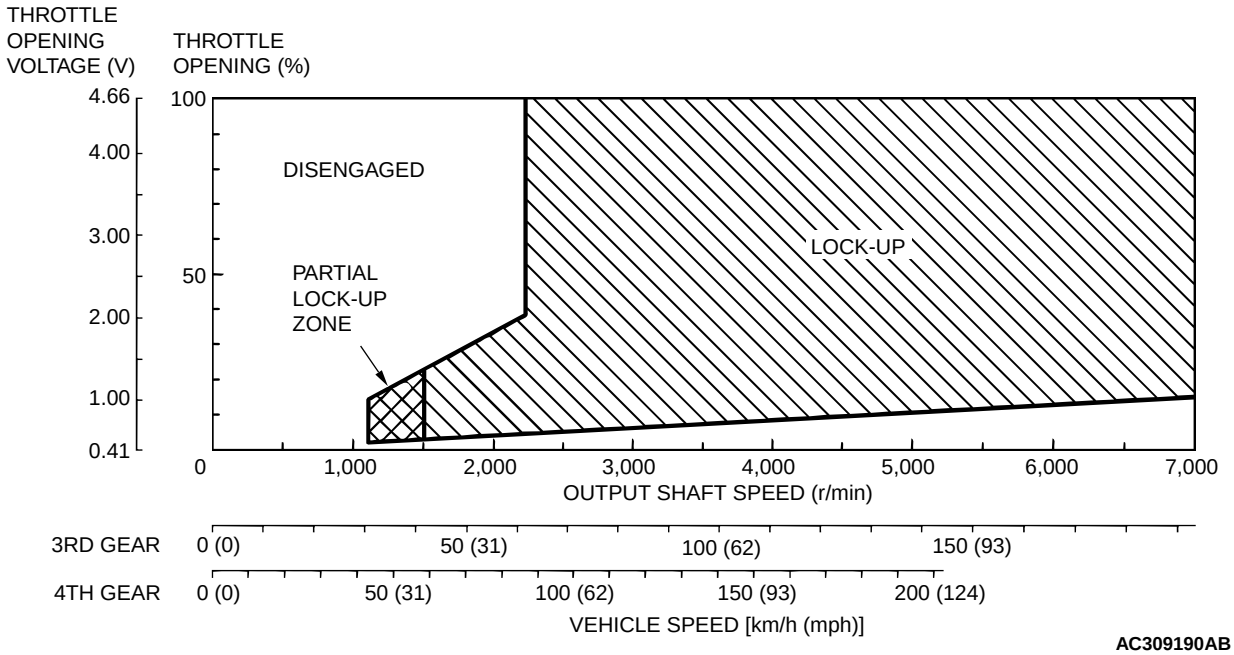


NOTE: Within 2 -to- 3 and 3 -to- 4 movement ranges, the PCM adjusts shift points according to the driving conditions by memorizing the accelerator pedal stroke and braking timing.

DOWNSHIFT PATTERN



TORQE CONVERTER CLUTCH CONTROL

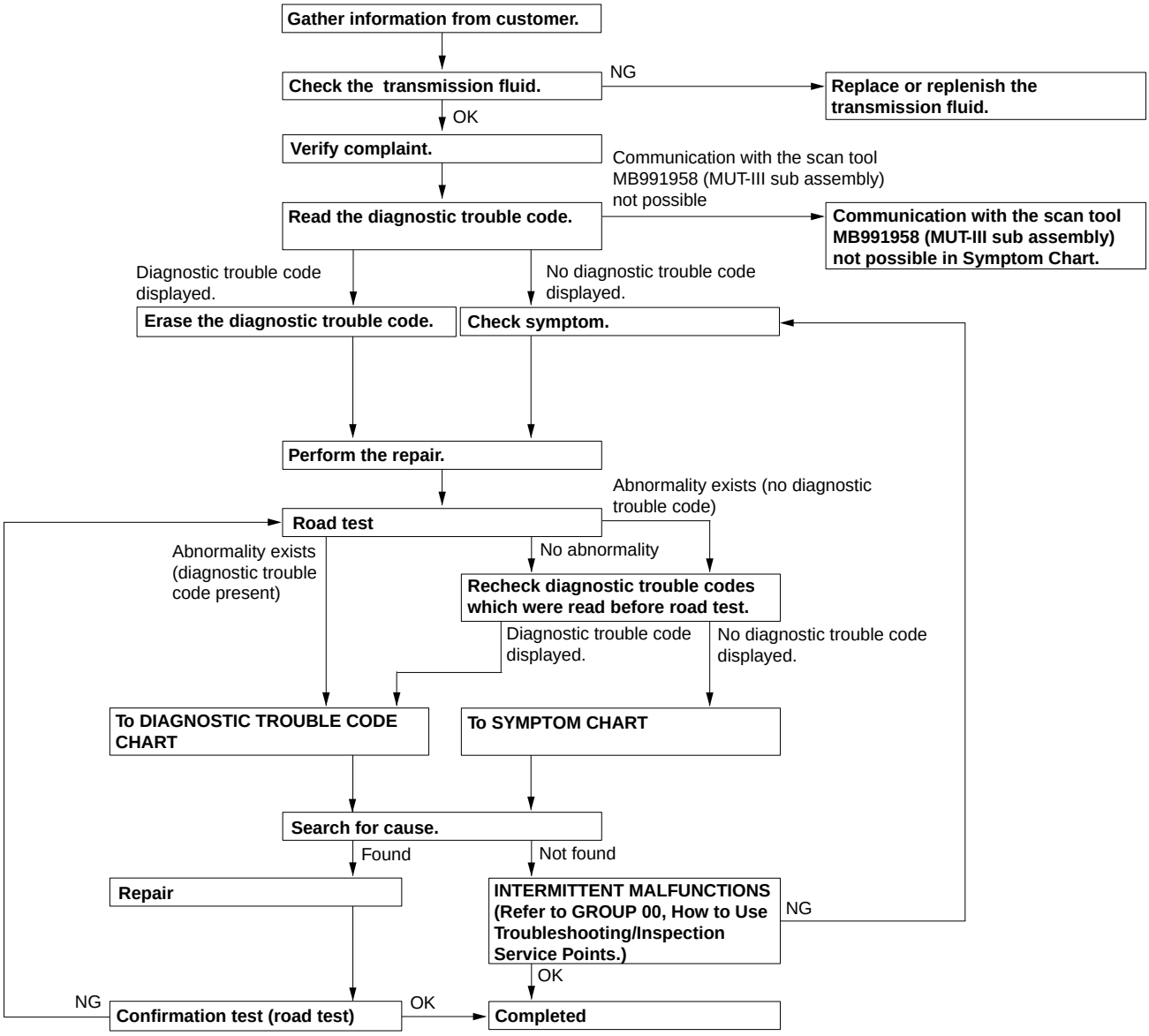


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AUTOMATIC TRANSAXLE DIAGNOSIS

DIAGNOSTIC TROUBLESHOOTING FLOW

M1231013500438



AC210189AB

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INTRODUCTION TO A/T DIAGNOSIS

M1231012300248

The automatic transaxle can exhibit any of the following symptoms: noise or vibration is generated, Transmission fluid leaks, the vehicle does not move forward or backward. The causes of these symptoms could come from: Incorrect mounting, the Transmission fluid may be low, or a component of the transaxle may be faulty.

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

A/T DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1231007600265

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will find most A/T malfunctions.

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 Codes (DTCs).
4. If you can not 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.00-6.
5. If you can verify the condition but there are no DTCs, or the system can not communicate with scan tool, refer to the Symptom Chart P.23A-39.
6. If there is a DTC, record the number of the code, then erase the code from memory using scan tool.
7. Reconfirm the symptom with a Road Test.
8. If a DTC is set again, go to the Inspection Chart for Diagnostic Trouble Codes.
9. If a 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.00-6.
10. After repairs are completed, conduct a Road Test duplicating the complaint conditions to confirm the malfunction has been eliminated.

DIAGNOSTIC FUNCTION

ON-BOARD DIAGNOSTICS

M1231022500094

The powertrain control module (PCM) monitors its input/output signals (some signals all the time and others under specified conditions). When an irregular signal is initially monitored, the PCM decides that a malfunction has occurred and records the occurrence as a diagnostic trouble code. There are 24 diagnostic items. The diagnostic results can be read with scan tool. Diagnostic trouble codes are kept in memory by direct battery feed. The codes are retained in memory even if the ignition switch is in the "LOCK" (OFF) position. DTCs are not erased even after the battery terminals and the PCM connector are disconnected. In addition, the diagnostic trouble code can also be erased by scan tool.

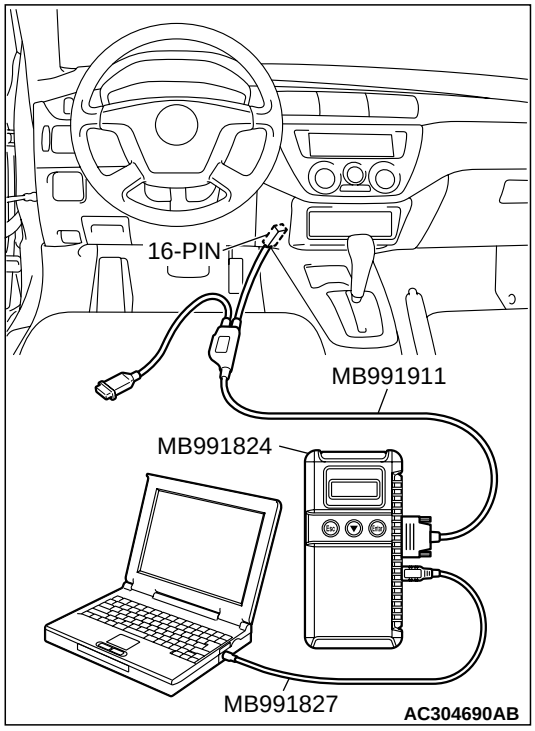
NOTE: If a sensor is disconnected when the ignition switch is in the "ON" position, a diagnostic trouble code is stored in memory. In this case, erase the DTC using scan tool.

The 24 diagnostic items are displayed in numeric order.

HOW TO CONNECT THE SCAN TOOL (MUT-III)

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



⚠ CAUTION

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

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991911 to special tool MB991824.
5. Connect special tool MB991911 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

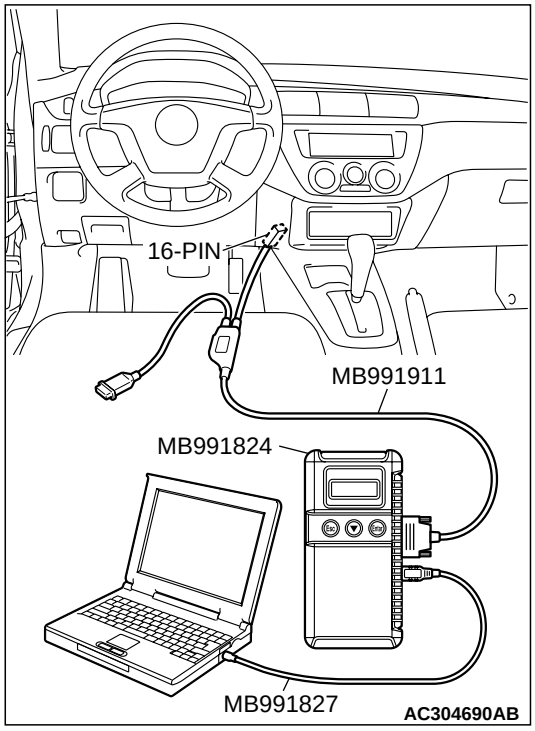
   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the MUT-III system on the personal computer.

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

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



⚠ CAUTION

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

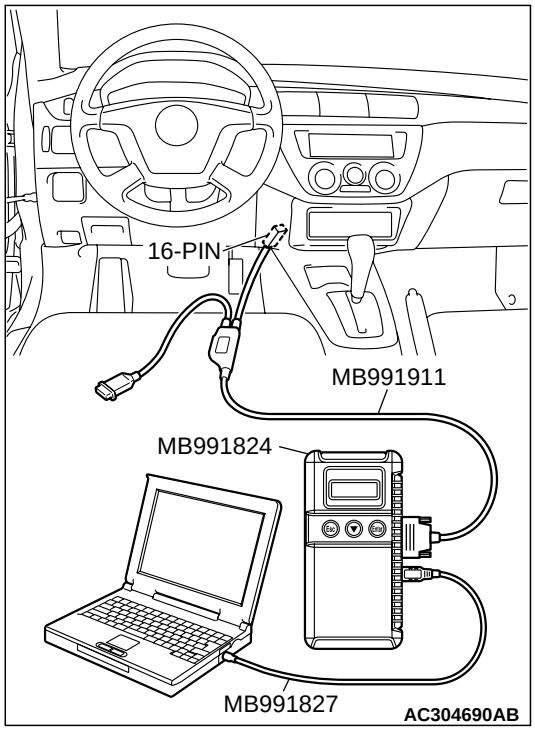
NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Diagnostic Trouble Code."
8. If a DTC is set, it is shown.
9. Choose "Erase DTCs" to erase the DTC.

HOW TO READ DATA LIST

Required Special Tools:

- MB991958 : Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



⚠ CAUTION

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

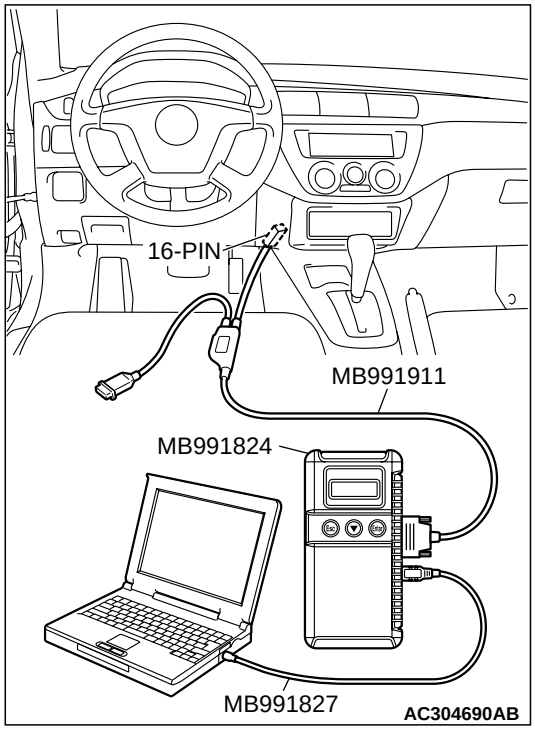
1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Data List."
8. Choose an appropriate item and select the "OK" button.

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HOW TO PERFORM ACTUATOR TEST

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



⚠ CAUTION

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

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Actuator Test."
8. Choose an appropriate item and select the "OK" button.

FAIL-SAFE/BACKUP FUNCTION

M1231008300256

When a malfunction of a main sensor or actuator is detected by the PCM, the transaxle is controlled by pre-set control logic to maintain safe conditions for driving.

The following table shows how the fail-safe/backup function affects vehicle driveability and operation.

MALFUNCTIONING ITEM		JUDGEMENT CONDITION	CONTROL DEFAULT DURING MALFUNCTION
Input shaft speed sensor		If 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 greater.	The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the transaxle holds 3rd gear or 2nd gear, depending on speed, as a fail-safe.
Output shaft speed sensor		The output signal from the output shaft speed sensor is not present for one second or more while the vehicle is driven.	The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, 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 ohms for 0.32 seconds.	The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the A/T control relay is turned off. The transaxle will only operate in 3rd and reverse gears until the system is repaired.
Underdrive solenoid valve			
Second solenoid valve			
Overdrive solenoid valve			
Torque converter clutch solenoid valve			
Incomplete shifting	1st	The gear ratio value from the output shaft speed sensor is not the same as the output from the input shaft speed sensor for one second after shifting has been completed.	The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the A/T control relay is turned off. The transaxle will only operate in 3rd and reverse gears until the system is repaired.
	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."	The A/T control relay is switched off. The transaxle will only operate in 3rd and reverse gears until the system is repaired.
Malfunction in the PCM		Malfunction has occurred in the PCM.	The A/T control relay is switched off. The transaxle will only operate in 3rd and reverse gears until the system is repaired.

ROAD TEST

M1231007800441

Check using 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-238).
2	Ignition switch: ON Engine: Stopped Transmission range: P	Transmission range (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	Transmission range switch	27, 28	Transmission range switch system (P.23A-109, P.23A-136).
		Accelerator pedal (1) Fully closed (2) Depressed (3) Fully open	Data list No.11 (1) 335 – 935 mV (2) Gradually rises from (1) (3) 4,390 – 5,290 mV	TP sensor	–	Group 13A, Diagnostic Trouble Code Procedures – DTCs P0121, P0122, P0123: Throttle Position Sensor System (P.13A-156, P.13A-169, P.13A-179).
		Brake pedal (1) Depressed (2) Released	Data list No.26 (1) ON (2) OFF	Stoplight switch	26	Stoplight switch system (P.23A-100).
3	Ignition switch: ST Engine: Stopped	Cranking test with lever in P or N range	Cranking should be possible	Cranking	-	Engine does not crank (P.23A-252).
4	Engine warming up	Drive for 15 minutes or more so that the transmission fluid temperature becomes 70 – 80°C (158 – 176°F)	Data list No.15 Gradually rises to 70 – 80°C (158 – 176°F)	Transmission fluid temperature sensor	15, 16	Transmission fluid temperature sensor system (P.23A-40, P.23A-53).

STEP	CONDITION BEFORE TEST/OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
5	Engine: Idling Transmission range: N	Brake pedal (Retest) (1) Depressed (2) Released	Data list No.26 (1) ON (2) OFF	Stoplight switch	26	Stoplight switch system (P.23A-100).
		Accelerator pedal (1) Fully closed (2) Depressed	Data list No.21 (1) Engine tachometer and the scan tool MB991958 (MUT-III sub assembly) shows the same engine speed (2) Gradually rises from (1)	Crankshaft position sensor	21	Group 13A, Diagnostic Trouble Code Procedures – DTC P0335: Crank shaft Position Sensor System (P.13A-371).
		Transmission range (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-261).
					-	Shift shock when shifting from N to D and long delay (P.23A-262).
					-	Shift shock when shifting from N to R and long delay (P.23A-266).
					-	Shift shock when shifting from N to D, N to R and long delay (P.23A-270).
				Does not move	-	Does not move forward (P.23A-254).
					-	Does not move backward (P.23A-257).
					-	Does not move (forward or backward) (P.23A-259).

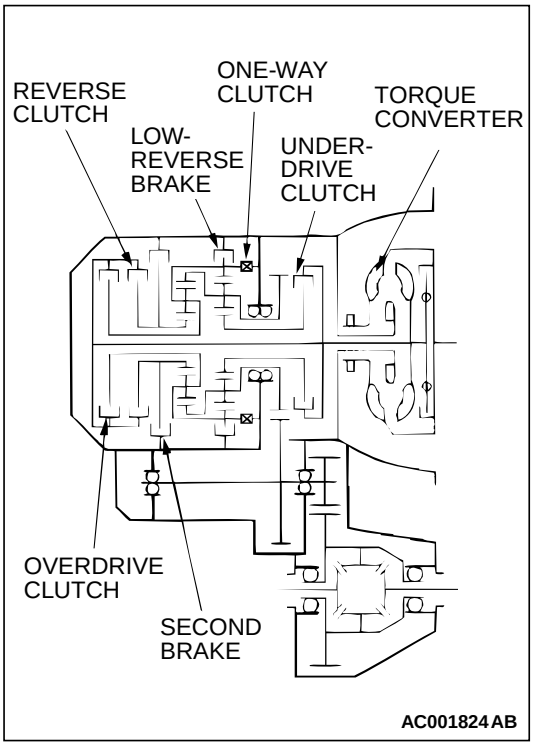
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STEP	CONDITION BEFORE TEST/OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
6	Transmission range: N (on a flat and straight road)	Transmission range and vehicle speed (Each condition should be maintained for 10 seconds or more). (1) Idling in 1st gear (Vehicle stopped) (2) Driving at constant speed of 10 km/h (6.2 mph) in 1st gear (3) Driving at constant speed of 30 km/h (19 mph) in 2nd gear (4) Driving at constant speed of 50 km/h (31 mph) in 3rd gear (5) Driving at constant speed of 60 km/h (37 mph) in 4th gear	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-155).
			Data list No.32 (2) 0%, (3) 0%, (4) 0%, (5) 100%	Underdrive solenoid valve duty %	32	Underdrive solenoid valve system (P.23A-168).
			Data list No.33 (2)100%, (3) 0%, (4) 100%, (5) 0%	Second solenoid valve duty %	33	Second solenoid valve system (P.23A-179).
			Data list No.34 (2) 100%, (3) 100%, (4) 0%, (5) 0%	Overdrive solenoid valve duty %	34	Overdrive solenoid valve system (P.23A-191).
			Data list No.29 (1) 0 km/h (0 mph) (4) 50 km/h (31 mph)	Vehicle speed signal	-	Vehicle speed signal system (P.23A-307.)
			Data list No.22 (4) 1,400 – 1,700 r/min	Input shaft speed sensor	22	Input shaft speed sensor system (P.23A-61).
			Data list No.23 (4) 1,400 – 1,700 r/min	Output shaft speed sensor	23	Output shaft speed sensor system (P.23A-80).
7	Transmission range: 3 (on a flat and straight road)	Transmission range and vehicle speed (1) Driving at speed of 60 km/h (37 mph) in 3rd gear (2) Driving at constant speed of 60 km/h (37 mph) (3) Release accelerator pedal (Speed under 50 km/h (31 mph)	Data list No.36 (2) 70 – 99.6% (3) 70 – 99.6% to 0%	Torque converter clutch solenoid valve duty %	36, 52, 53	Torque converter clutch solenoid system (P.23A-203, P.23A-228, P.23A-234).
			Data list No.52 (2) –10 to 10 r/min (3) The value changes from (2)	Torque converter clutch amount of slippage		

STEP	CONDITION BEFORE TEST/OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
8	Use the scan tool MB991958 (MUT-III sub assembly) to stop the INVECS-II function Transmission range: D (on a flat and straight road)	(1) Accelerate to 4th gear at a throttle position sensor output of 1.5 V (accelerator opening angle of 25%) (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%)	Data list No.11, 23 The shifting points correspond with the scan tool display and the TP sensor voltage (opening angle) and output shaft speed, which are shown in the standard shift pattern	Malfunction when shifting	-	Shift shock and slipping (P.23A-272).
				Does not shift according to instructions	-	Early or late shifting in all gears (P.23A-275).
					-	Early or late shifting in some gears (P.23A-279).
				Does not shift	-	No diagnostic trouble code (P.23A-281).
					22	Input shaft speed sensor system (P.23A-61).
					23	Output shaft speed sensor system (P.23A-80).

STEP	CONDITION BEFORE TEST/OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
8	Use the scan tool MB991958 (MUT-III sub assembly) to stop the INVECS-II function Transmission range: D (on a flat and straight road)	(1) Accelerate from 1st gear to 4th gear. (2) While driving at 60 km/h (37 mph) in 4th gear, downshift to 3rd gear (3) While driving at 40 km/h (25 mph) in 3rd gear, downshift to 2nd gear (4) While driving at 20 km/h (12 mph) in 2nd gear, downshift to 1st gear	Data list No.63 (1) 1st → 2nd → 3rd → 4th (2) 4th → 3rd (3) 3rd →2nd (4) 2nd →1st	Does not shift from 1 to 2 or 2 to 1	31	Low-reverse solenoid valve system (P.23A-155).
					33	Second solenoid valve system (P.23A-179).
					41	1st gear incorrect ratio (P.23A-215).
					42	2nd gear incorrect ratio (P.23A-215).
				Does not shift from 2 to 3 or 3 to 2	33	Second solenoid valve system (P.23A-179).
					34	Overdrive solenoid valve system (P.23A-191).
					42	2nd gear incorrect ratio (P.23A-215).
					43	3rd gear incorrect ratio (P.23A-215).
				Does not shift from 3 to 4 or 4 to 3	32	Underdrive solenoid valve system (P.23A-168).
					33	Second solenoid valve system (P.23A-179).
					43	3rd gear incorrect ratio (P.23A-215).
					44	4th gear incorrect ratio (P.23A-215).

STEP	CONDITION BEFORE TEST/OPERATION	TEST/OPERATION	STANDARD	INSPECTION ITEM	DTC	INSPECTION PROCEDURE PAGE
9	Transmission range: N (on a flat and straight road)	Monitor data list No.22 and No.23 with the scan tool MB991958 (MUT-III sub assembly) (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 match	22	Input shaft speed sensor system (P.23A-61).
					23	Output shaft speed sensor system (P.23A-80).
					46	Reverse gear incorrect ratio (P.23A-215).



TORQUE CONVERTER STALL TEST

M1231005400384

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

⚠ *WARNING*

Do not let anyone stand in front of or behind the vehicle while this test is performed.

1. Check the transmission fluid level and temperature. Check the engine coolant temperature.
   - Transmission fluid level: At the "HOT" mark on the dipstick
   - Transmission fluid temperature: 70 – 80°C (158 – 176°F)
   - Engine coolant temperature: 80 – 100°C (176 – 212°F)

   NOTE: Measures transmission fluid temperature with scan tool MB991958 (MUT-III sub assembly).
2. Chock both rear wheels.
3. Connect a tachometer.
4. Apply the parking and service brakes fully.
5. Start the engine.

⚠ CAUTION

- **The throttle should not be fully open for any more than five seconds.**
- **If you repeat the stall test when the transmission fluid temperature is greater than 80°C (176°F), move the selector lever to the "N" position and let the engine run at approximately 1,000 r/min for at least one minute. Wait until the transmission fluid temperature returns to 80°C (176°F) or less.**

6. Move the selector lever to the "D" position. Fully depress the accelerator pedal and read the maximum engine speed.

   Standard value: Stall speed: 2,100 – 2,600 r/min
7. Move the selector lever to the "R" position. Fully depress the accelerator pedal and read the maximum engine speed.

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

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TORQUE CONVERTER STALL TEST JUDGMENT RESULTS

1. Stall speed is too high in both "D" and "R" range
   - Malfunction of the torque converter (Slippage on the splines of the torque converter and the input shaft)
   - Low line pressure
   - Low-reverse brake slippage and malfunction of the 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 is too low in both "D" and "R" ranges
   - Malfunction of the torque converter (Slippage of the one-way clutch)
   - Insufficient engine output

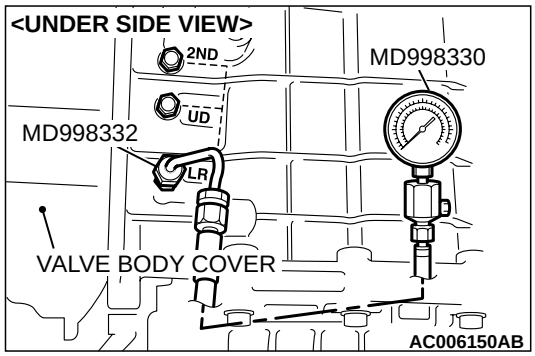
HYDRAULIC PRESSURE TESTS

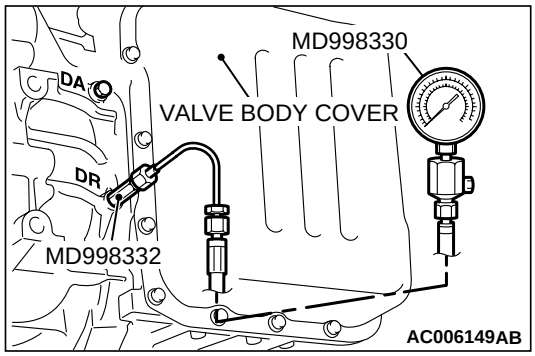
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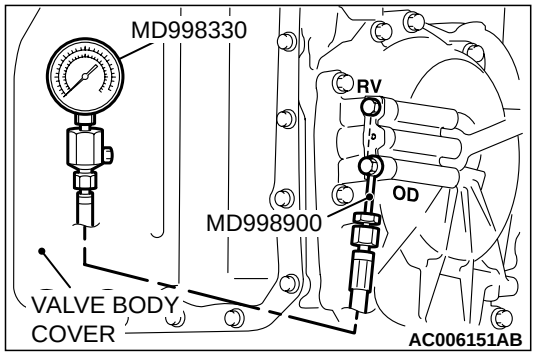
⚠ CAUTION

The transmission fluid temperature should be between 70 – 80°C (158 – 176°F) during the test.

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







3. Connect the special tools (3.0 MPa (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*
   - *DR: Torque converter release pressure port*
   - *DA: Torque converter apply pressure port*
   - *RV: Reverse clutch pressure port*
   - *OD: Overdrive clutch pressure port*
4. Restart the engine.
5. Check that there are no leaks around the special tool port adapters.
6. 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.
7. If the pressure is not within the standard value, stop the engine and refer to the hydraulic pressure test diagnosis table.
8. Remove the O-ring from the port plug and replace it.
9. Remove the special tool, and install the plugs to the hydraulic pressure ports.
10. Start the engine and check that there are no leaks around the plugs.

STANDARD HYDRAULIC PRESSURE TABLE

MEASUREMENT CONDITION			STANDARD HYDRAULIC PRESSURE MPa (psi)					
TRANS MISSION RANGE	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	–	–	–	0.31 – 0.39 (45 – 57)	–	0.25 – 0.39 (37 – 57)
R	Reverse	2,500	–	1.27 – 1.77 (185 – 256)	–	1.27 – 1.77 (185 – 256)	–	0.50 – 0.70 (73 – 101)
N	–	2,500	–	–	–	0.31 – 0.39 (45 – 57)	–	0.25 – 0.39 (37 – 57)
L	1st gear	2,500	1.01 – 1.05 (147 – 152)	–	–	1.01 – 1.05 (147 – 152)	–	0.50 – 0.70 (73 – 101)
2	2nd gear	2,500	1.01 – 1.05 (147 – 152)	–	–	–	1.01 – 1.05 (147 – 152)	0.50 – 0.70 (73 – 101)
3	3rd gear	2,500	0.59 – 0.69 (86 – 100)	–	0.59 – 0.69 (86 – 100)	–	–	–
D	4th gear	2,500	–	–	0.59 – 0.69 (86 – 100)	–	0.59 – 0.69 (86 – 100)	–

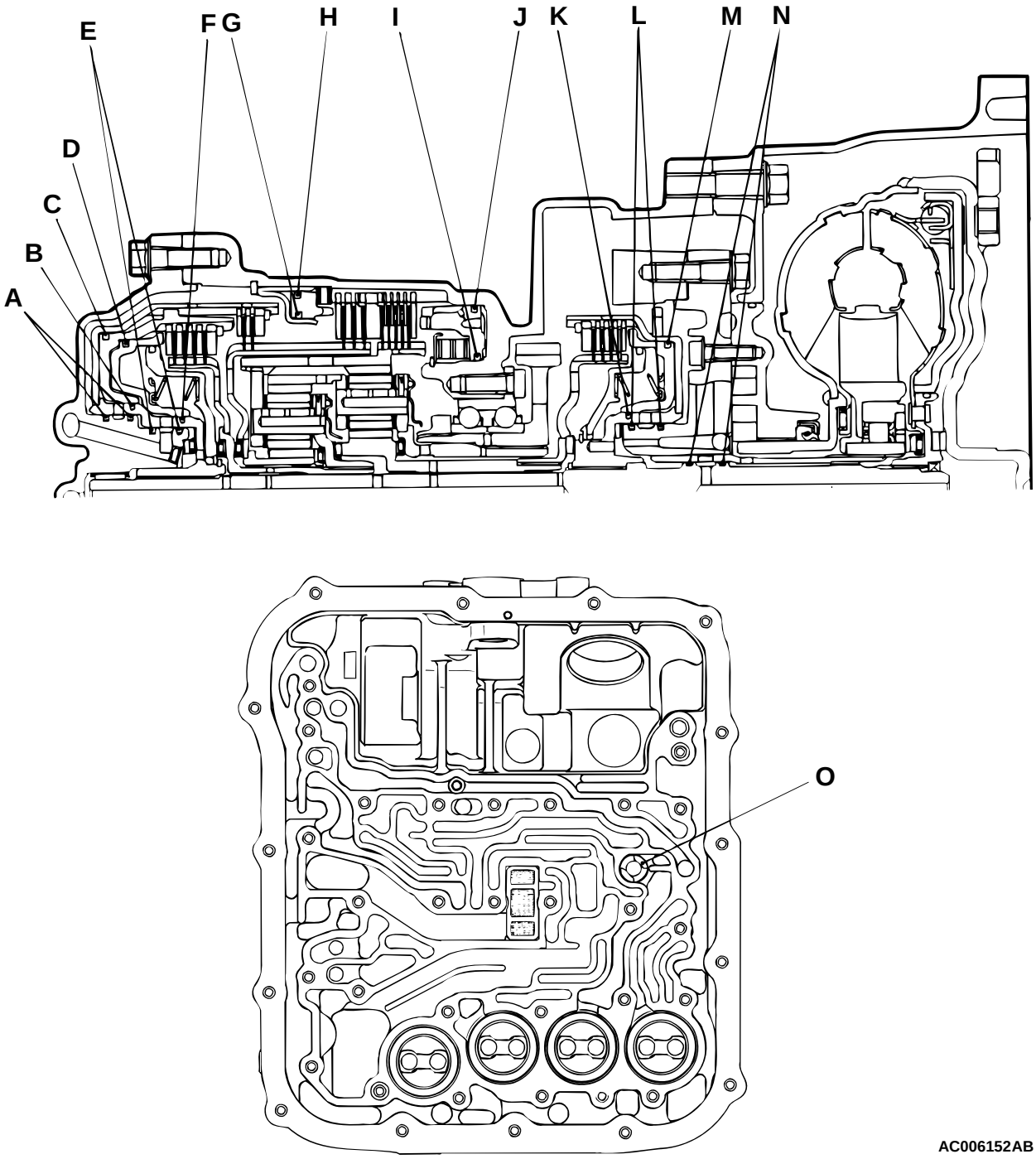
NOTE: When the torque converter pressure is measured, the engine speed should be 1,500 r/min or less.

HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

SYMPTOM	PROBABLE CAUSE
All hydraulic pressures are high.	Malfunction of the regulator valve
All hydraulic pressures are low.	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
	Improperly installed solenoid valves
	Damaged solenoid valve O-rings
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
Only underdrive clutch 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 the check ball
	Clogged orifice
	Incorrect valve body installation
	Malfunction of the accumulator for underdrive clutch
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

SYMPTOM	PROBABLE CAUSE
Only overdrive clutch 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 the check ball
	Clogged orifice
	Incorrect valve body installation
	Malfunction of the accumulator for overdrive clutch
Only low-reverse brake 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 all the check balls
	Clogged orifice
	Incorrect valve body installation
	Malfunction of the accumulator for low-reverse brake
Only second brake 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
	Malfunction of the accumulator for second brake
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
	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 the check ball
	Incorrect valve body installation

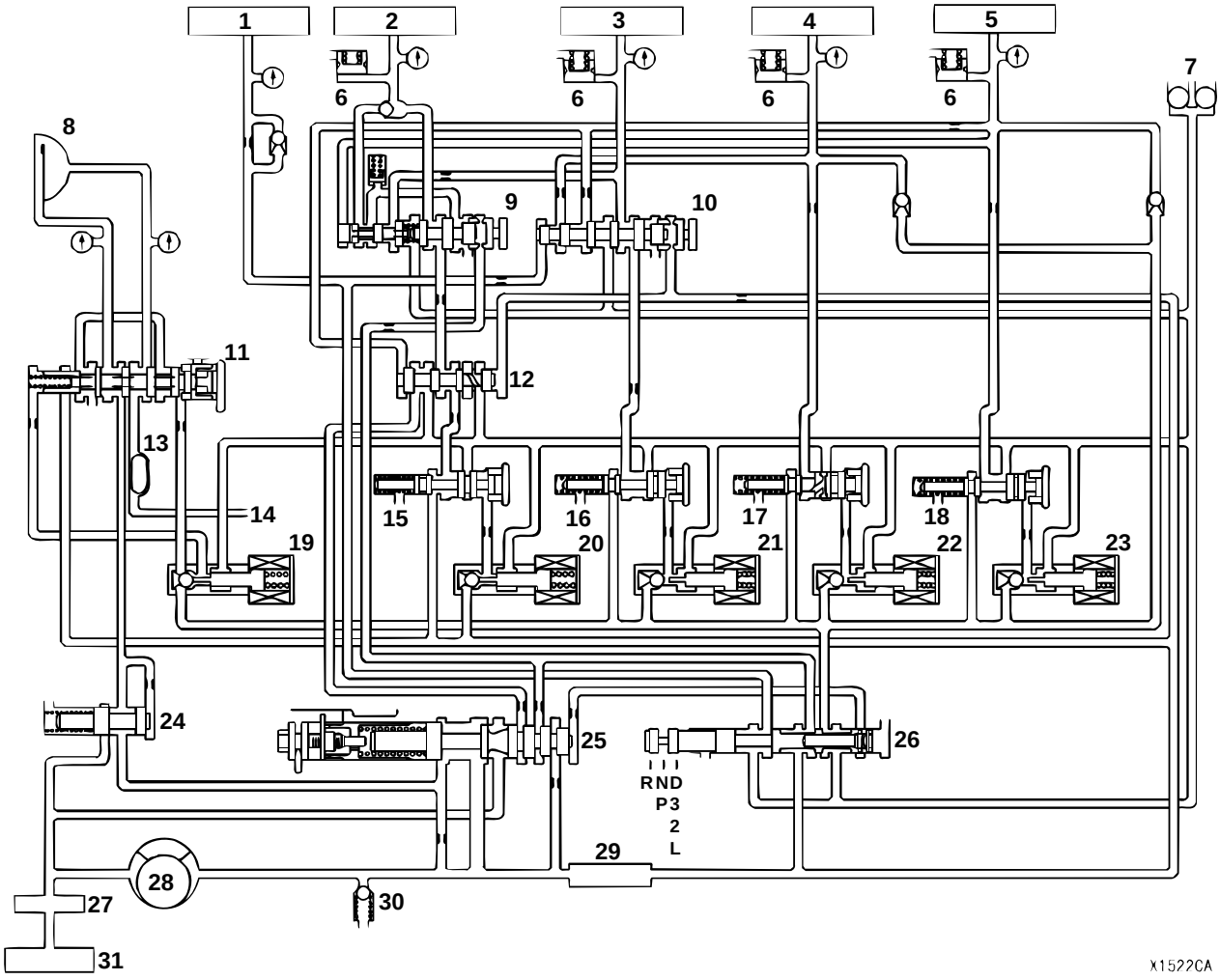
OIL SEAL LAYOUT



HYDRAULIC CIRCUIT

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PARKING AND NEUTRAL



: LINE PRESSURE

: OIL PUMP SUCTION PRESSURE

: TORQUE CONVERTER CLUTCH PRESSURE

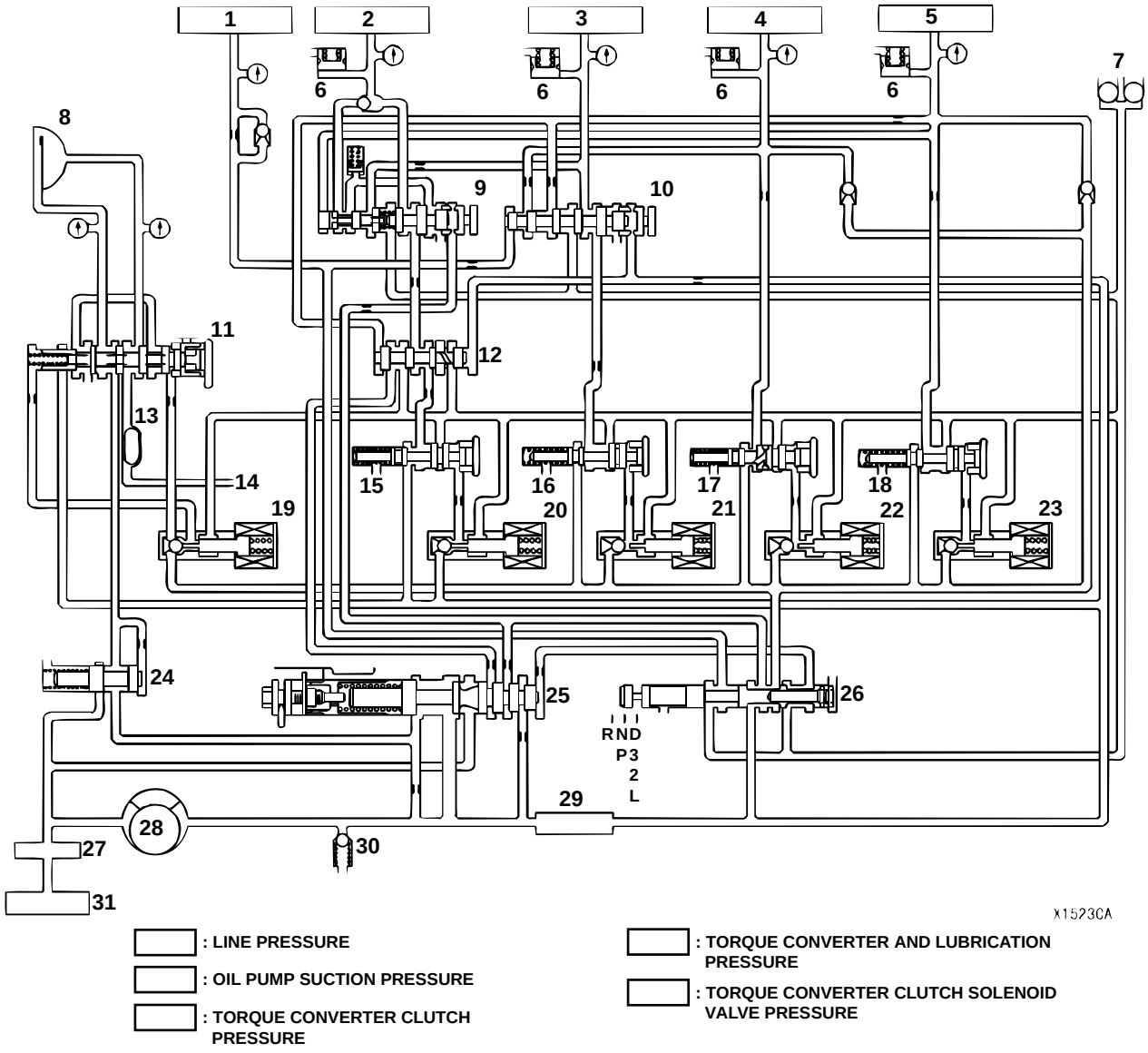
: TORQUE CONVERTER AND LUBRICATION PRESSURE

: 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. TRANSMISSION 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

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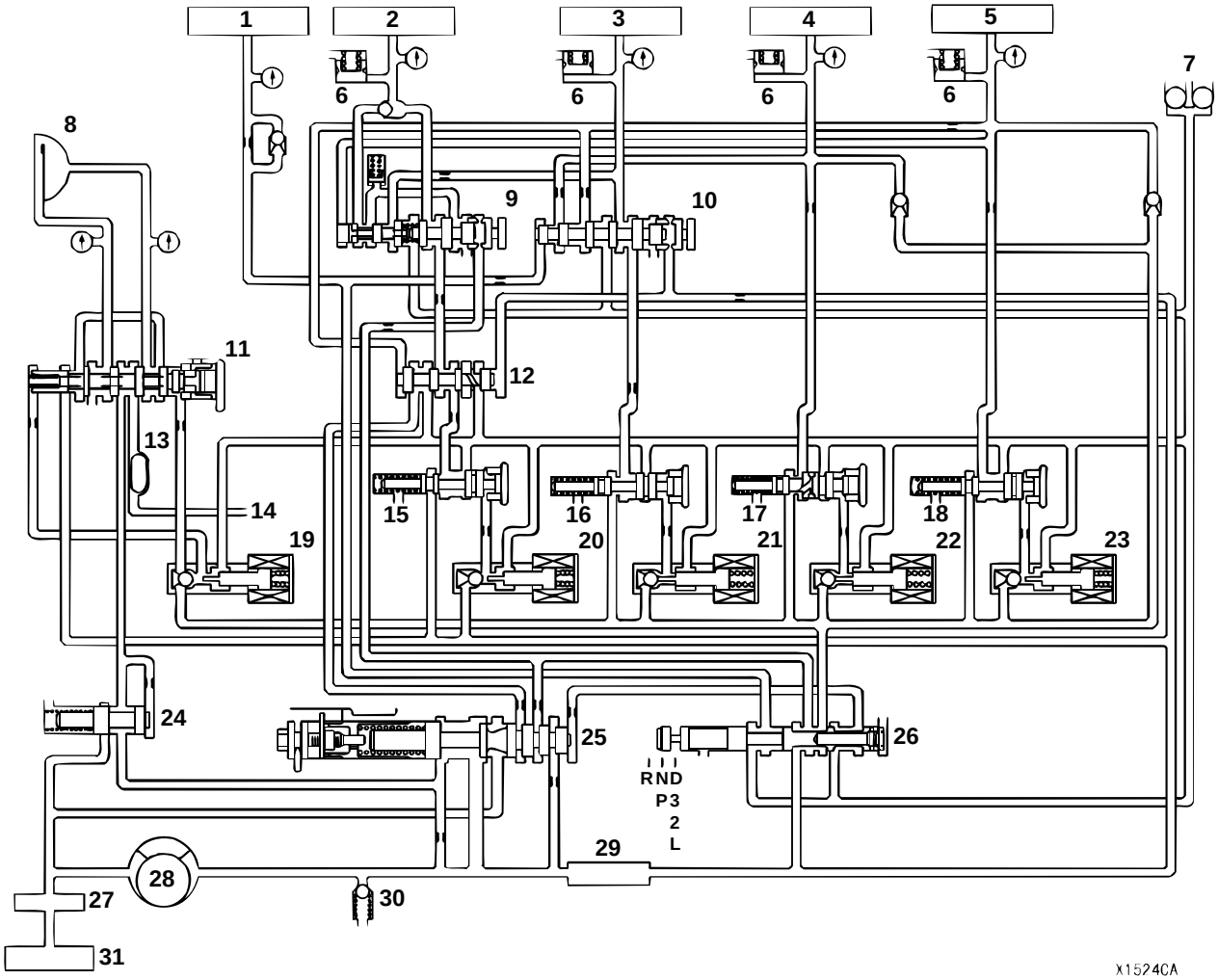
1ST GEAR



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

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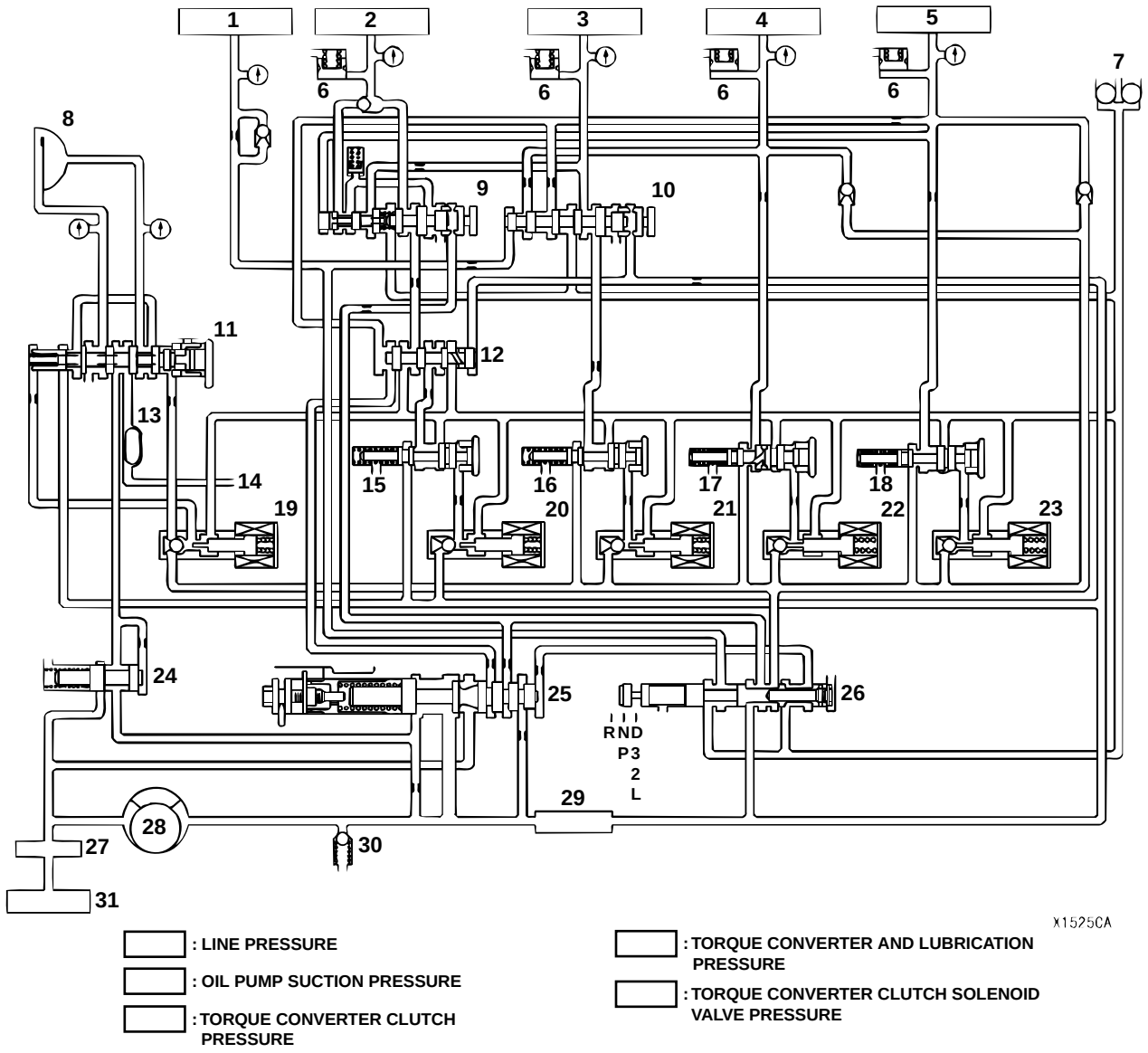
2ND GEAR



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

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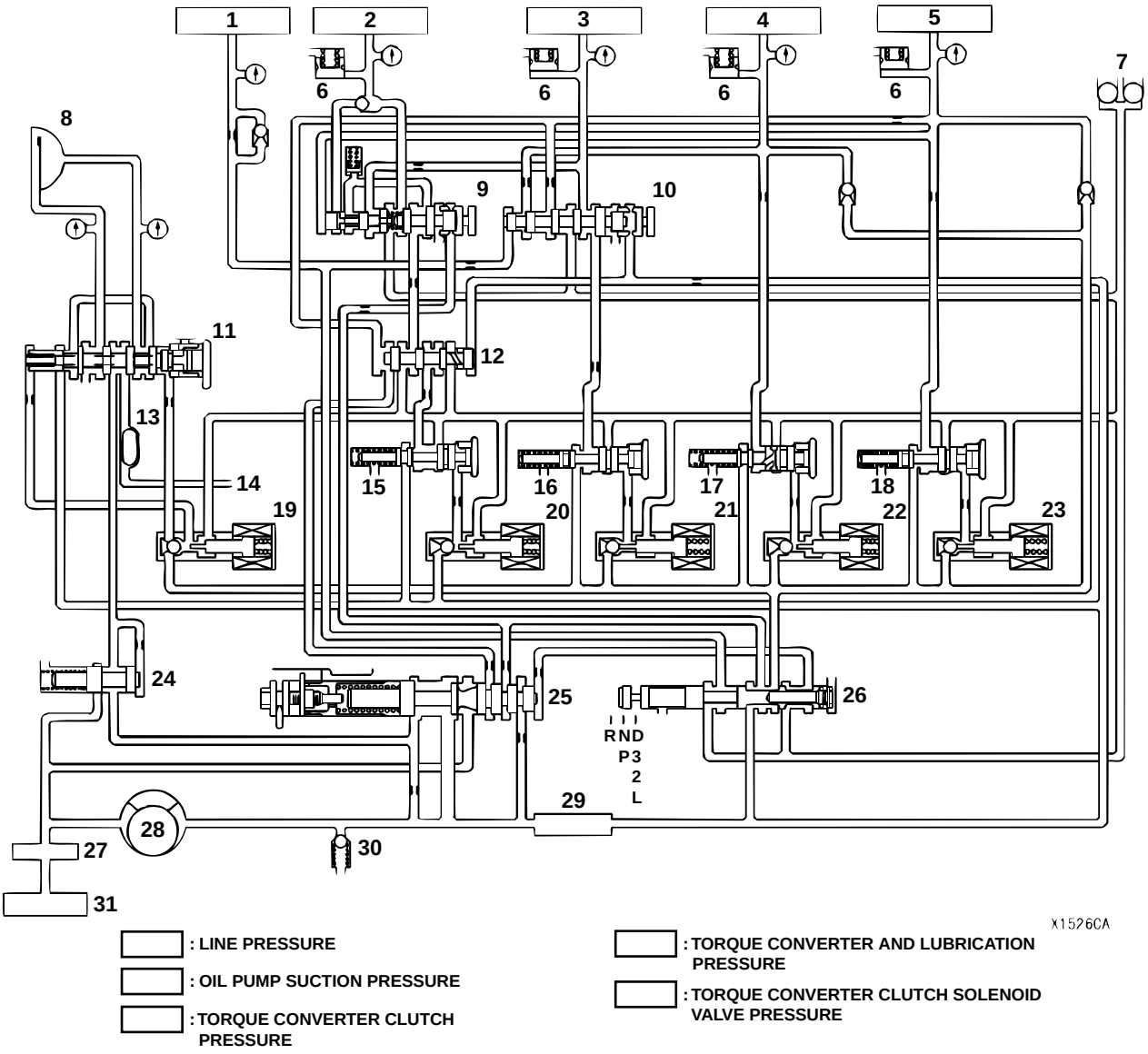
3RD GEAR



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

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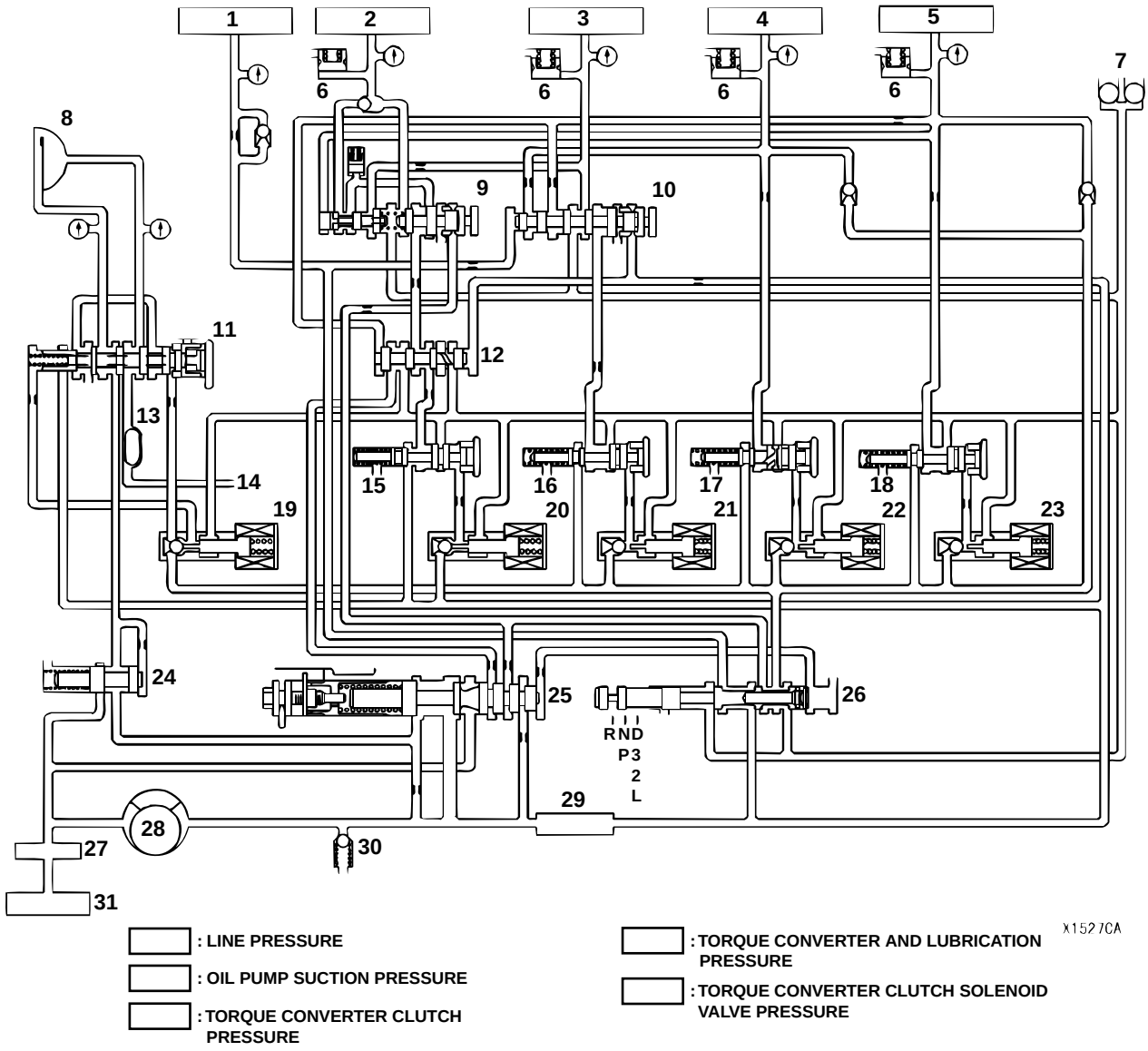
4TH GEAR



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

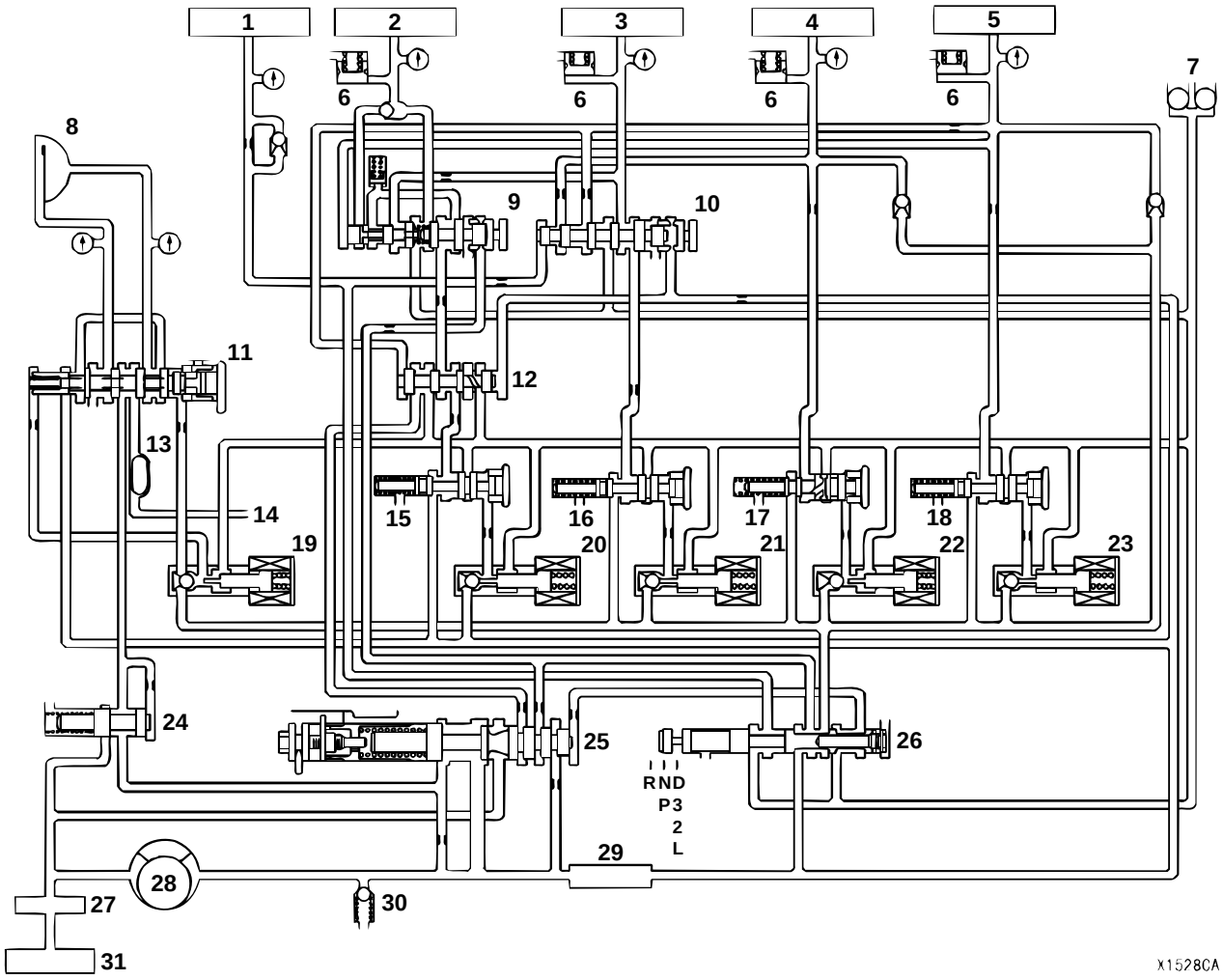
REVERSE



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
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

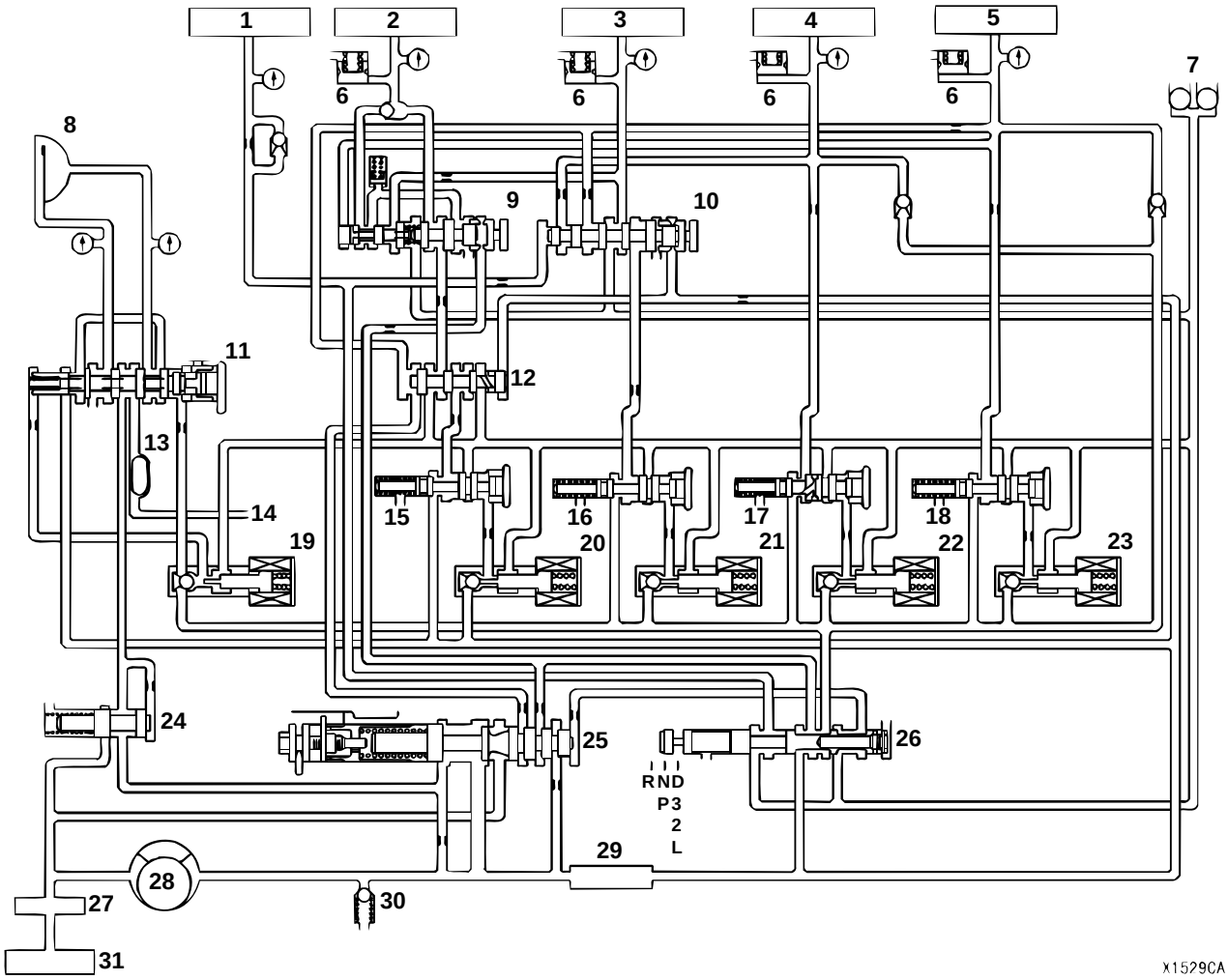
FAIL-SAFE (IN CASE OF FAIL-SAFE VALVE A OPERATION)



1. REVERSE CLUTCH
2. LOW-REVERSE BRAKE
3. SECOND BRAKE
4. UNDERDRIVE CLUTCH
5. OVERDRIVE CLUTCH
6. ACCUMULATOR
7. CHECK BALL
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

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



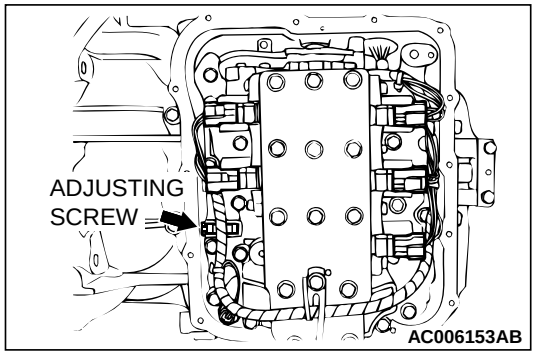
: LINE PRESSURE
: OIL PUMP SUCTION PRESSURE
: TORQUE CONVERTER CLUTCH PRESSURE
: TORQUE CONVERTER AND LUBRICATION PRESSURE
: TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE

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

LINE PRESSURE ADJUSTMENT

M1231001700383



1. Drain the transmission fluid.
   NOTE: The hydraulic pressure test must be performed 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 counterclockwise.
   NOTE: When adjusting the line pressure, adjust to the middle of the standard value range.
   Standard value: 1.01 – 1.05 MPa (147 – 152 psi)
4. Install the valve body cover. Pour in one quart transmission fluid.
5. Repeat the hydraulic pressure test. (Refer to P.23A-23). Readjust the line pressure if necessary.

DIAGNOSTIC TROUBLE CODE CHART

M1231007900363

A/T DTC NO.	MFI DTC NO.	DIAGNOSIS ITEM		REFERENCE PAGE
11	–	Throttle position sensor (TPS) system	Short circuit	Group 13A, Diagnostic Trouble code Procedures P.13A-156, P.13A-169, P.13A-179 (P0121, P0122, P0123 – Throttle Position Sensor Circuit)
12			Open circuit	
14			Sensor maladjustment	
15	P0713	Transmission fluid temperature sensor system	Open circuit	P.23A-40
16	P0712		Short circuit	P.23A-53
21	–	Crankshaft position sensor system	Open circuit	Group 13A, Diagnostic Trouble code Procedures P.13A-371 (P0335 – Crankshaft Position Sensor Circuit)
22	P0715	Input shaft speed sensor system	Short circuit/open circuit	P.23A-61
23	P0720	Output shaft speed sensor system	Short circuit/open circuit	P.23A-80
26	–	Stoplight switch system	Short circuit	P.23A-100
27	P0705	Transmission range switch system	Open circuit	P.23A-109
28			Short circuit	P.23A-136

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A/T DTC NO.	MFI DTC NO.	DIAGNOSIS ITEM		REFERENCE PAGE
31	P0753	Low-reverse solenoid valve system	Short circuit/open circuit	P.23A-155
32	P0758	Underdrive solenoid valve system	Short circuit/open circuit	P.23A-168
33	P0763	Second solenoid valve system	Short circuit/open circuit	P.23A-179
34	P0768	Overdrive solenoid valve system	Short circuit/open circuit	P.23A-191
36	P0743	Torque converter clutch solenoid valve system	Short circuit/open circuit	P.23A-203
41	P0731	1st gear incorrect ratio		P.23A-215
42	P0732	2nd gear incorrect ratio		P.23A-215
43	P0733	3rd gear incorrect ratio		P.23A-215
44	P0734	4th gear incorrect ratio		P.23A-215
46	P0736	Reverse gear incorrect ratio		P.23A-215
52	P0741	Torque converter clutch system	Defective system	P.23A-228
53	P0742		Clutch stuck on	P.23A-234
54	P1751	A/T control relay system	Short circuit to ground/open circuit	P.23A-238

NOTE: The MFI diagnostic trouble codes are the codes which are set when item "MFI" is selected on scan tool MB991958 (MUT-III sub assembly). However, the codes above indicate failure in the automatic transmission.

SYMPTOM CHART

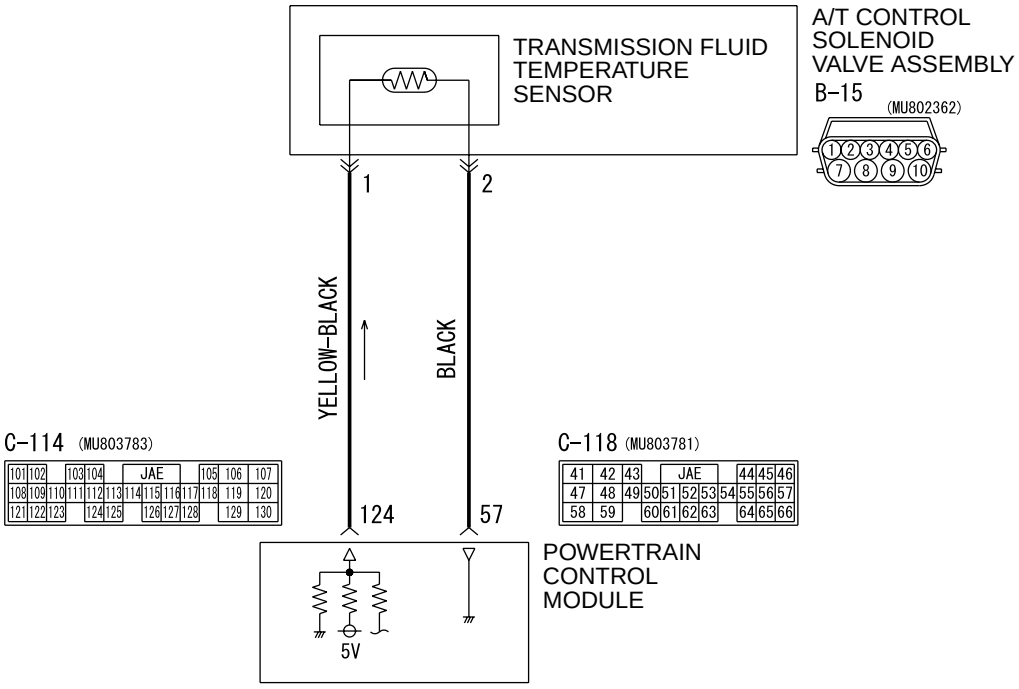
M1231008000299

SYMPTOM		INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication with scan tool is not possible	Communication with all systems is impossible	-	Group 13A, Symptom Procedures P.13A-714
	Communication with the PCM only is impossible	-	Group 13A, Symptom Procedures P.13A-717
Driving impossible	Engine does not start	1	P.23A-252
	Does not move forward	2	P.23A-254
	Does not move backward	3	P.23A-257
	Does not move (forward and backward)	4	P.23A-259
Malfunction when moving selector into gear	Engine stalls when moving selector lever from "N" to "D" or "N" to "R"	5	P.23A-261
	Shift shock when shifting from "N" to "D" and long delay	6	P.23A-262
	Shift shock when shifting from "N" to "R" and long delay	7	P.23A-266
	Shift shock when shifting from "N" to "D" and "N" to "R" and long delay	8	P.23A-270
Malfunction when shifting	Shift shock and slipping	9	P.23A-272
Does not shift properly	Early or late shifting in all gears	10	P.23A-275
	Early or late shifting in some gears	11	P.23A-279
Does not shift	No diagnostic trouble codes	12	P.23A-281
Malfunction while driving	Poor acceleration	13	P.23A-285
	Vibration	14	P.23A-287
Vehicle shifts differently with A/C engaged		15	P.23A-289
Transaxle won't downshift under load with auto-cruise engaged		16	P.23A-300
Vehicle speed signal system		17	P.23A-307

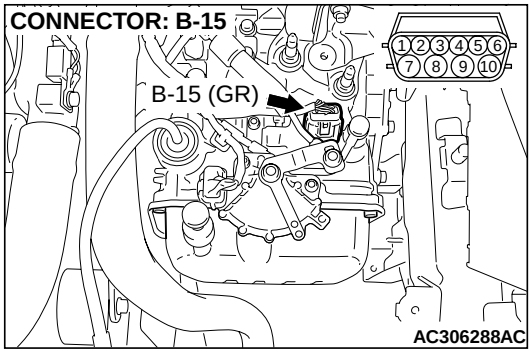
DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC 15 (P0713): Transmission Fluid Temperature Sensor System (Open Circuit)

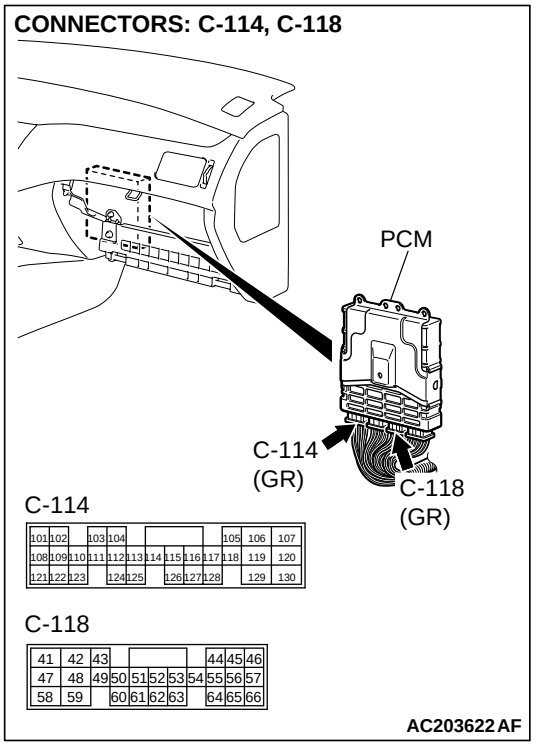
Transmission Fluid Temperature Sensor System Circuit



AC307925AC



AC306288AC



AC203622AF

TSB Revision

CIRCUIT OPERATION

- The PCM (terminal 124) applies 5 volts to the transmission fluid temperature sensor output terminal (terminal 1).
- The transmission fluid temperature sensor circuit is grounded to the PCM (terminal 57).
- When the transmission fluid temperature is cold, the transmission fluid temperature sensor resistance is high. When the transmission fluid temperature is hot, the transmission fluid temperature sensor resistance is low.

DESCRIPTIONS OF MONITOR METHODS

- If transmission fluid temperature is below specified value even after driving test for more than specified period, PCM judges that transmission fluid temperature sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

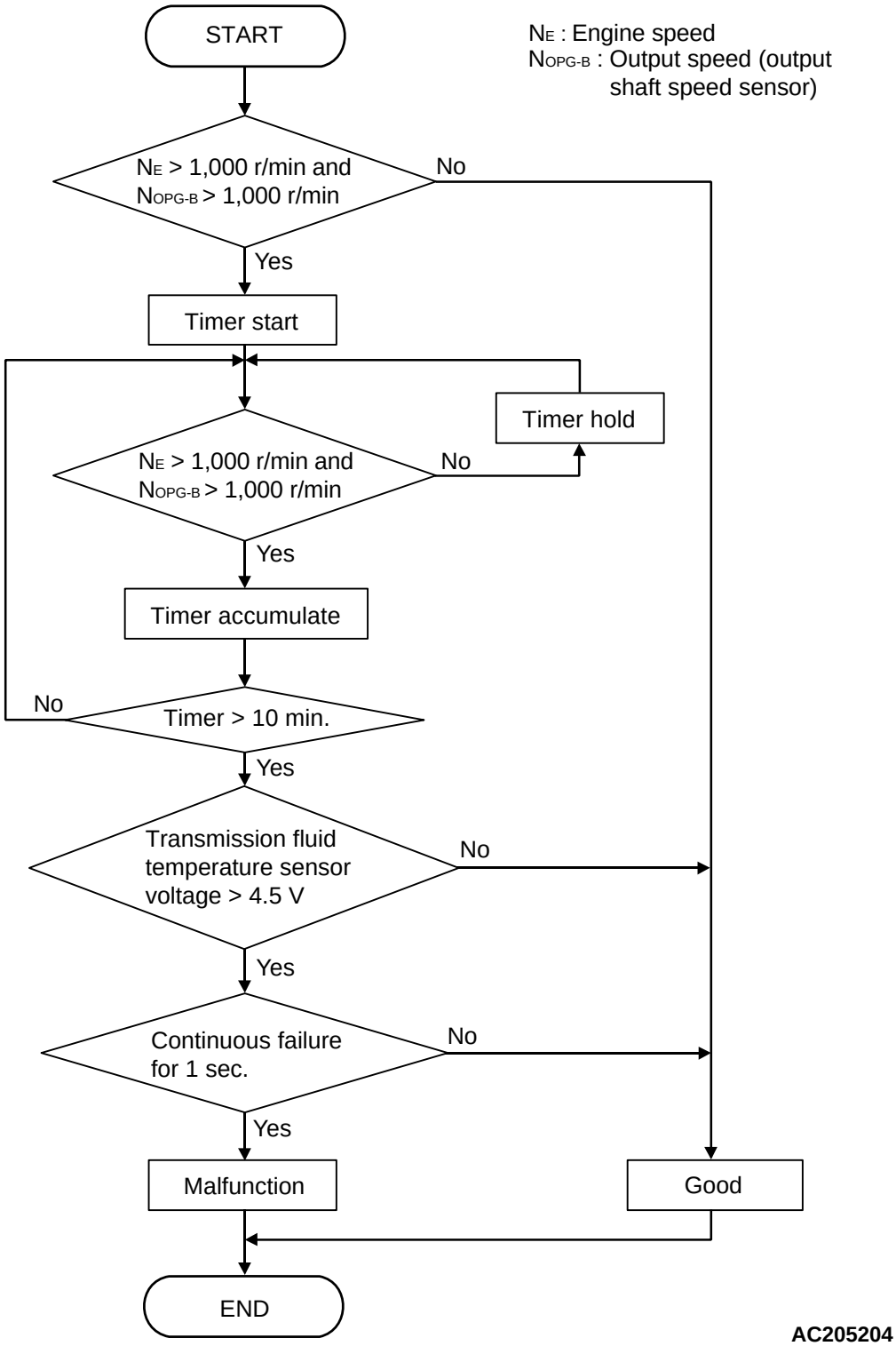
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 23 (P0720): Output shaft speed sensor malfunction

Sensor (The sensor below is determined to be normal)

- Output shaft speed sensor

LOGIC FLOW CHARTS (Monitor Sequence)



AC205204

DTC SET CONDITIONS

Check Conditions

- Engine speed: 1,000 r/min or more.
- Output speed: 1,000 r/min or more.
- Accumulated time in above condition: 10 minutes.

Judgement Criteria

- Transmission fluid temperature sensor voltage: 4.5 volts or more. (1 second)

TSB Revision

OBD-II DRIVE CYCLE PATTERN

Start the engine, drive at 60 km/h (37 mph) or more for 15 minutes in total.

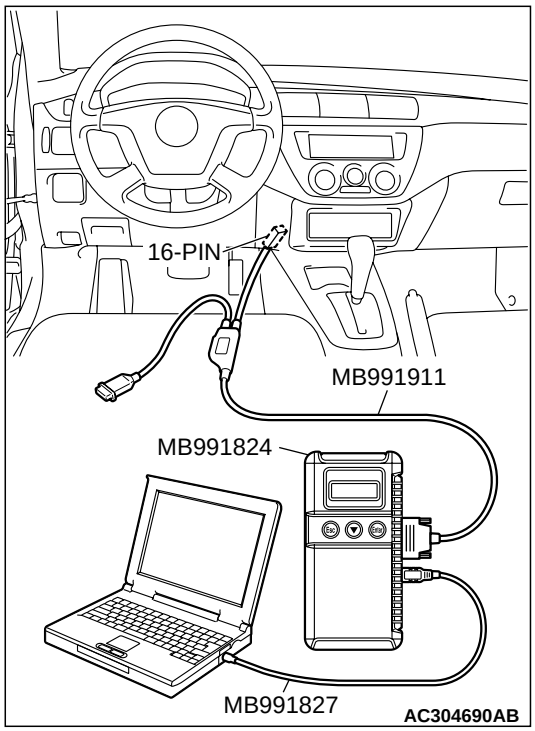
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 15: Transmission Fluid Temperature Sensor.
  - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature).

    NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.
  - When the engine is warm: 70 to 80°C (158 to 176°F).

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

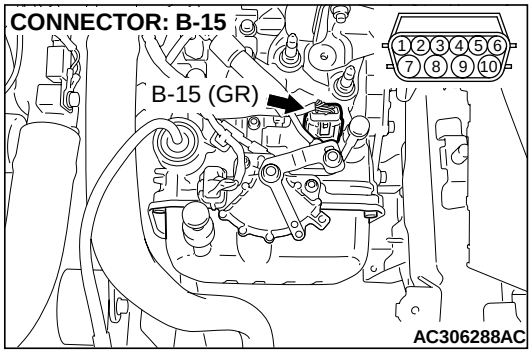
Q: Is the sensor operating properly?

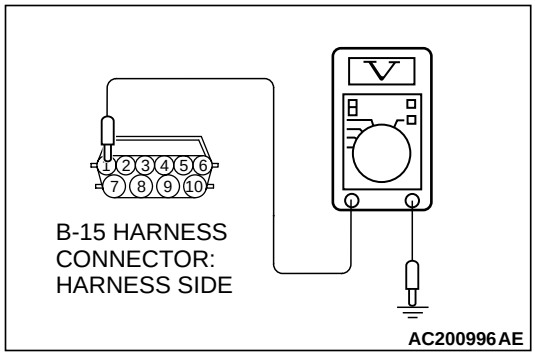
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector B-15 by backprobing.

(1) Do not disconnect connector B-15.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the voltage between terminal 1 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

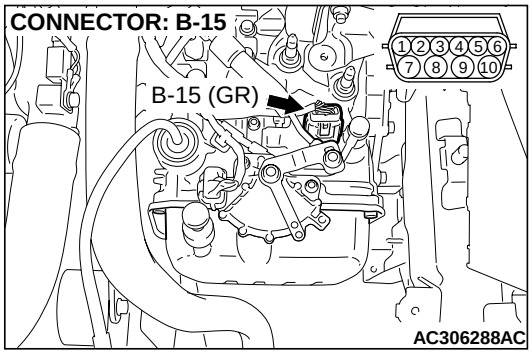
(4) Turn the ignition switch to the "LOCK" (OFF) position.

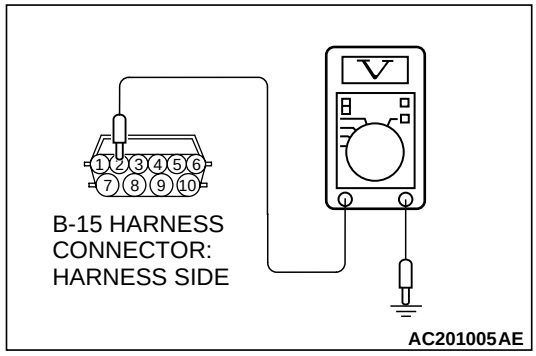
Q: Is the measured voltage within the specified range?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Measure the ground voltage at the A/T control solenoid valve assembly connector B-15 by backprobing.

(1) Do not disconnect connector B-15.
(2) Turn the ignition switch to the "ON" position.



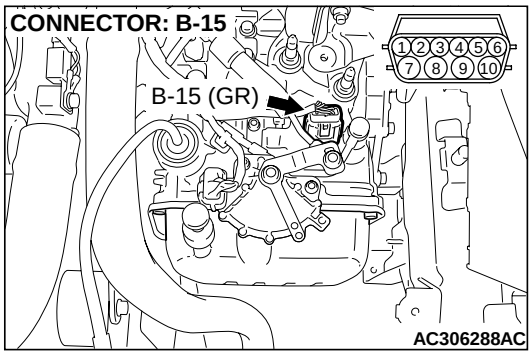


(3) Measure the voltage between terminal 2 and ground by backprobing.
- The voltage should measure 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

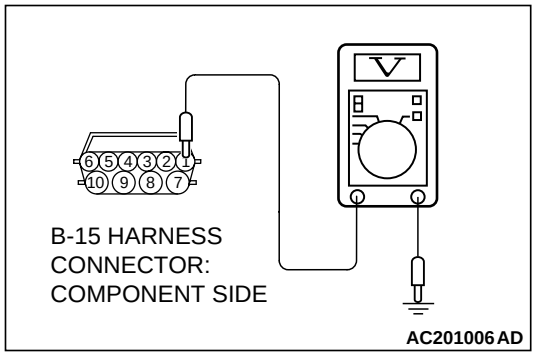
YES : Go to Step 4.
NO : Go to Step 7.



STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the harness side.

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



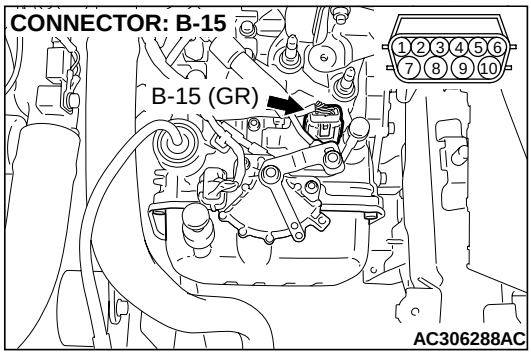
(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

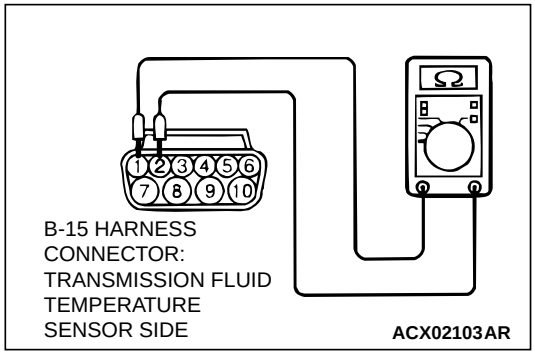
YES : Go to Step 5.

NO : Go to Step 9.



STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the sensor side.

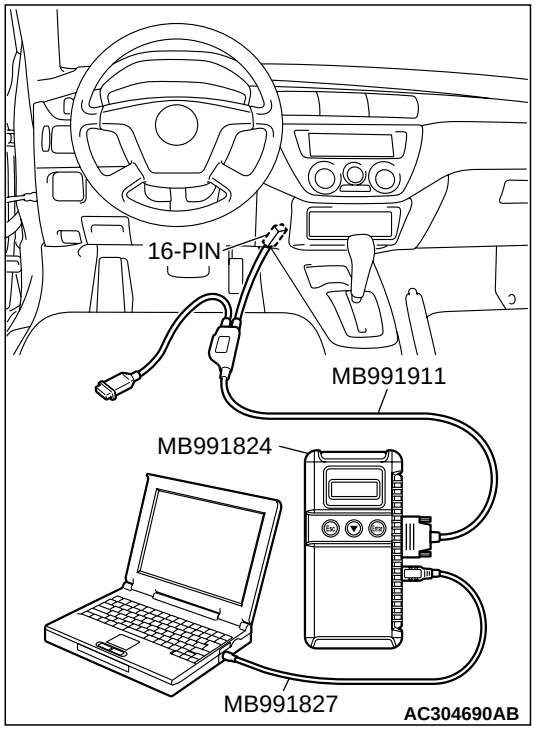


(2) Measure the resistance between terminal 1 and 2.
- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
- When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
- When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
- When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
- When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
- When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor. Refer to GROUP 23C, Transaxle P.23C-9.



STEP 6. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 15: Transmission Fluid Temperature Sensor.
  - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature).

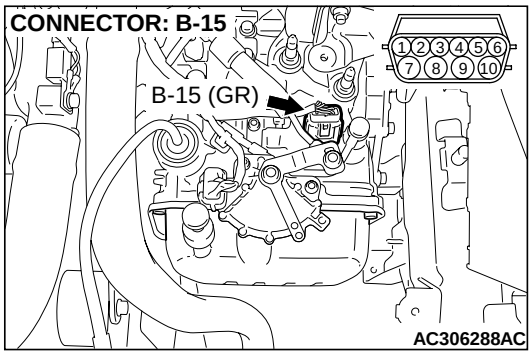
    NOTE: Set scan tool MB991958 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.
  - When the engine is warm: 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 : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

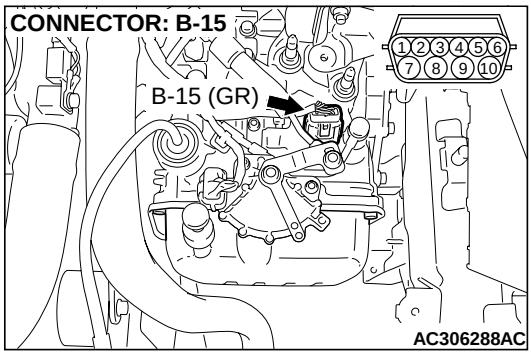


STEP 7. Check A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

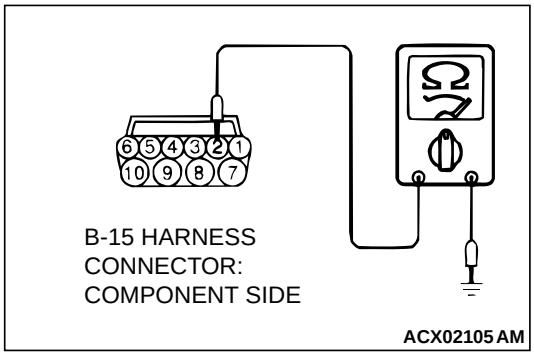
YES : Go to Step 8.

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



STEP 8. Measure the resistance of the ground circuit at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the harness side.



(2) Measure the resistance between terminal 2 and ground.
- The resistance should measure less than 2 ohms.

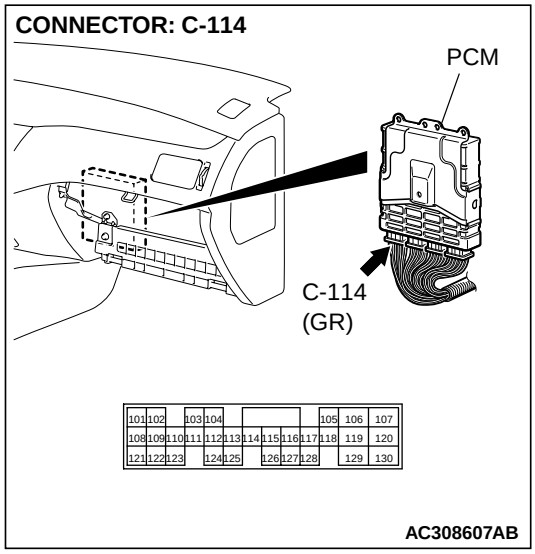
Q: Is the resistance less than 2 ohms?

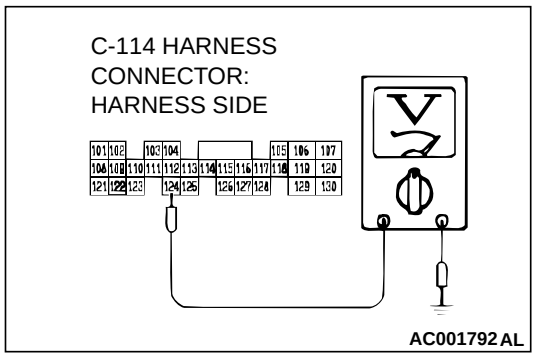
YES : Go to Step 5.
NO : Go to Step 12.

STEP 9. Measure the sensor output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.

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





(3) Measure the voltage between terminal 124 and ground.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 4.0 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 6.

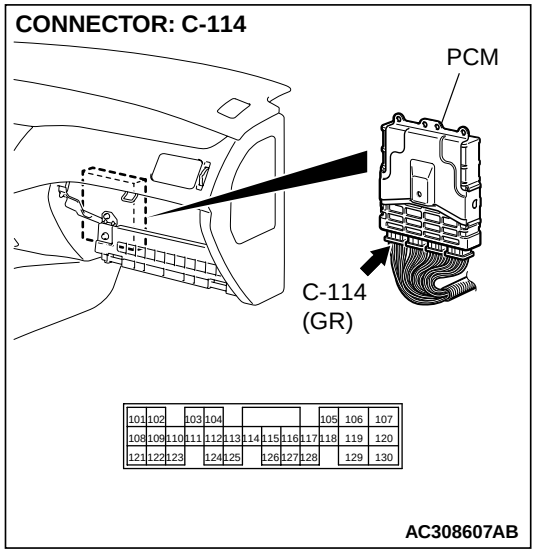
NO : Go to Step 10.

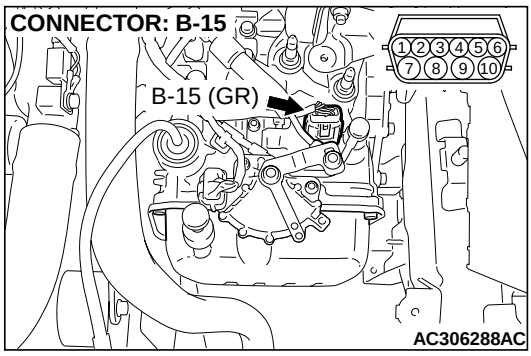
STEP 10. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

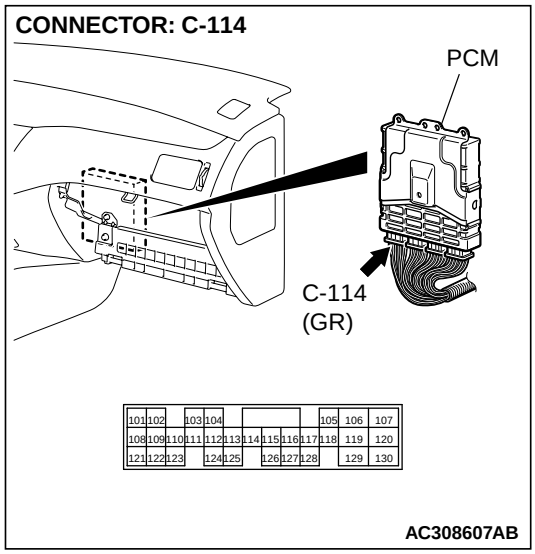
Q: Are the connector and terminals in good condition?

YES : Go to Step 11.

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







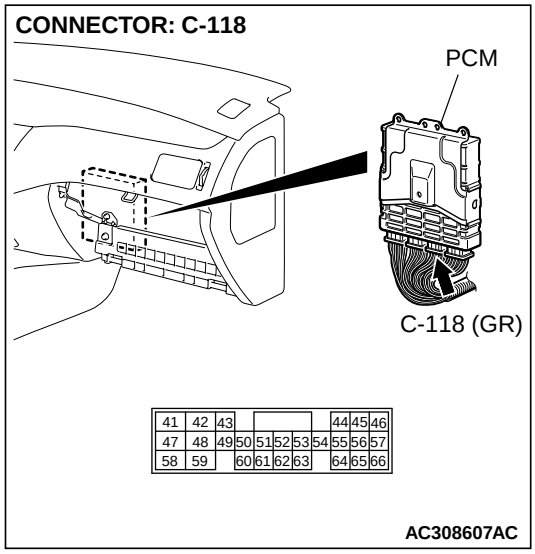
STEP 11. Check the harness for open circuit or short circuit to ground between A/T control solenoid valve connector B-15 terminal 1 and PCM connector C-114 terminal 124.

Q: Is the harness wire in good condition?

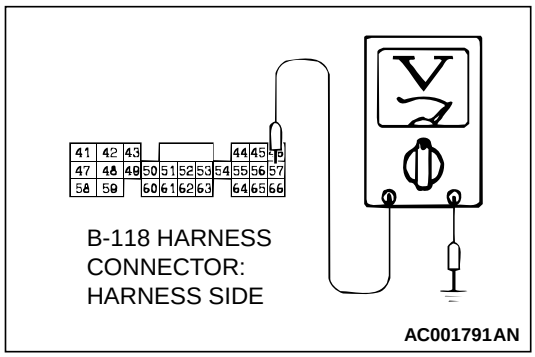
YES : Go to Step 6.

NO : Repair or replace the harness wire.

STEP 12. Measure the ground voltage at PCM connector C-118 by backprobing.



(1) Do not disconnect connector C-118.
(2) Turn the ignition switch to the "ON" position.

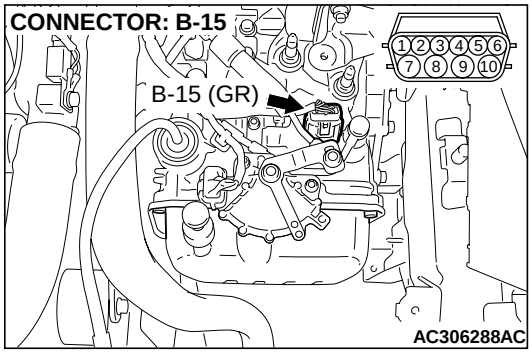


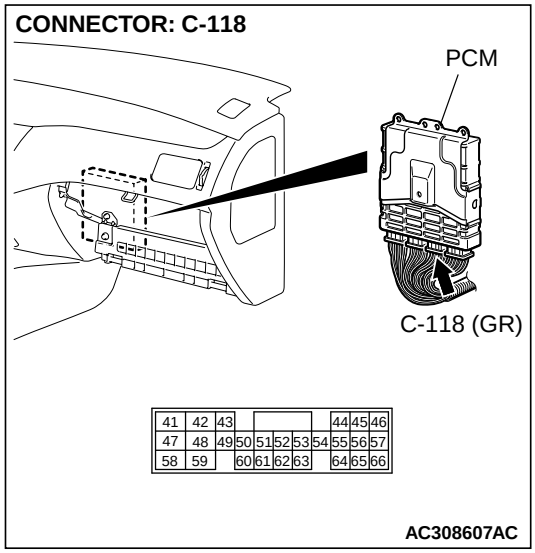
(3) Measure the voltage between terminal 57 and ground.
- Voltage should measure 0.5 volt or less.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 13.
NO : Go to Step 14.



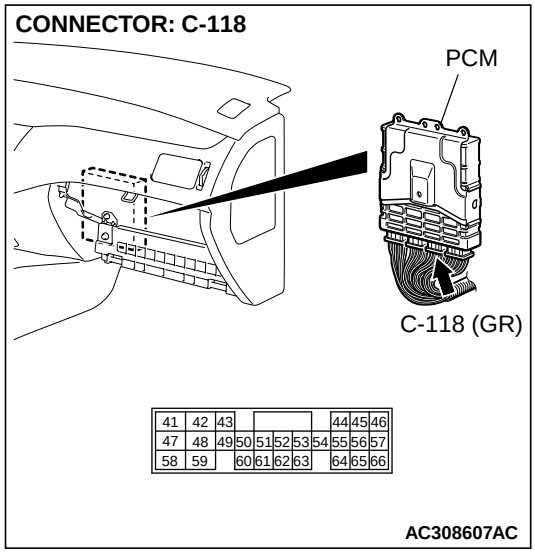


STEP 13. Check the harness for open circuit or damage between A/T control solenoid valve connector B-15 terminal 2 and PCM connector C-118 terminal 57.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair or replace the harness wire.



STEP 14. Check PCM connector C-118 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

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

DTC 16 (P0712): Transmission Fluid Temperature Sensor System (Short Circuit)

Transmission Fluid Temperature Sensor System Circuit

Refer to P.23A-40.

CIRCUIT OPERATION

Refer to P.23A-40.

DESCRIPTIONS OF MONITOR METHODS

- If transmission fluid temperature equals or exceeds specified value, PCM judges that transmission fluid temperature sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

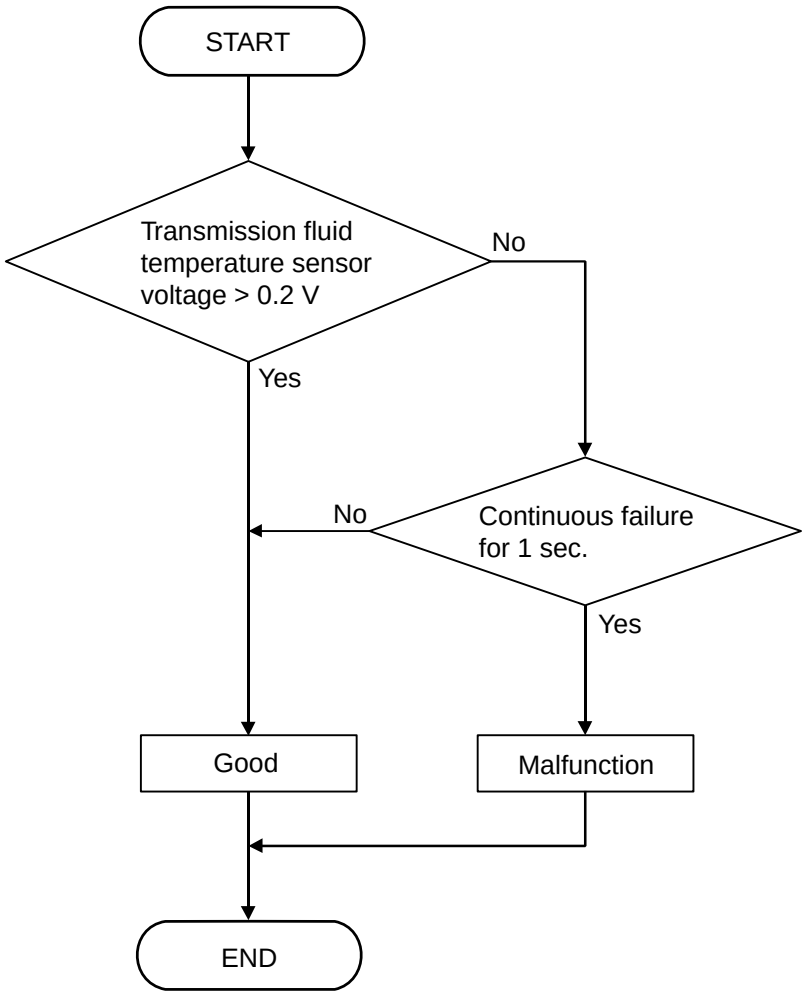
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

LOGIC FLOW CHARTS (Monitor Sequence)



AC205182

DTC SET CONDITIONS

Check Conditions, Judgement Criteria

- Transmission fluid temperature sensor voltage: 0.2 volt or less. (1 second)

OBD-II DRIVE CYCLE PATTERN

Start the engine, keep the vehicle stopped in "P" range for 5 seconds.

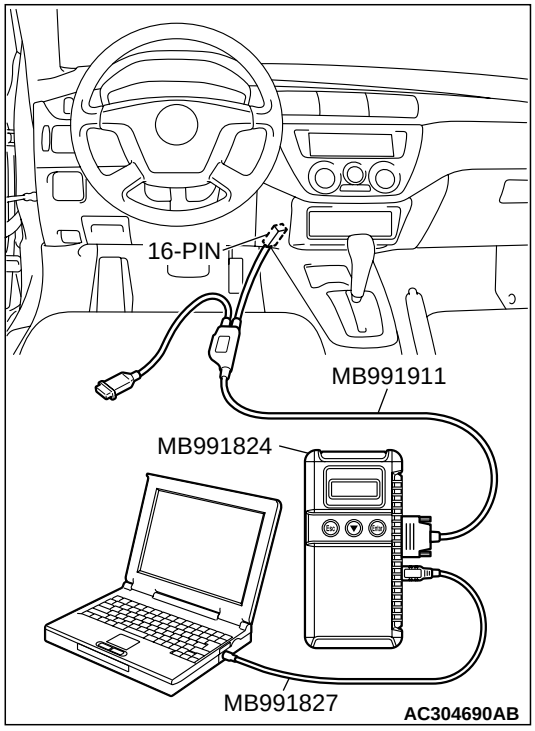
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 15: Transmission Fluid Temperature Sensor.
  - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature).

    NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.
  - When the engine is warm: 70 to 80°C (158 to 176°F).

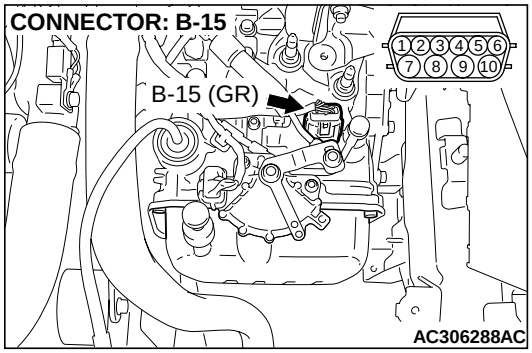
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

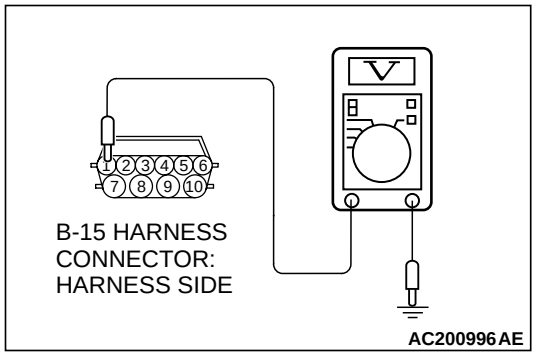
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector B-15 by backprobing.



(1) Do not disconnect connector B-15.
(2) Turn the ignition switch to the "ON" position.



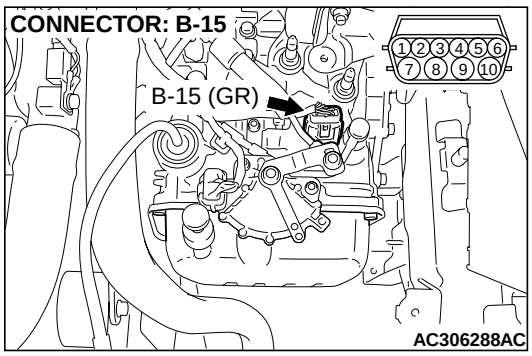
(3) Measure the voltage between terminal 1 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

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

Q: Is the measured voltage within the specified range?

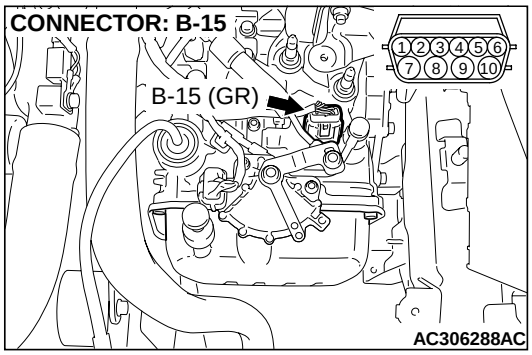
YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Check A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

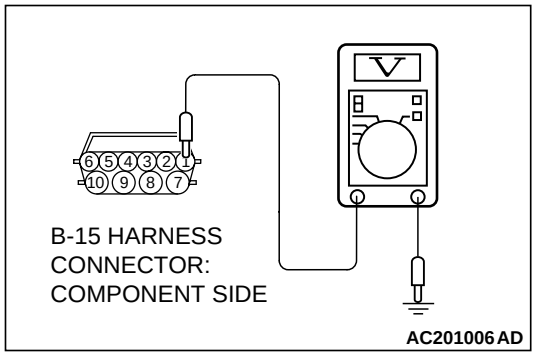
YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the harness side.

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



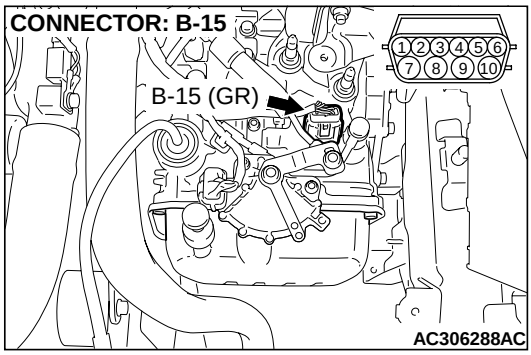
(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

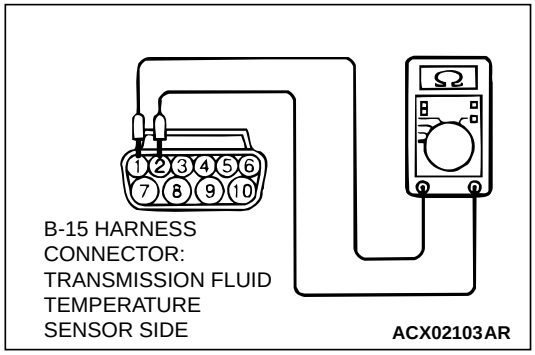
YES : Go to Step 5.

NO : Go to Step 7.



STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the sensor side.

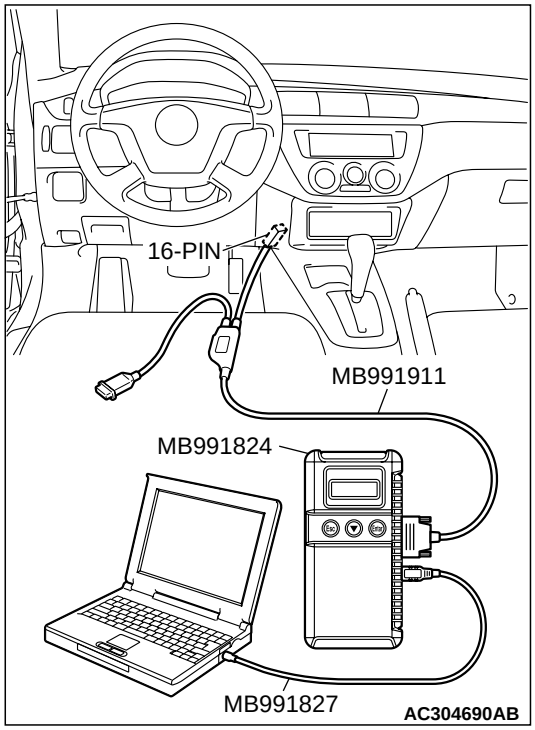


(2) Measure the resistance between terminal 1 and 2.
- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
- When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
- When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
- When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
- When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
- When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor. Refer to GROUP 23C, Transaxle P.23C-9.



STEP 6. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 15: Transmission Fluid Temperature Sensor.
  - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature).

    NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.
  - When the engine is warm: 70 to 80°C (158 to 176°F).

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

Q: Is the sensor operating properly?

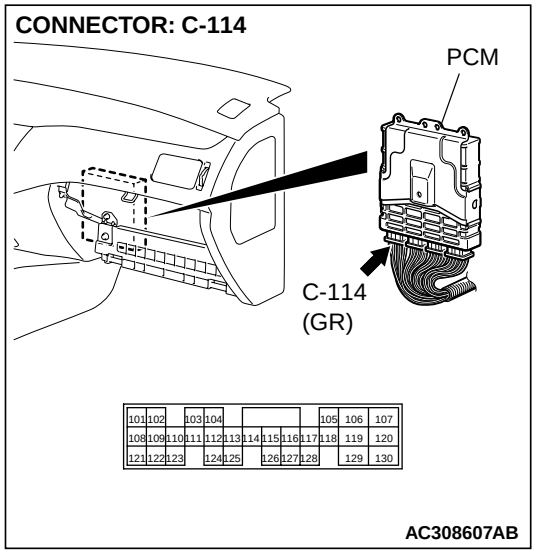
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

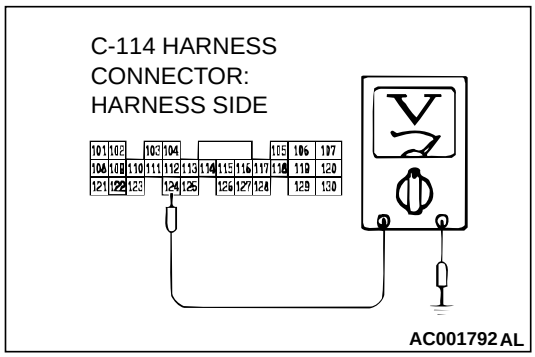
NO : Replace the PCM.

STEP 7. Measure the sensor output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.

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





(3) Measure the voltage between terminal 124 and ground.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 4.0 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 6.

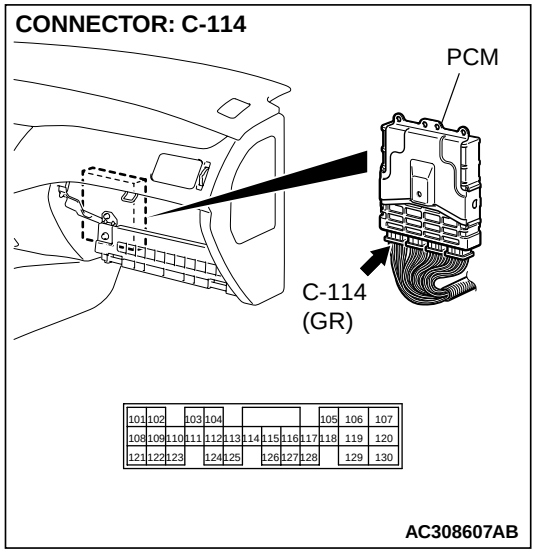
NO : Go to Step 8.

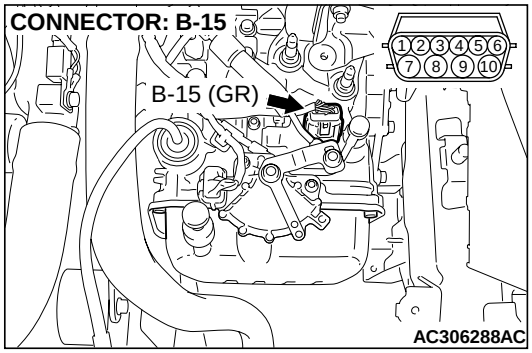
STEP 8. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

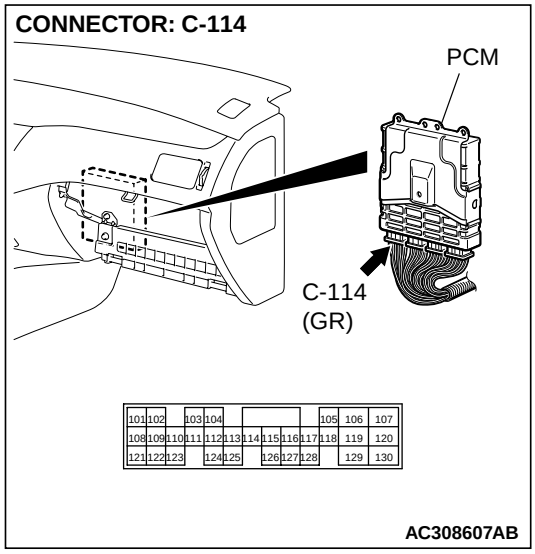
Q: Are the connector and terminals in good condition?

YES : Go to Step 9.

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







STEP 9. Check the harness for a short circuit to ground between A/T control solenoid valve connector B-15 terminal 1 and PCM connector C-114 terminal 124.

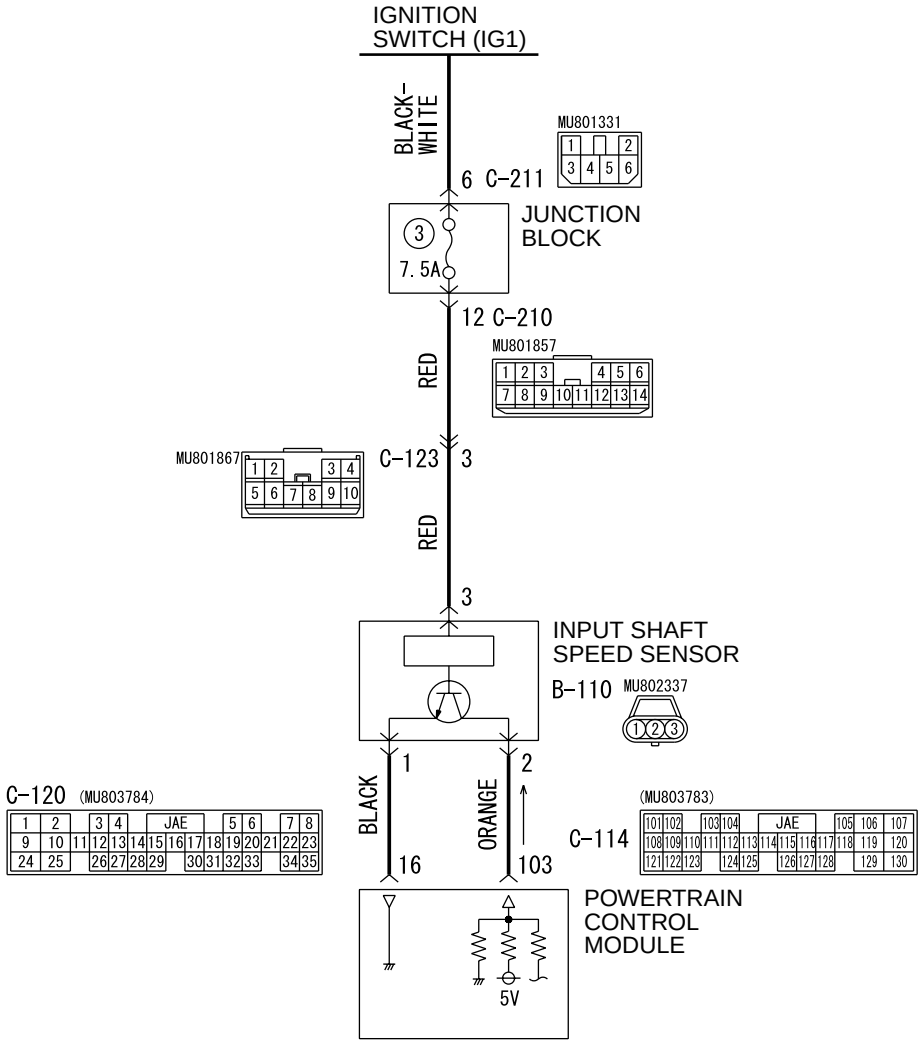
Q: Is the harness wire in good condition?

YES : Go to Step 6.

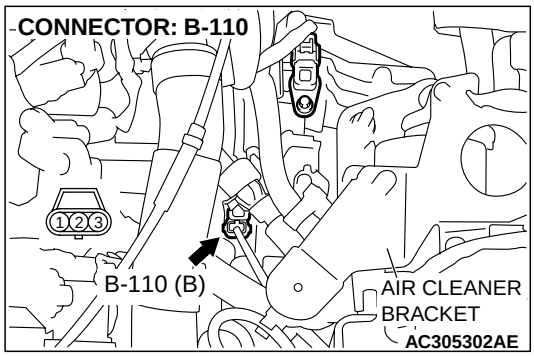
NO : Repair or replace the harness wire.

DTC 22 (P0715): Input Shaft Speed Sensor System

Input Shaft Speed Sensor System Circuit

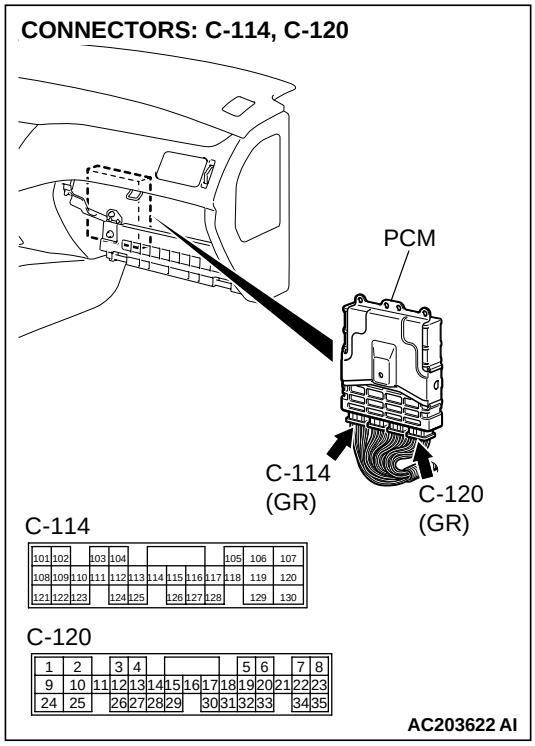


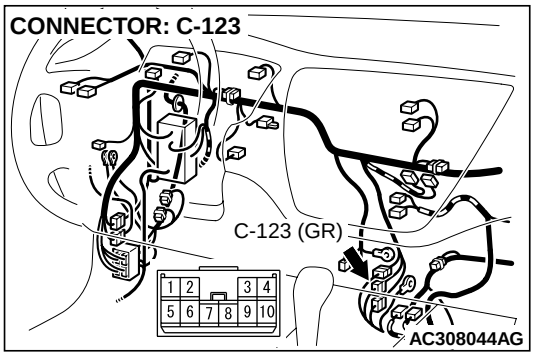
AC307926AC

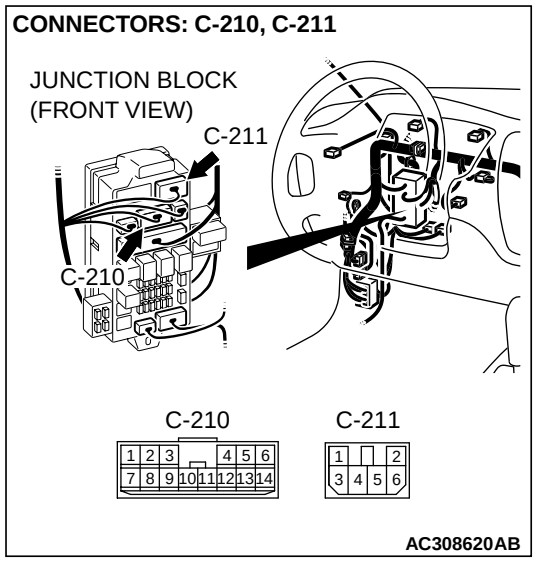


AC305302AE

TSB Revision







CIRCUIT OPERATION

- The input shaft speed sensor generates 0 ⇔ 5 volts pulse signal when the input shaft rotates. The pulse signal frequency increases with a rise in input shaft speed.
- The input shaft speed sensor is connected to the PCM (terminals 16 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.

DESCRIPTIONS OF MONITOR METHODS

- If there is no detection pulse from input shaft speed sensor (turbine rotation) even during driving test at more than specified speed, PCM judges that input shaft speed sensor has a failure.

MONITOR EXECUTION

- Continuous

TSB Revision

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

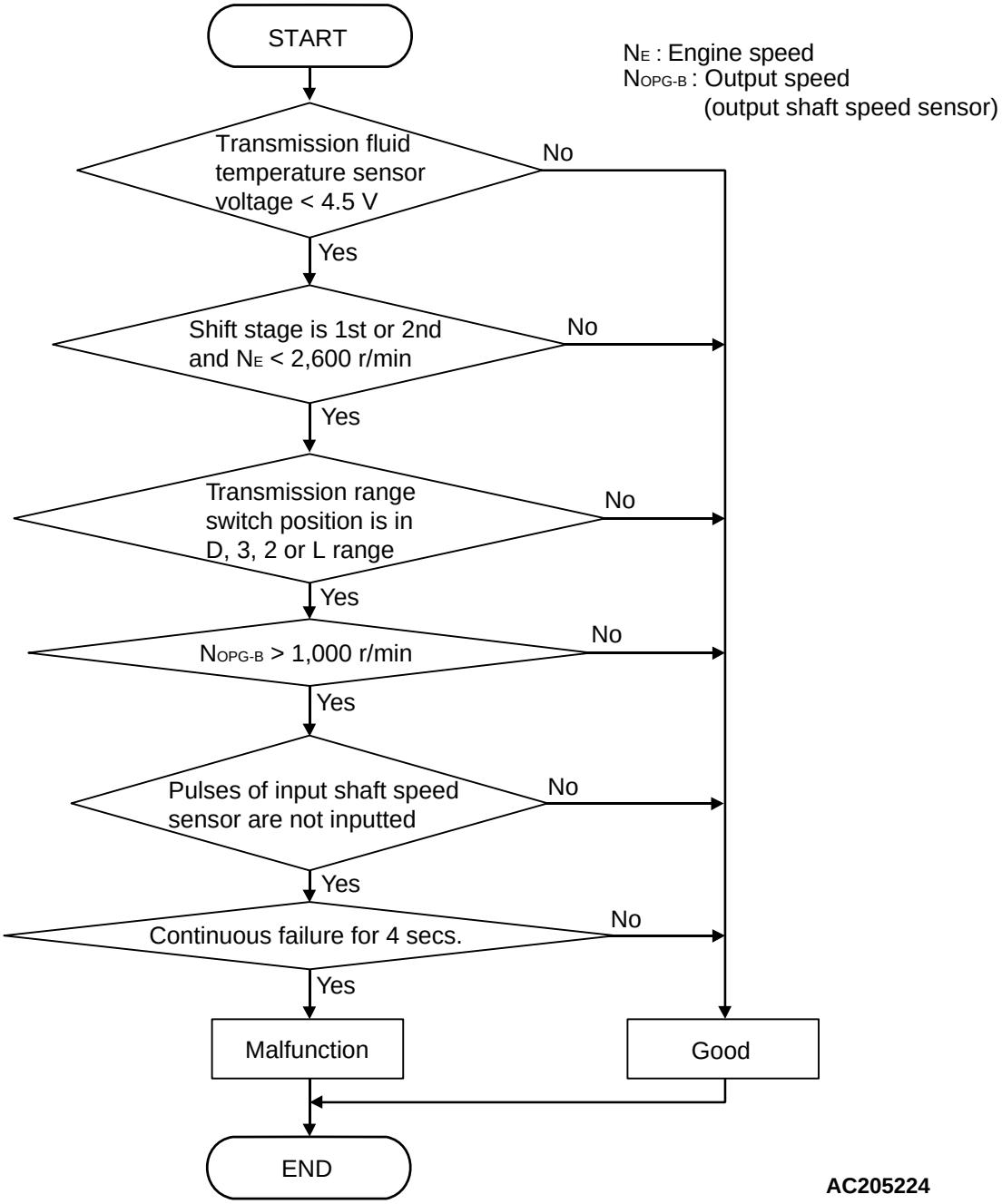
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 23 (P0720): Output shaft speed sensor malfunction

Sensor (The sensor below is determined to be normal)

- Output shaft speed sensor

LOGIC FLOW CHARTS (Monitor Sequence)



DTC SET CONDITIONS

Check Conditions

- Transmission range switch position: D, 3, 2 or L.
- Output speed: 1,000 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.

TSB Revision

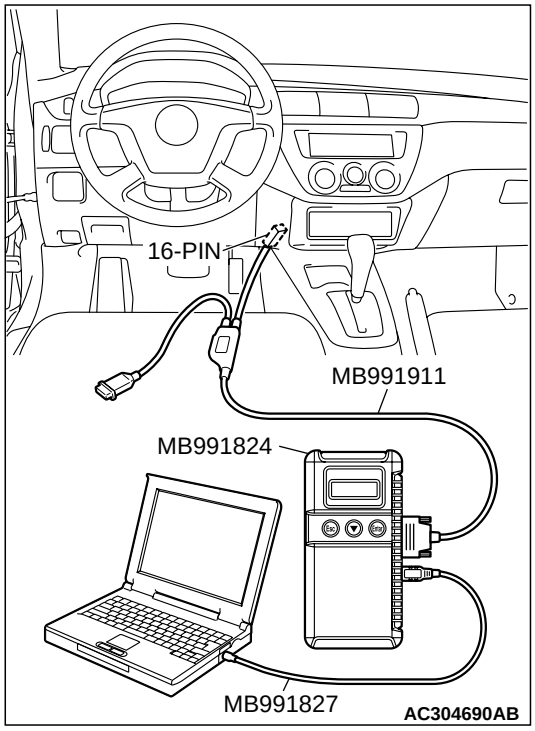
Judgement Criteria
- Input shaft speed sensor signal: no signal change. (4 seconds)
- If DTC 22 (P0715) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure.

OBD-II DRIVE CYCLE PATTERN
Start the engine, shift to 3rd gear or higher, and drive at 40 km/h (25 mph) or more for 10 seconds.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the input shaft speed sensor
- Malfunction of the underdrive clutch retainer
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check data list item 22: Input Shaft Speed Sensor.

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

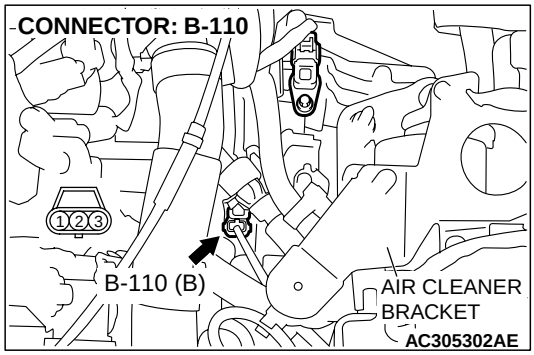
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to data reading mode.
- Item 22: Input Shaft Speed Sensor.
  - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).

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

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

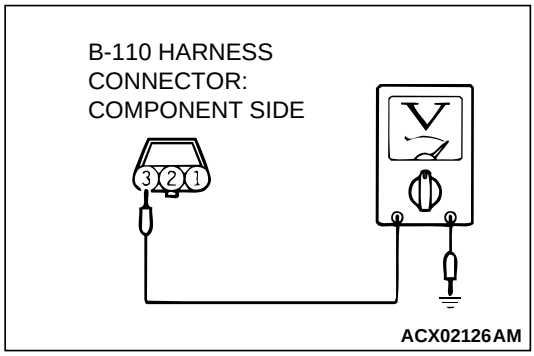
NO : Go to Step 2.



STEP 2. Measure the power supply voltage at the input shaft speed sensor connector B-110.

(1) Disconnect connector B-110 and measure at the harness side.

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



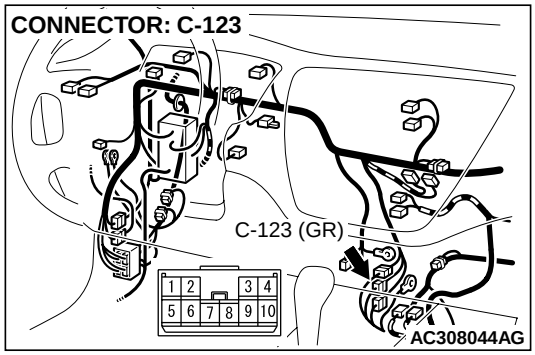
(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

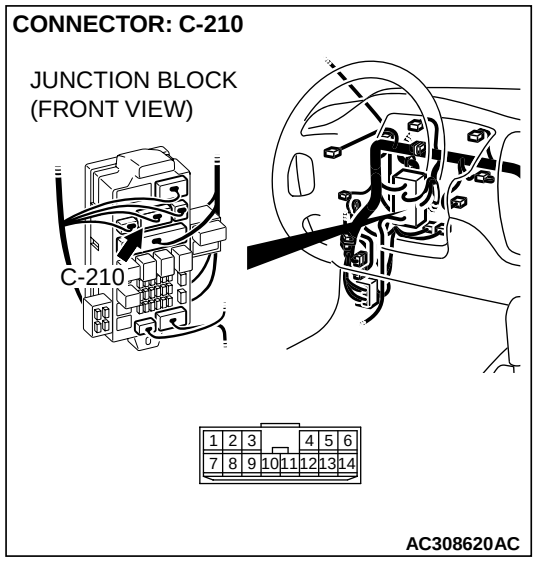
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 5.

NO : Go to Step 3.





STEP 3. Check intermediate connector C-123 and junction block connector C-210 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

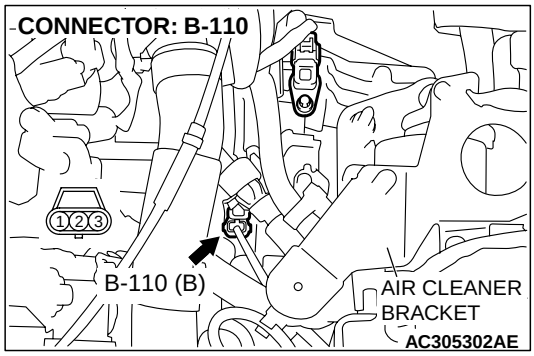
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

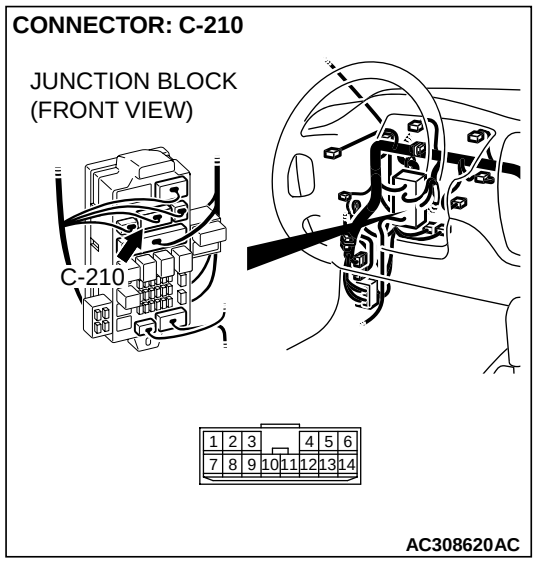
STEP 4. Check the harness for open circuit or short circuit to ground between the input shaft speed sensor connector B-110 terminal 3 and the junction block connector C-210 terminal 12.

Q: Is the harness wire in good condition?

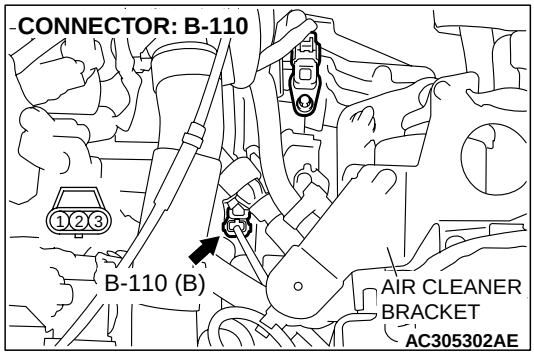
YES : Go to Step 5.

NO : Repair or replace the harness wire.

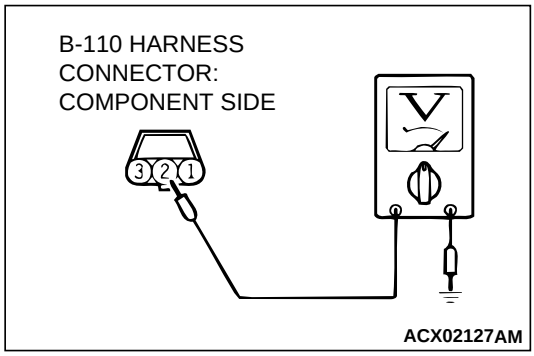




STEP 5. Measure the PCM to speed sensor output voltage at the input shaft speed sensor connector B-110.



(1) Disconnect connector B-110 from the speed sensor and measure voltage at the harness side.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

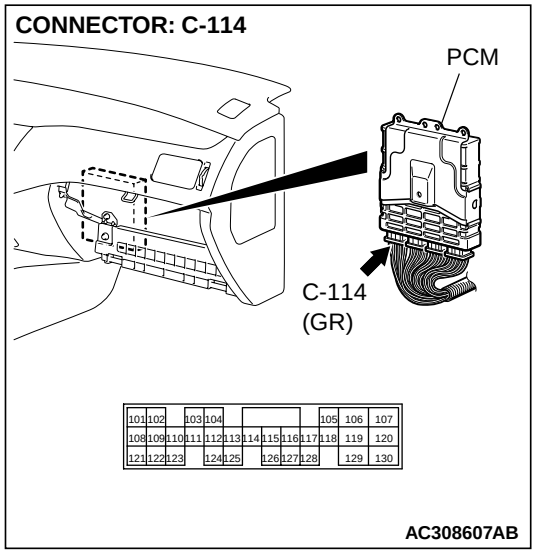
Q: Is the measured voltage between 4.5 and 4.9 volts?

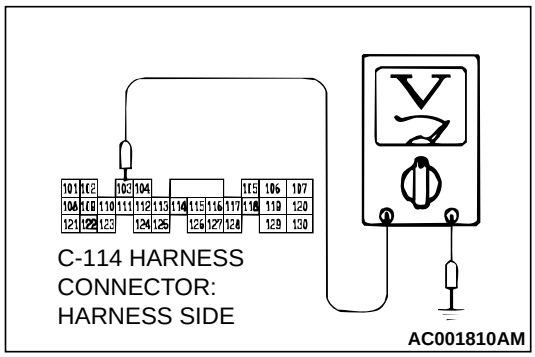
YES : Go to Step 11.
NO : Go to Step 6.

STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.

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





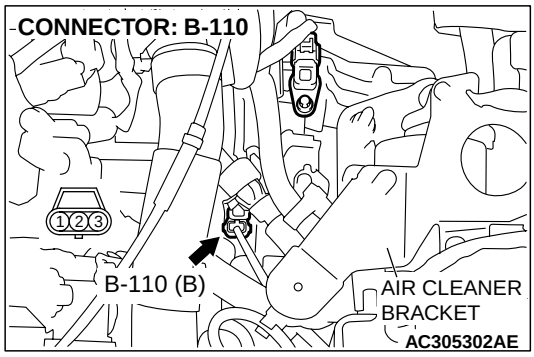
(3) Measure the voltage between terminal 103 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

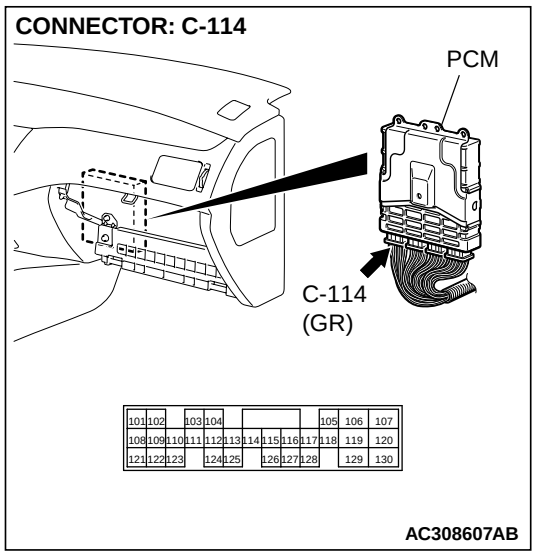
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 7.

NO : Go to Step 9.





STEP 7. Check input shaft speed sensor connector B-110 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors in good condition?

YES : Go to Step 8.

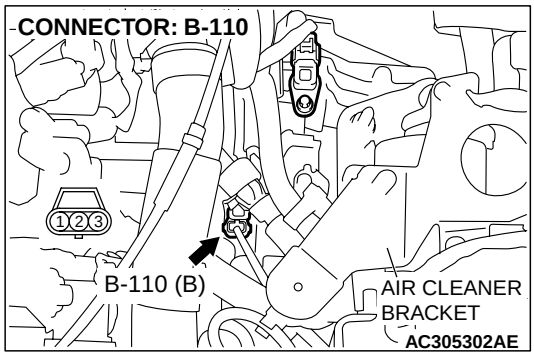
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

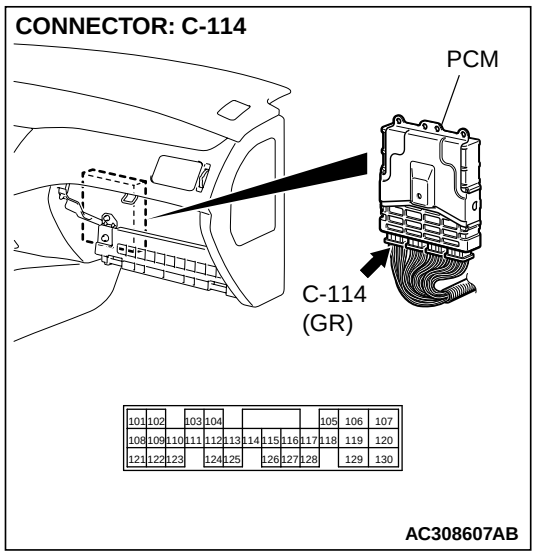
STEP 8. Check the harness for open circuit or damage between input shaft speed sensor connector B-110 terminal 2 and PCM connector C-114 terminal 103.

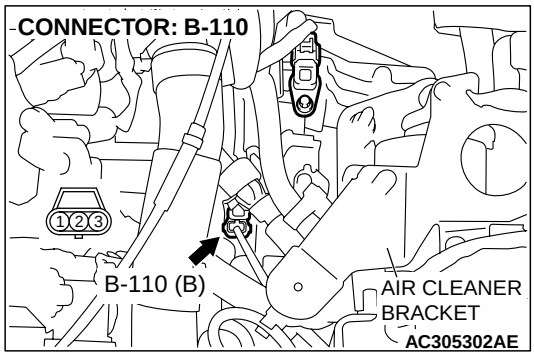
Q: Is the harness wire in good condition?

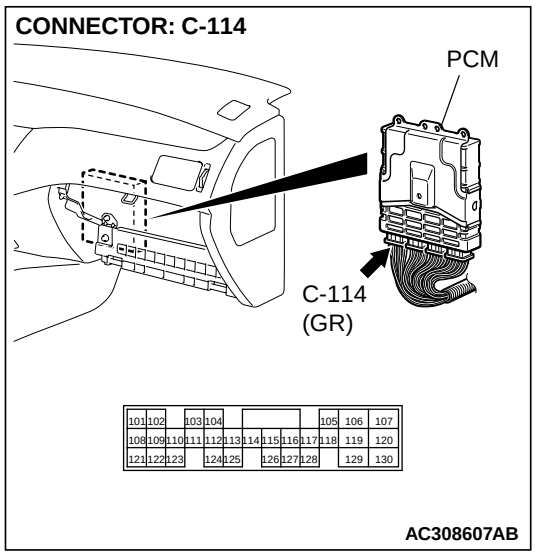
YES : Go to Step 19.

NO : Repair or replace the harness wire.









STEP 9. Check input shaft speed sensor connector B-110 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

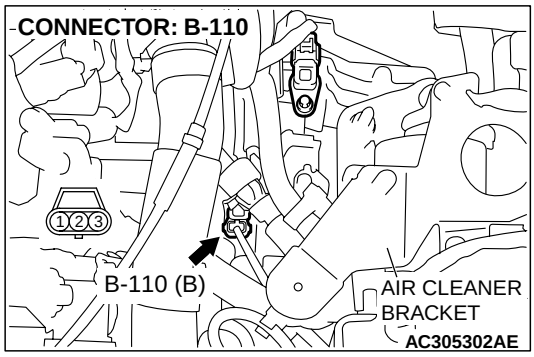
NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

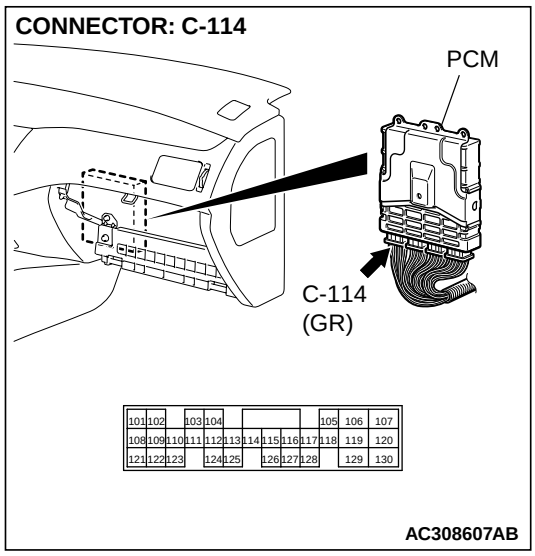
STEP 10. Check the harness for short circuit to ground between input shaft speed sensor connector B-110 terminal 2 and PCM connector C-114 terminal 103.

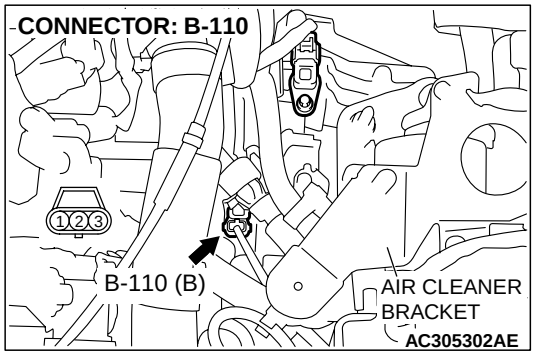
Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.

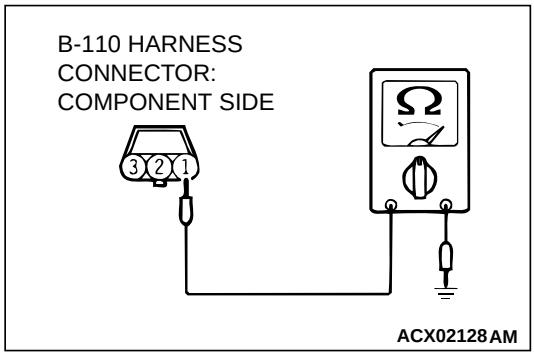






STEP 11. Measure the ground circuit for resistance at the input shaft speed sensor connector B-110.

(1) Disconnect connector B-110 from the speed sensor and measure at the harness side.



(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

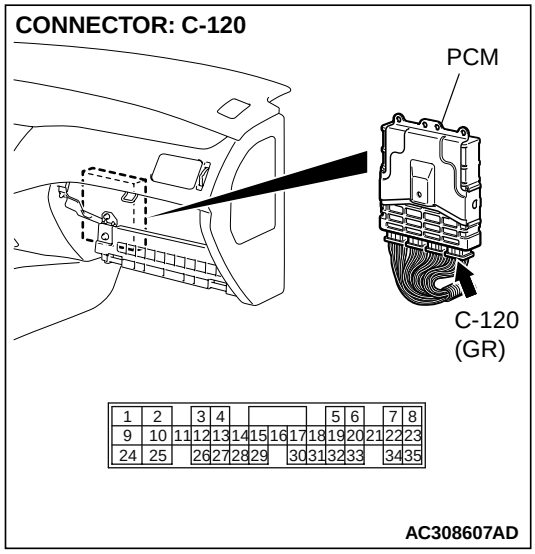
Q: Is the measured resistance less than 2 ohms?

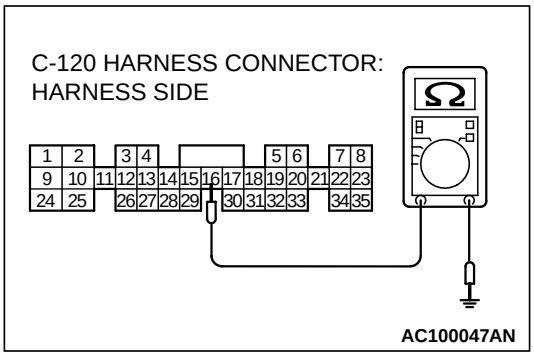
YES : Go to Step 16.
NO : Go to Step 12.

STEP 12. Measure the resistance at the PCM connector C-120 by backprobing.

(1) Do not disconnect connector C-120.

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





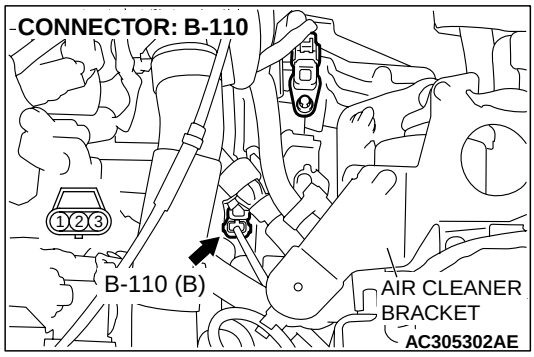
(3) Measure the resistance between terminal 16 and ground.
- The resistance should measure less than 2 ohms.

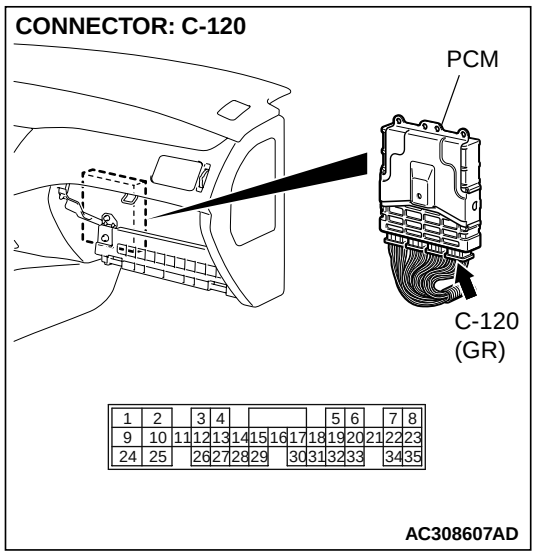
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 13.

NO : Go to Step 15.





STEP 13. Check input shaft speed sensor connector B-110 and PCM connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

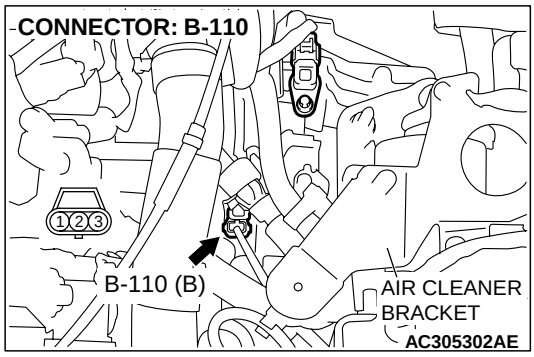
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

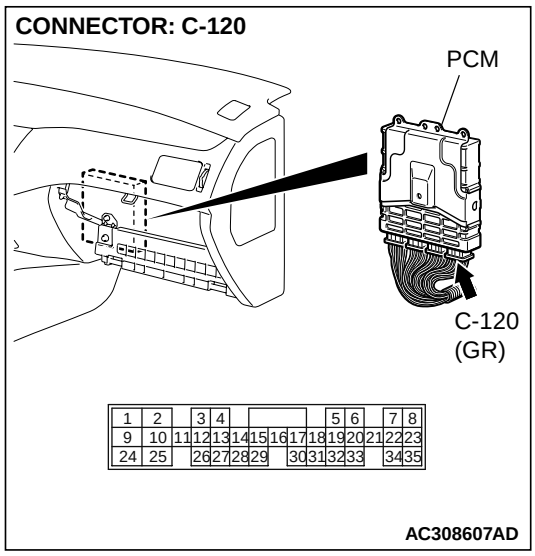
STEP 14. Check the harness for open circuit or damage between input shaft speed sensor connector B-110 terminal 1 and PCM connector C-120 terminal 16.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



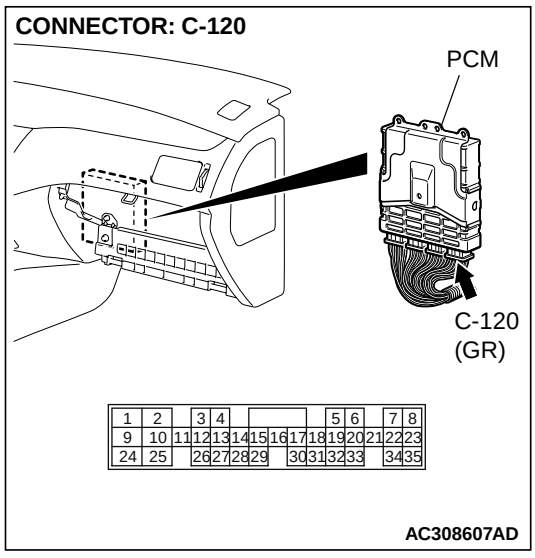


STEP 15. Check PCM connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

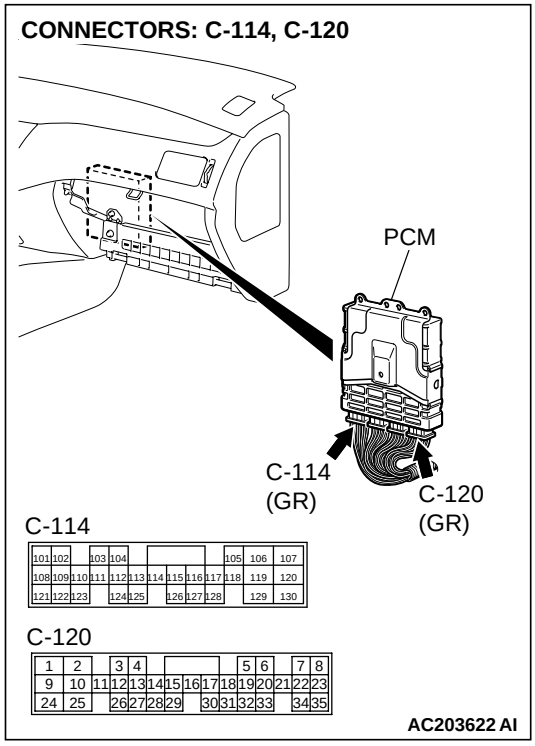
YES : Replace the PCM.

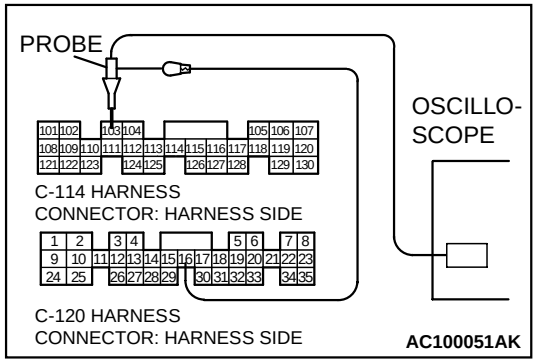
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



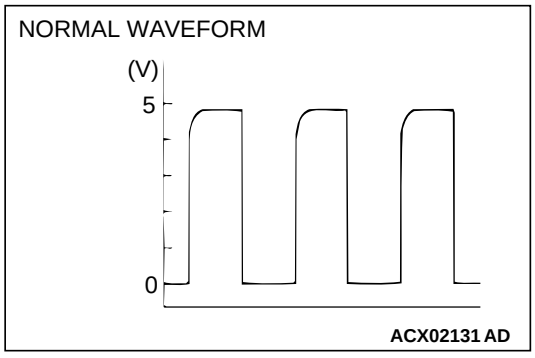
STEP 16. Using the oscilloscope, check the input shaft speed sensor waveform at PCM connectors C-114 and C-120 by backprobing.

(1) Do not disconnect connectors C-114 and C-120.





(2) Connect an oscilloscope probe to PCM connectors C-114 terminal 103 and C-120 terminal 16.
(3) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph) (Gear range: 3rd gear).

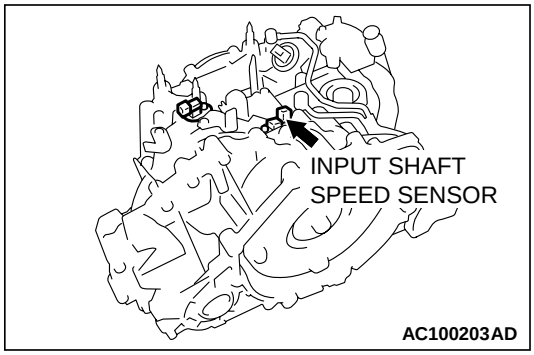


(4) Check the input shaft speed sensor waveform.
- The input shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.8 volt or less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 19.
NO : Go to Step 17.

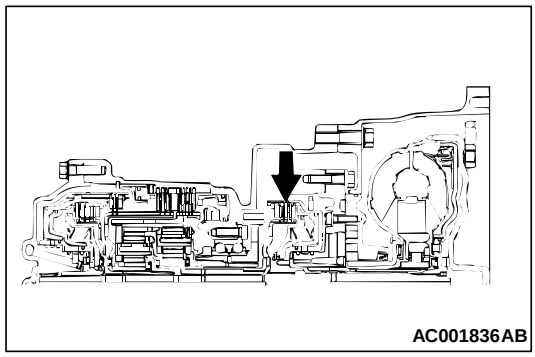


STEP 17. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23C, Transaxle P.23C-9.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : Go to Step 18.
NO : The procedure is complete.

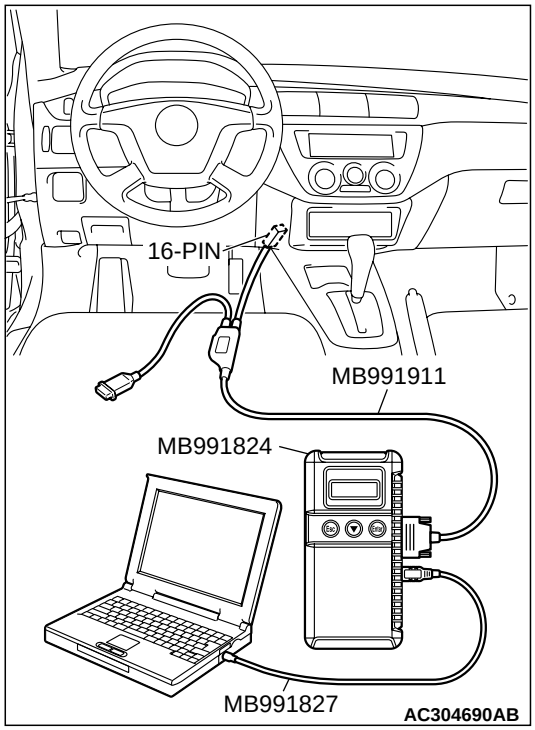


STEP 18. Replace the underdrive clutch retainer.

(1) Replace the underdrive clutch retainer. Refer to GROUP 23C, Underdrive Clutch and Input Shaft P.23C-61.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.



STEP 19. Using scan tool MB991958, check data list item 22: Input Shaft Speed Sensor.

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to data reading mode.
- Item 22: Input Shaft Speed Sensor.
  - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).

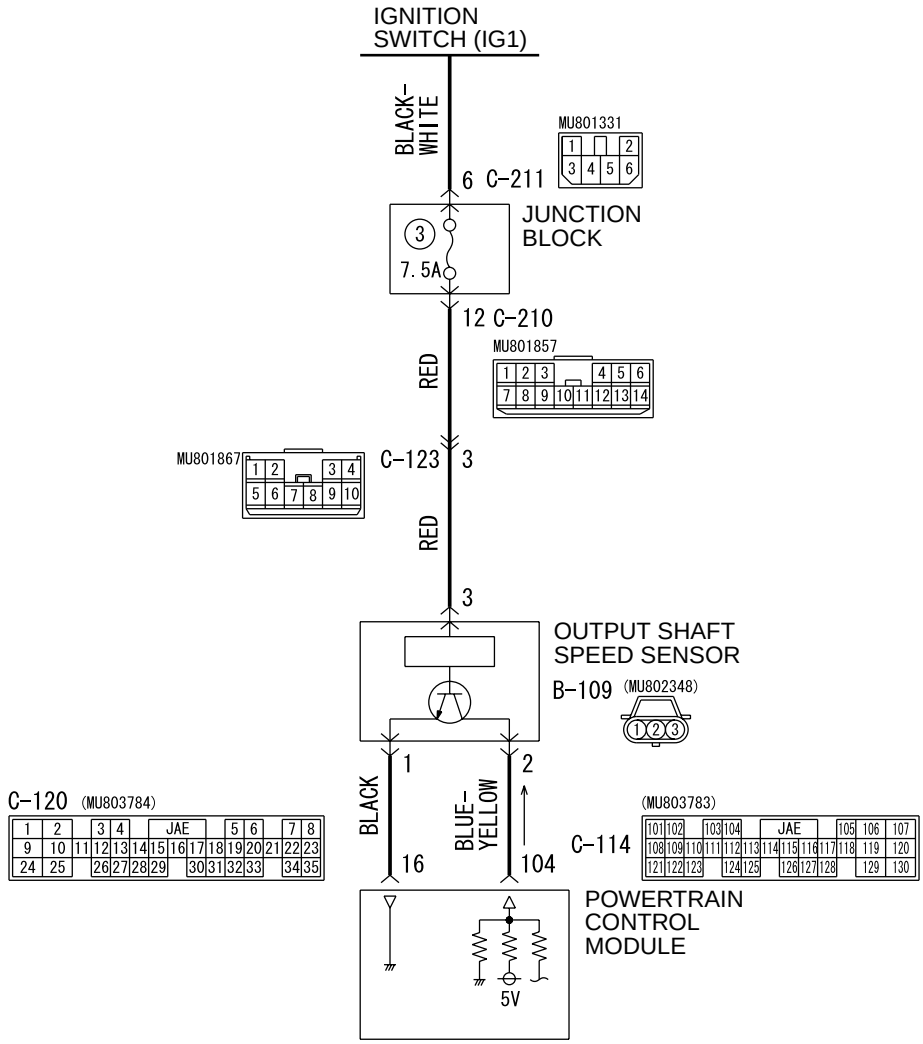
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

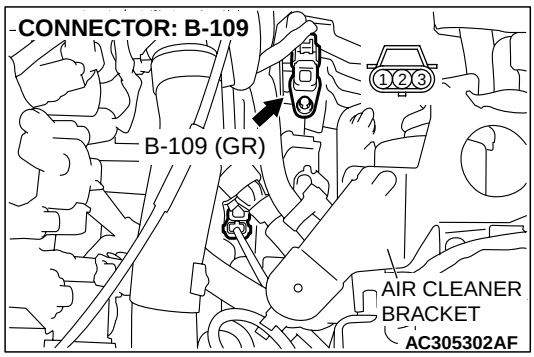
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the PCM.

DTC 23 (P0720): Output Shaft Speed Sensor System

Output Shaft Speed Sensor System Circuit

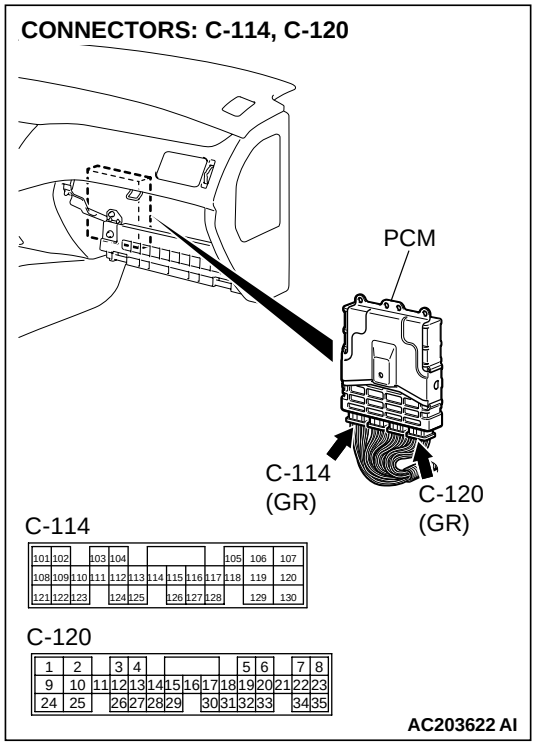


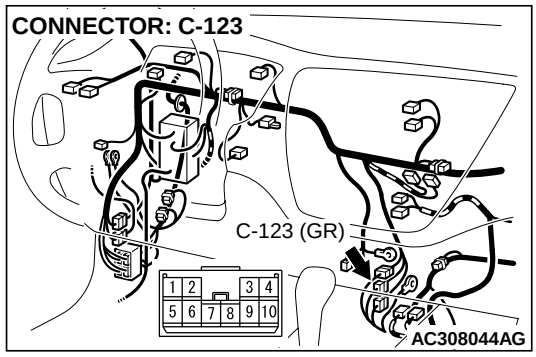
AC307927AC

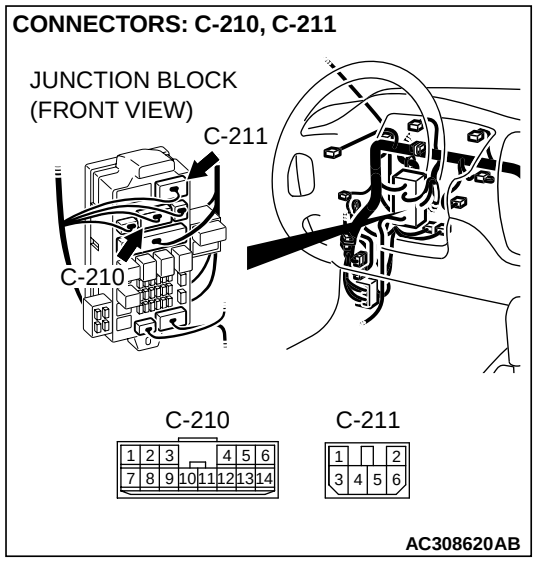


AC305302AF

TSB Revision







CIRCUIT OPERATION

- The output shaft speed sensor generates a 0 ⇔ 5 volt pulse signal when the output shaft rotates. The pulse signal frequency increases with a rise output shaft speed.
- The output shaft speed sensor is connected to the PCM (terminals 16 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.

TSB Revision

DESCRIPTIONS OF MONITOR METHODS

- <If open circuit occurs during driving test> If abruptly reduced output revolution is detected during driving test, and a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that output shaft speed sensor has a failure.
- <If open circuit occurs with vehicle stopped, and driving test is started> If there is no detection pulse from output shaft speed sensor (output rotation) even when engine revolution and turbine revolution both equal or exceed specified value, PCM judges that output shaft speed sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

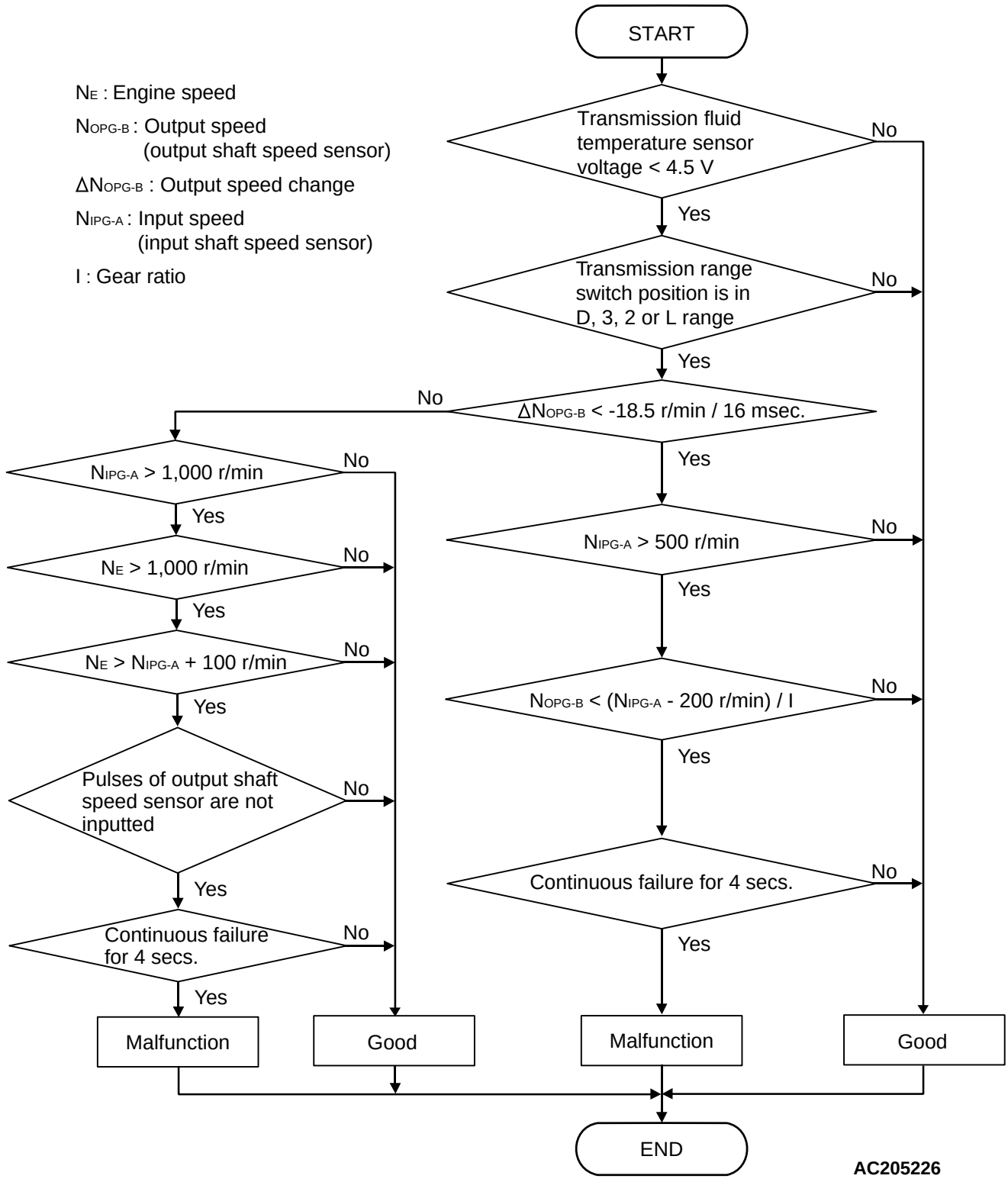
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low and reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Torque converter clutch solenoid
- Low and reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



DTC SET CONDITIONS

Check Conditions

- Transmission range switch position: D, 3, 2 or L.
- Input speed: 1,000 r/min or more.
- Engine speed: 1,000 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Calculated slip (engine speed - input speed): 100 r/min or more.

TSB Revision

Judgement Criteria
- Output speed: no signal change. (4 seconds)
- If DTC 23 (P0720) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure.

Check Conditions
- Transmission range switch position: D, 3, 2 or L.
- Input speed: 500 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Rapid output speed change: -18.5 r/min / 0.016 second or less.

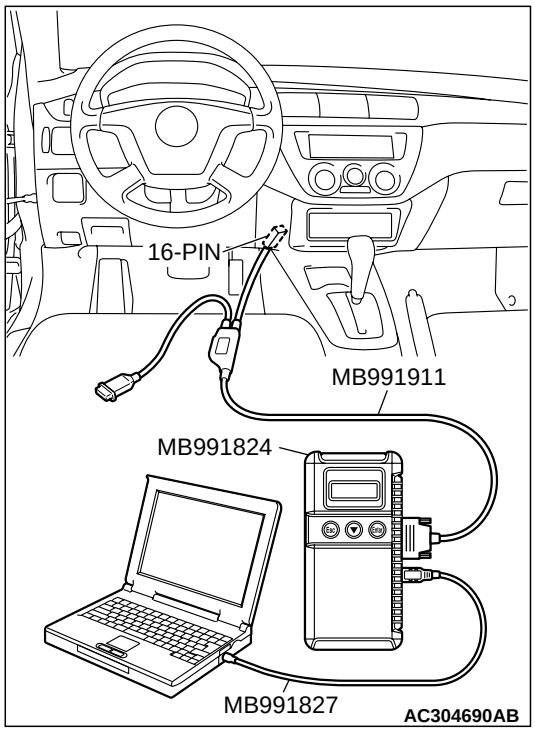
Judgement Criteria
- Output speed: [(input speed - 200 r/min) / gear ratio] or less. (4 seconds)
- If DTC 23 (P0720) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure.

OBD-II DRIVE CYCLE PATTERN
Start the engine, and drive for 5 seconds, with 1st gear fixed (L range), at 20 km/h (12 mph) or more with 50% or more of throttle valve opening. Then stop the vehicle, and drive again for 5 seconds, with 1st gear fixed (L range), at 20 km/h (12 mph) or more with 50% or more of throttle valve opening.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the output shaft speed sensor
- Malfunction of the transfer drive gear or driven gear
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check data list item 23: Output Shaft Speed Sensor.

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

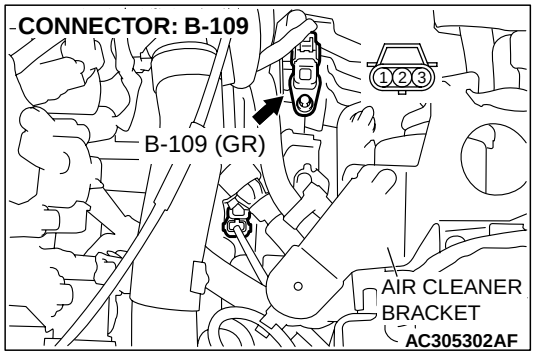
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 23: Output Shaft Speed Sensor.
  - When driving at a constant speed of 50km/h (31mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).

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

Q: Is the sensor within the specified range?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

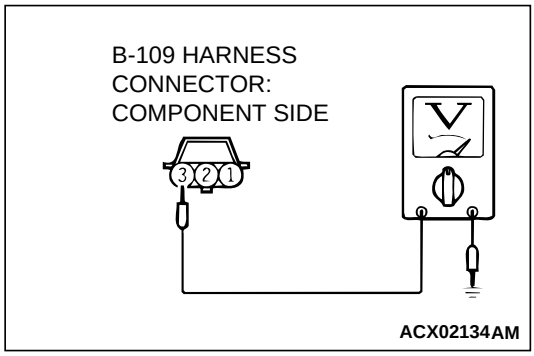
NO : Go to Step 2.



STEP 2. Measure the power supply voltage at the output shaft speed sensor connector B-109.

(1) Disconnect connector B-109 and measure at the harness side.

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

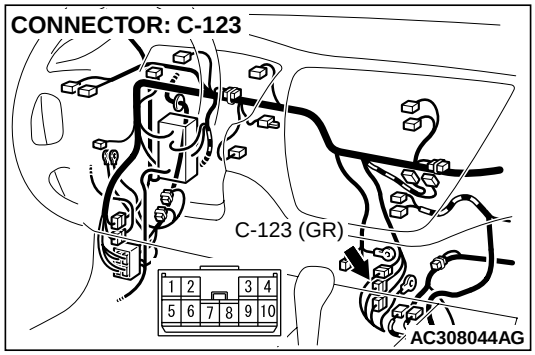


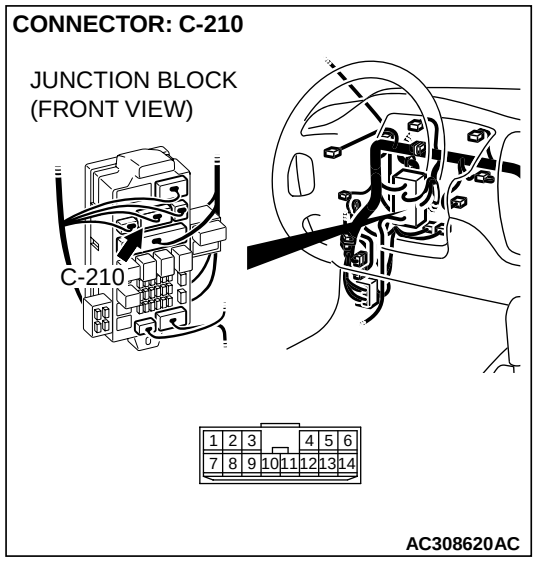
(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

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

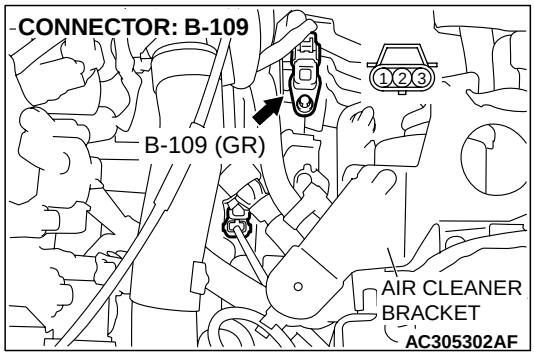


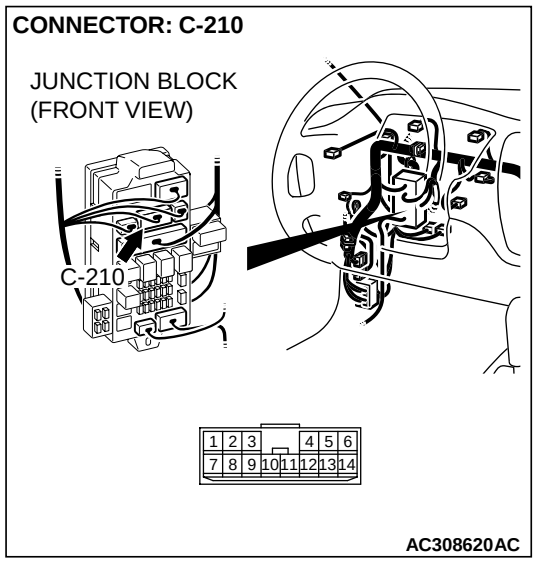


STEP 3. Check intermediate connector C-123 and junction block connector C-210 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

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





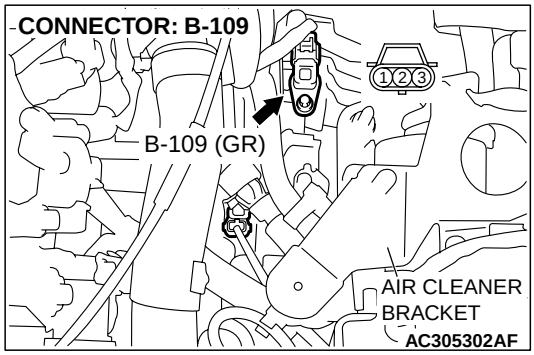
STEP 4. Check the harness for open circuit or short circuit to ground between the output shaft speed sensor connector B-109 terminal 3 and the junction block connector C-210 terminal 12.

Q: Is the harness wire in good condition?

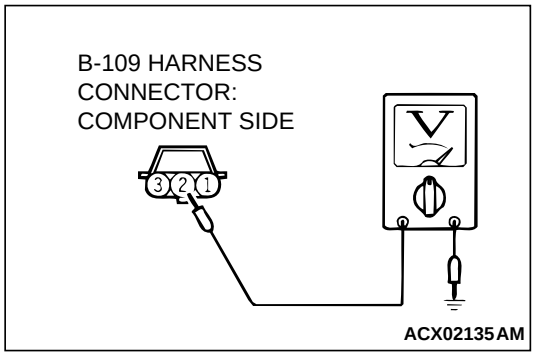
YES : Go to Step 5.

NO : Repair or replace the harness wire.

STEP 5. Measure the PCM to speed sensor output voltage at the output shaft speed sensor connector B-109.



(1) Disconnect connector B-109 from the speed sensor and measure voltage at the harness side.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

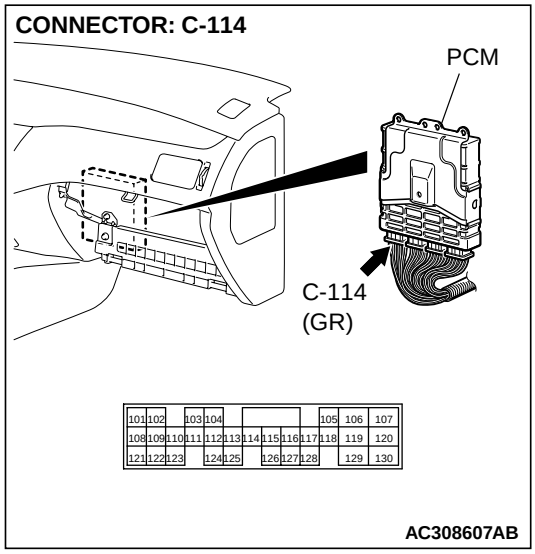
Q: Is the measured voltage between 4.5 and 4.9 volts?

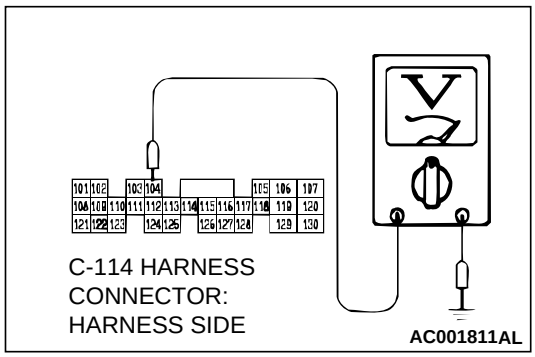
YES : Go to Step 11.
NO : Go to Step 6.

STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector C-114 by backprobing.

(1) Do not disconnect connectors C-114.

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





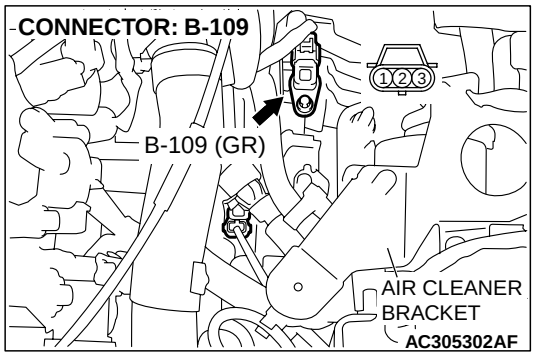
(3) Measure the voltage between terminal 104 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

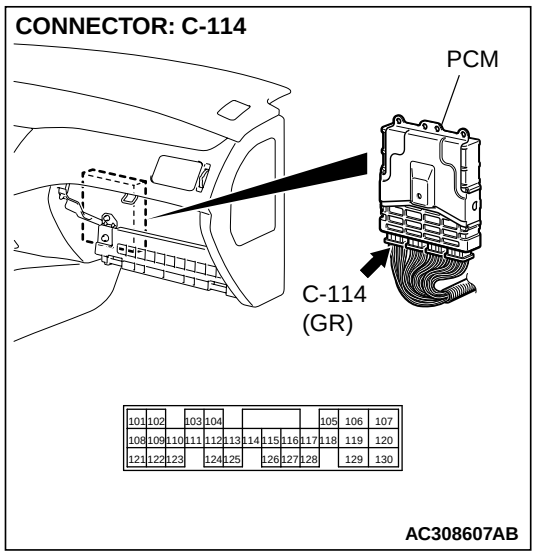
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 7.

NO : Go to Step 9.



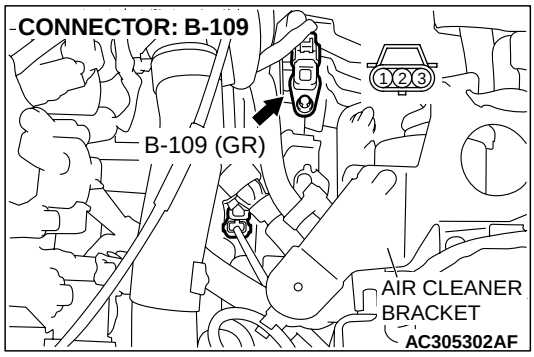


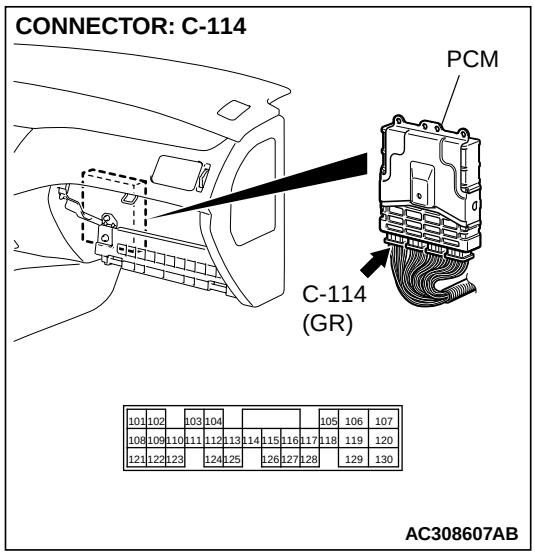
STEP 7. Check output shaft speed sensor connector B-109 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors in good condition?

YES : Go to Step 8.

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



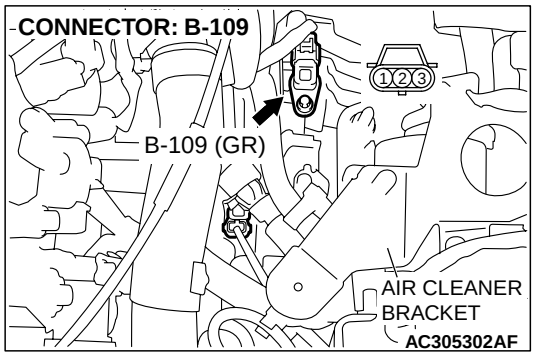


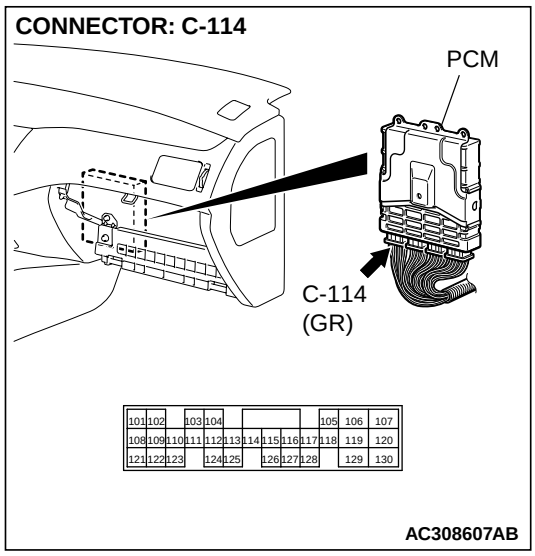
STEP 8. Check the harness for open circuit or damage between output shaft speed sensor connector B-109 terminal 2 and PCM connector C-114 terminal 104.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.





STEP 9. Check output shaft speed sensor connector B-109 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

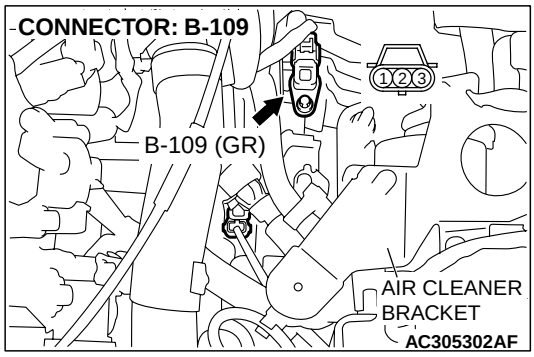
NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

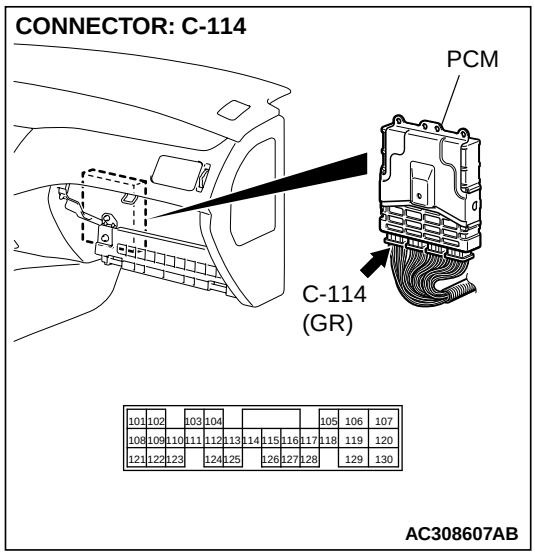
STEP 10. Check the harness for short circuit to ground between output shaft speed sensor connector B-109 terminal 2 and PCM connector C-114 terminal 104.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

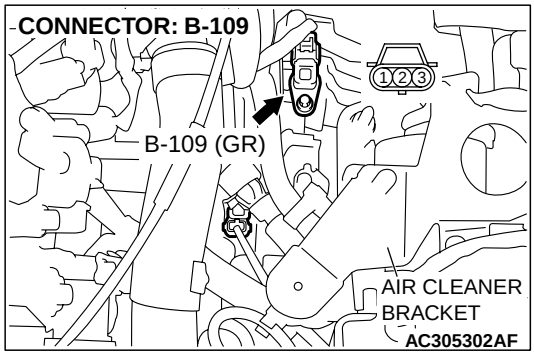
NO : Repair or replace the harness wire.

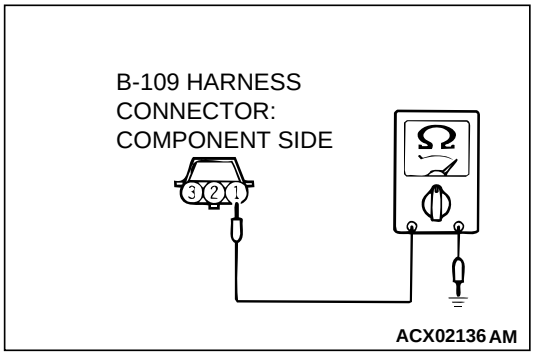




STEP 11. Measure the ground circuit for resistance at the output shaft speed sensor connector B-109.

(1) Disconnect connector B-109 from the speed sensor and measure at the harness side.





(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

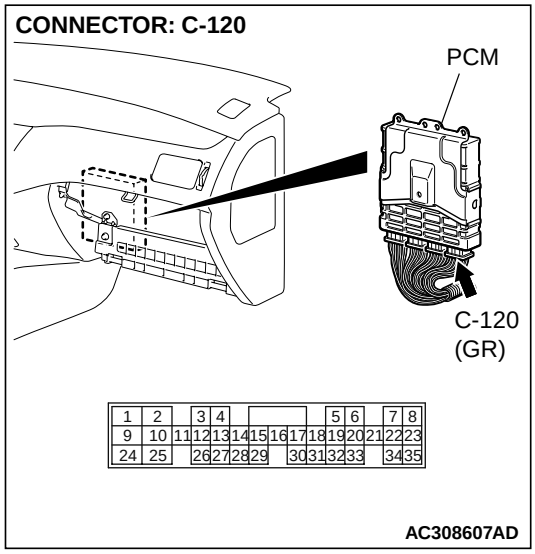
Q: Is the measured resistance less than 2 ohms?

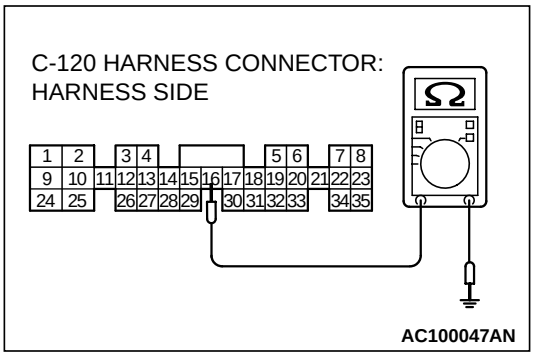
YES : Go to Step 16.
NO : Go to Step 12.

STEP 12. Measure the resistance at the PCM connector C-120 by backprobing.

(1) Do not disconnect connector C-120.

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





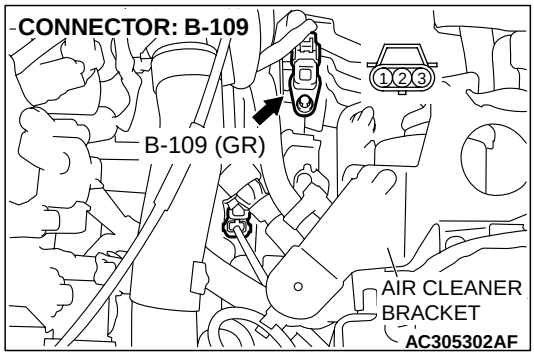
(3) Measure the resistance between terminal 16 and ground.
- The resistance should measure less than 2 ohms.

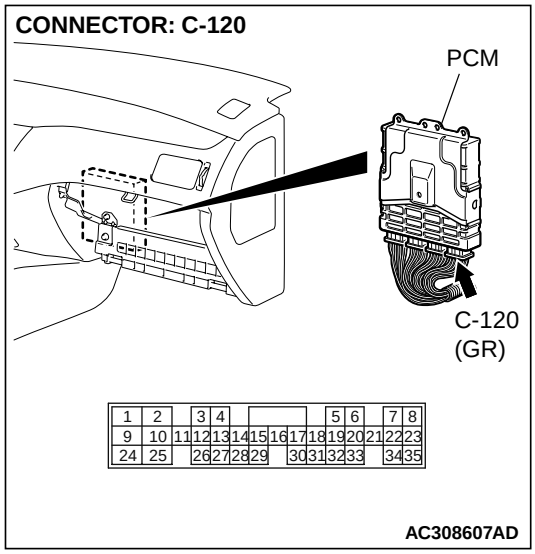
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 13.

NO : Go to Step 15.





STEP 13. Check output shaft speed sensor connector B-109 and PCM connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

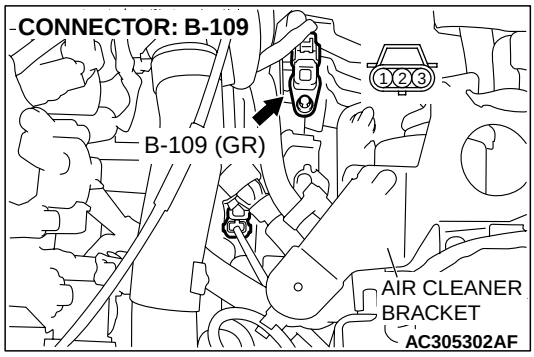
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

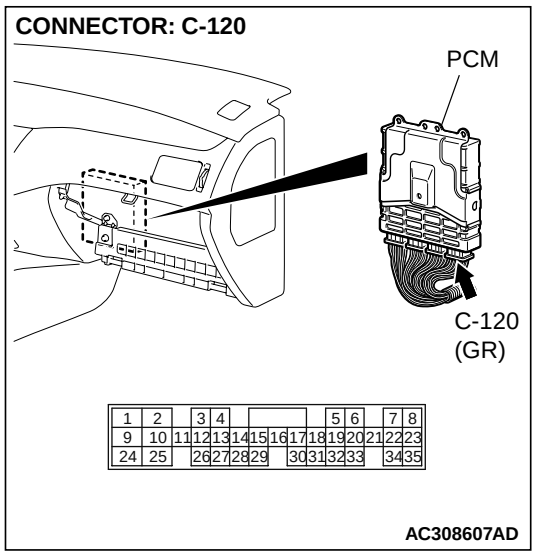
STEP 14. Check the harness for open circuit or damage between output shaft speed sensor connector B-109 terminal 1 and PCM connector C-120 terminal 16.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



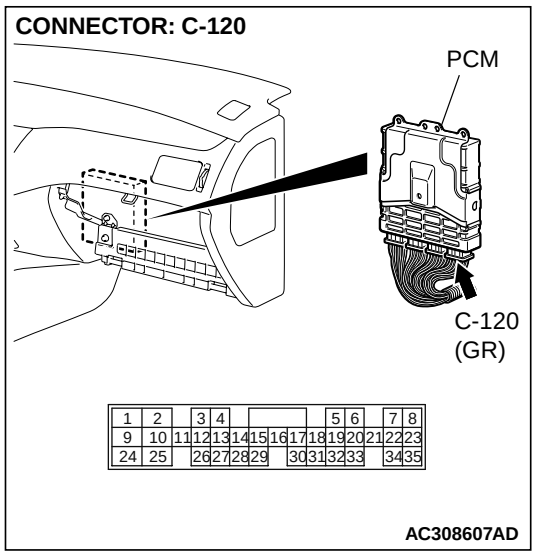


STEP 15. Check PCM connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

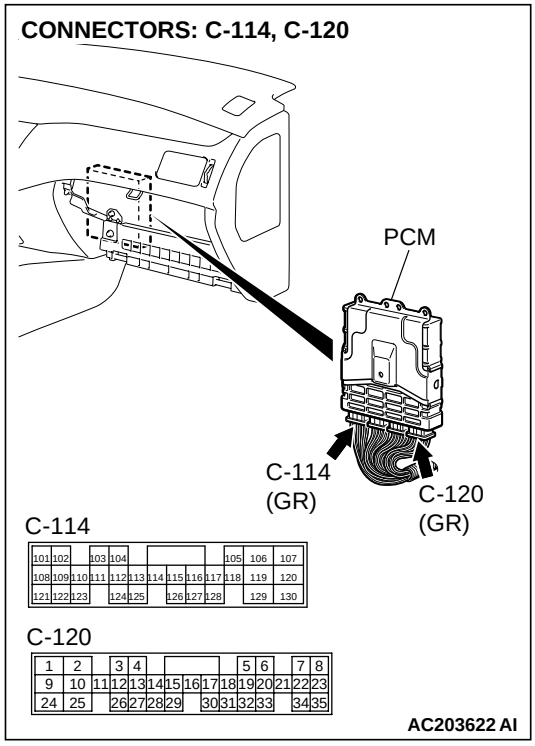
YES : Replace the PCM.

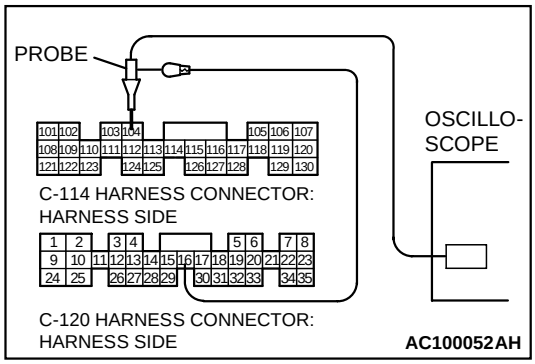
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



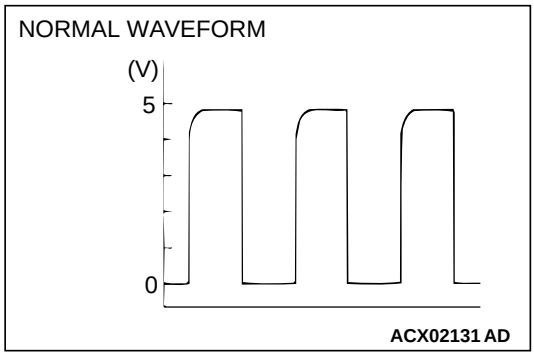
STEP 16. Using the oscilloscope, check the output shaft speed sensor waveform at PCM connectors C-114 and C-120 by backprobing.

(1) Do not disconnect connectors C-114 and C-120.





(2) Connect an oscilloscope probe to PCM connectors C-114 terminal 104 and C-120 terminal 16.
(3) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph) (Gear range: 3rd gear).

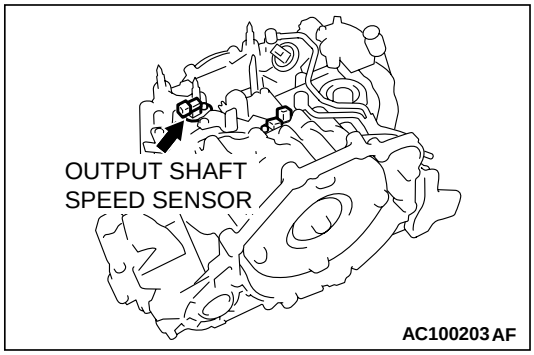


(4) Check the output shaft speed sensor waveform.
- The output shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.8 volt or less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 19.
NO : Go to Step 17.

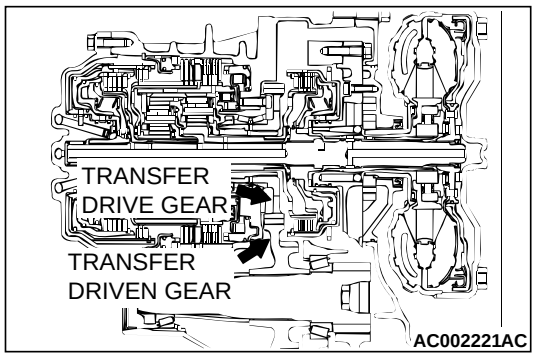


STEP 17. Replace the output shaft speed sensor.

(1) Replace the output shaft speed sensor. Refer to GROUP 23C, Transaxle P.23C-9.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : Go to Step 18.
NO : The procedure is complete.

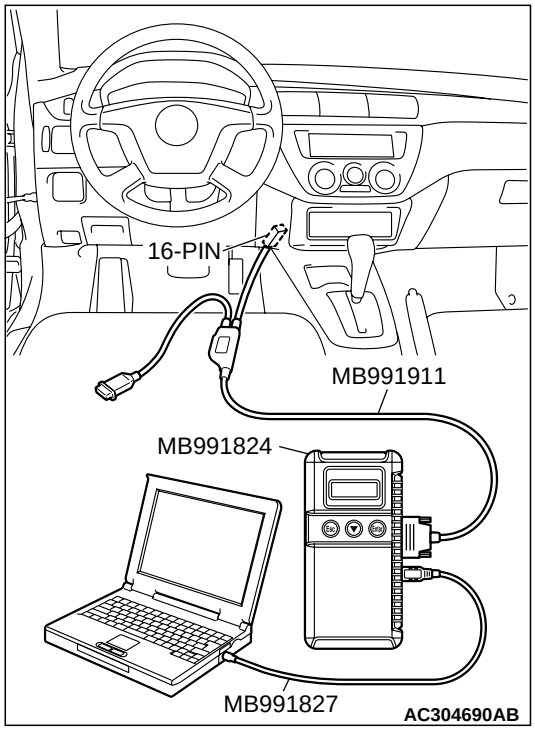


STEP 18. Replace the transfer drive gear or driven gear.

(1) Replace the transfer drive gear or driven gear. Refer to GROUP 23C, Transaxle P.23C-9, Output Shaft P.23C-69.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.



STEP 19. Using scan tool MB991958, check data list item 23: Output Shaft Speed Sensor.

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to data reading mode.
- Item 23: Output Shaft Speed Sensor.
  - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).

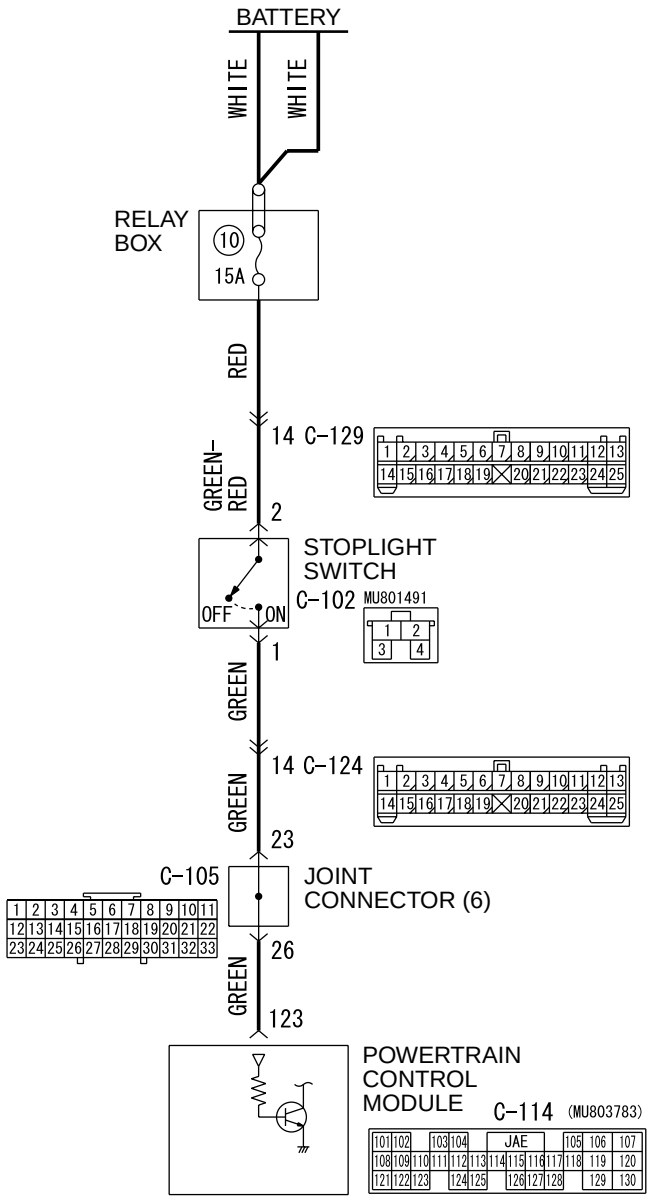
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the PCM.

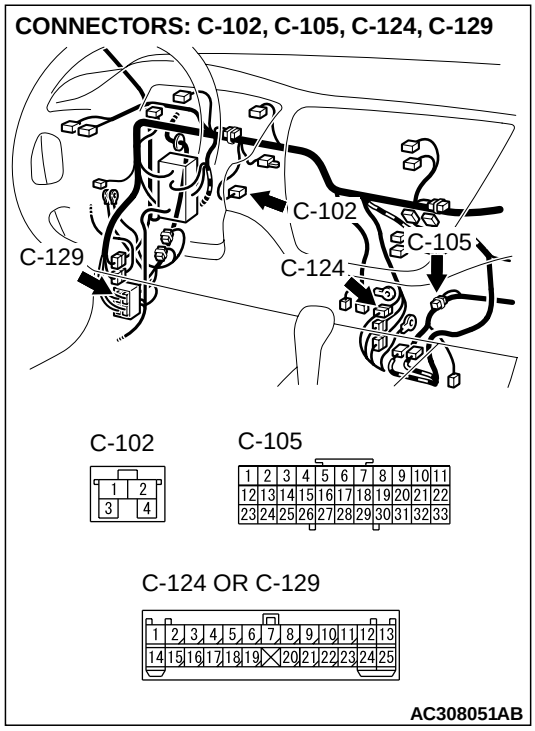
DTC 26: Stoplight Switch System

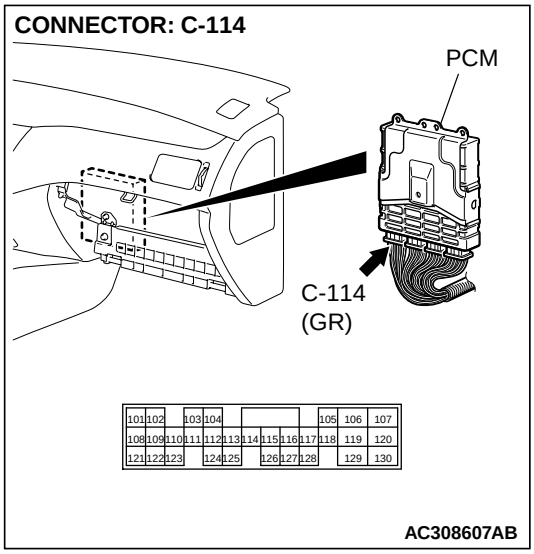
Stoplight Switch System Circuit



AC307928AC

TSB Revision





CIRCUIT OPERATION

- Battery positive voltage is supplied to the stop-light switch (terminal 2).
- When the brake pedal is depressed, battery positive voltage is applied to the PCM (terminal 123).

DTC SET CONDITIONS

If the stoplight switch is on for five minutes or more while driving above 50 km/h (31 mph), or all of the stop light bulbs are blown, it is judged there is a short circuit or open circuit in the stoplight switch. This causes DTC 26 to be set.

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

- Malfunction of the stoplight switch
- Malfunction of stoplight bulb
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Check the brake pedal height.

Refer to GROUP 35A, On-vehicle Service – Brake Pedal Check and Adjustment P.35A-20.

Q: Is the height adjusted properly?

YES : Go to Step 2.
NO : Adjust the brake pedal to the proper height.

STEP 2. Check the stoplight bulb.

Refer to GROUP 54A, Rear combination light P.54A-62.

Q: Is the stoplight bulb in good condition?

YES : Go to Step 3.

NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal P.35A-34.

STEP 3. Using scan tool MB991958, check data list item 26: Stoplight Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.

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

(3) Set scan tool MB991958 to the data reading mode.

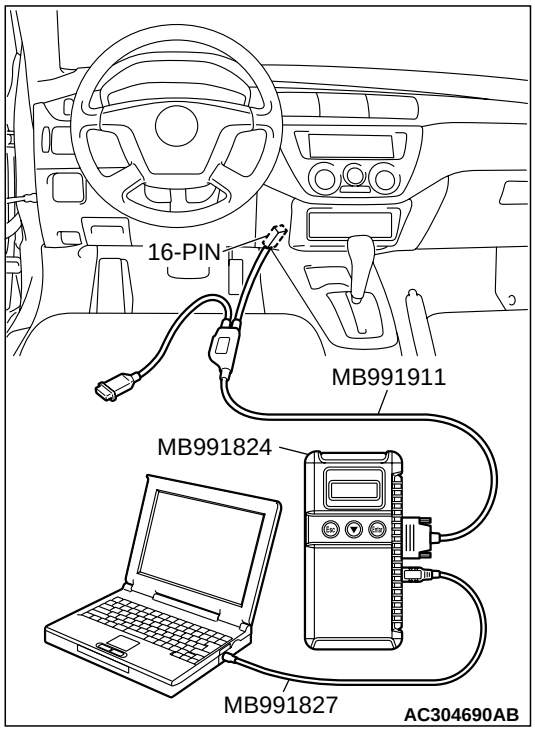
- Item 26: Stoplight Switch.
  - When the brake pedal is depressed, the display on scan tool MB991958 should be "ON."
  - When the brake pedal is not depressed, the display on scan tool MB991958 should be "OFF."

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

Q: Is the switch operating properly?

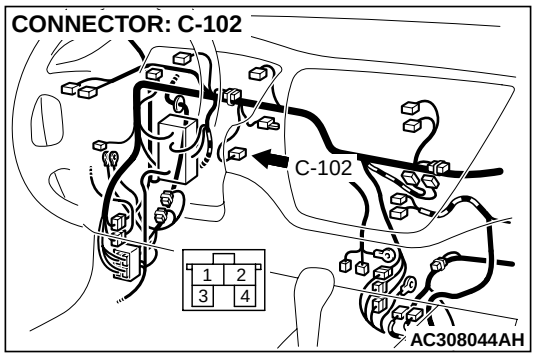
YES : It can be assumed that this malfunction may be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 4.



STEP 4. Measure the stoplight switch power supply voltage at connector C-102 by backprobing.

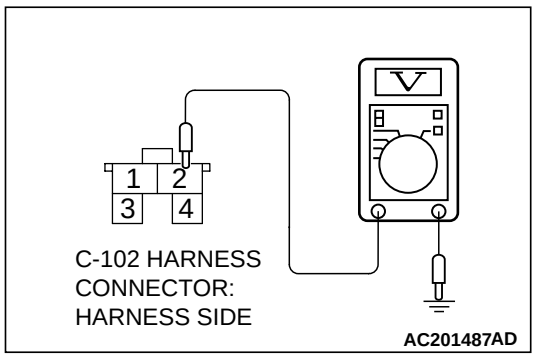
(1) Remove the stoplight switch from the mounting bracket.
(2) Do not disconnect connector C-102.



(3) Measure the voltage between terminal 2 and ground by backprobing.
- The voltage should measure battery positive voltage.

Q: Is the measured voltage battery positive voltage?

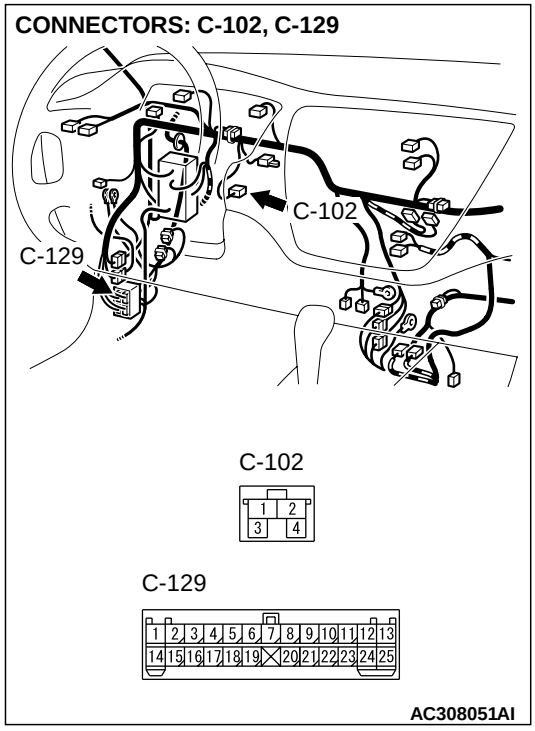
YES : Go to Step 7.
NO : Go to step 5.

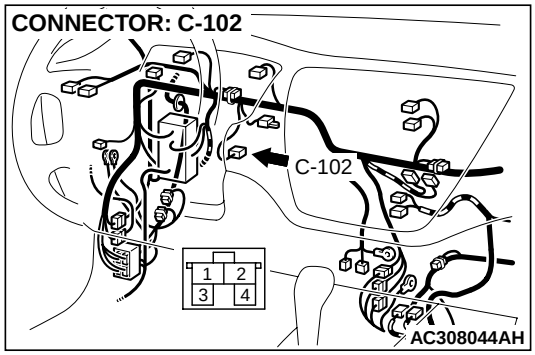


STEP 5. Check stoplight switch connector C-102 and intermediate connector C-129 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

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



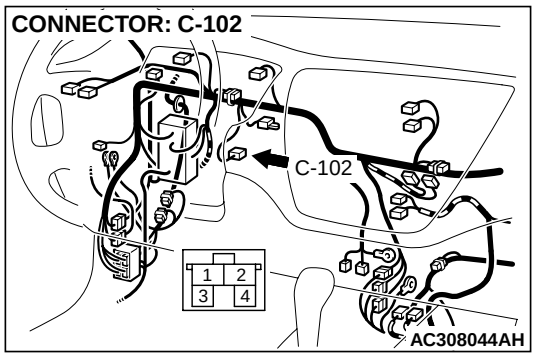


STEP 6. Check the harness for damage between stoplight switch connector C-102 terminal 2 and the power supply fuse.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

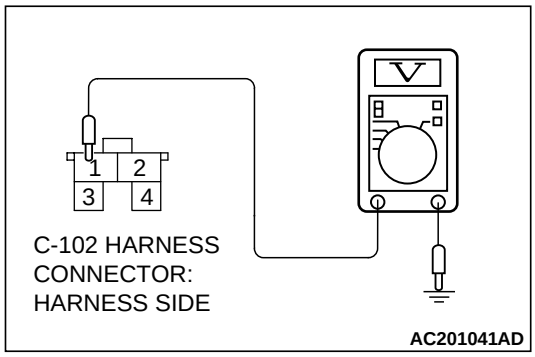
NO : Repair or replace the harness wire.



STEP 7. Measure the stoplight switch output voltage to the PCM at connector C-102 by backprobing.

(1) Remove the stoplight switch from the mounting bracket.

(2) Do not disconnect connector C-102.



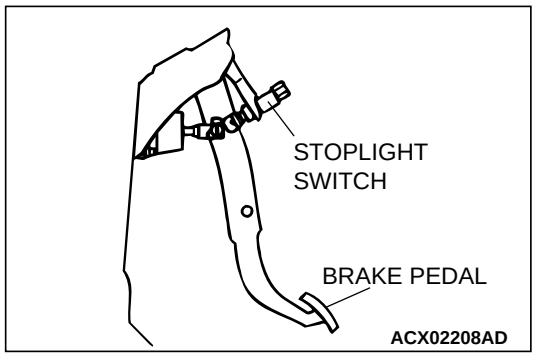
(3) Measure the voltage between terminal 1 and ground by backprobing.

- When the switch button is out (closed circuit), voltage should equal battery positive voltage.
- When the switch button is depressed (open circuit), voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the switch button released (closed circuit), and less than 1.0 volt with the switch button depressed (open circuit)?

YES : Go to Step 9.

NO : Go to Step 8.



STEP 8. Check the stoplight switch.

Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check P.35A-35.

Q: Does the stoplight switch pass the checks?

YES : Go to Step 9.

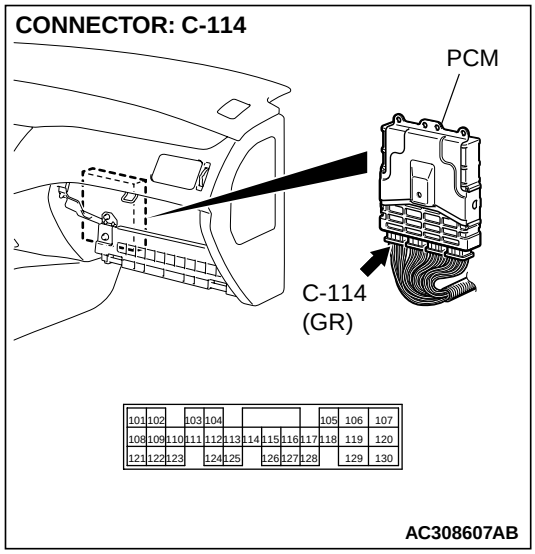
NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal P.35A-34.

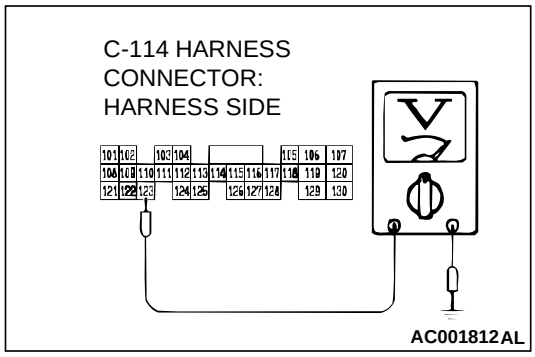
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STEP 9. Measure the stoplight switch output voltage at the PCM connector C-114 by backprobing.

(1) Install the stoplight switch into the mounting bracket if it was removed.

(2) Do not disconnect connector C-114.



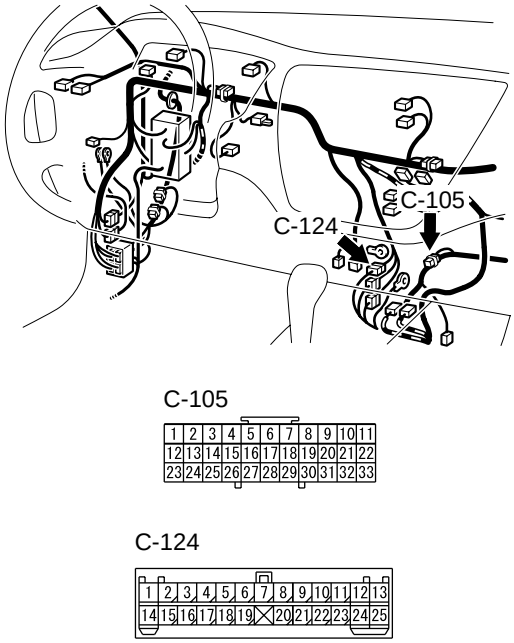


(3) Measure the voltage between terminal 123 and ground.
- When the brake pedal is depressed, voltage should be measured battery positive voltage.
- When the brake pedal is not depressed, voltage should be measured less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the brake pedal depressed (closed circuit), and less than 1.0 volt with the brake pedal released (open circuit)?

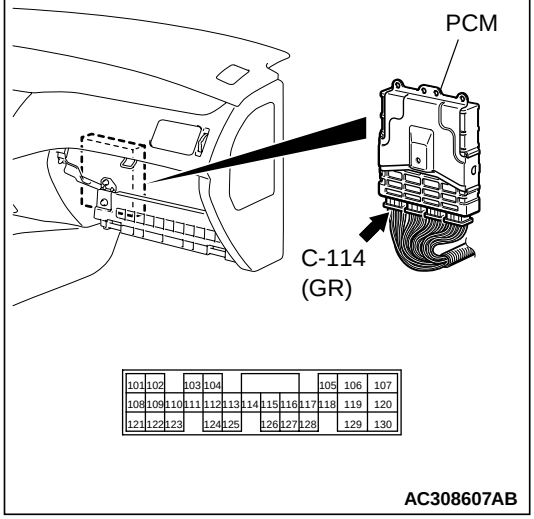
YES : Go to Step 12.
NO : Go to Step 10.

CONNECTORS: C-105, C-124



AC308051AJ

CONNECTOR: C-114



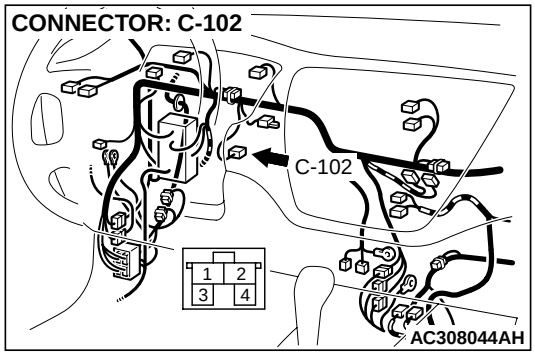
AC308607AB

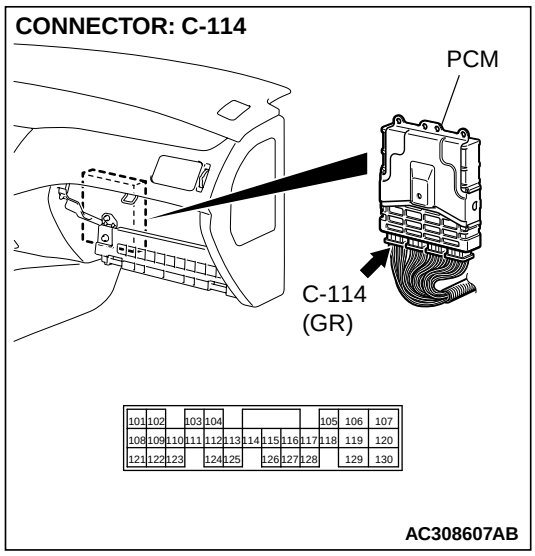
STEP10. Check joint connector (6) C-105, PCM connector C-114 and intermediate connector C-124 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

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



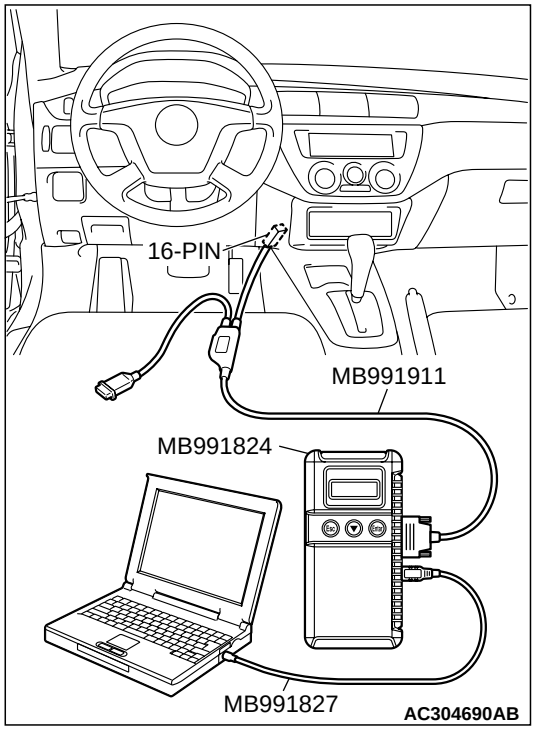


STEP 11. Check the harness for damage between stoplight switch connector C-102 terminal 1 and PCM connector C-114 terminal 123.

Q: Is the harness wire in good condition?

YES : Go to Step 12.

NO : Repair or replace the harness wire.



STEP 12. Using scan tool MB991958, check data list item 26: Stoplight Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 26: Stoplight Switch.
  - When the brake pedal is depressed, the display on scan tool MB991958 should be "ON."
  - When the brake pedal is not depressed, the display on scan tool MB991958 should be "OFF."

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

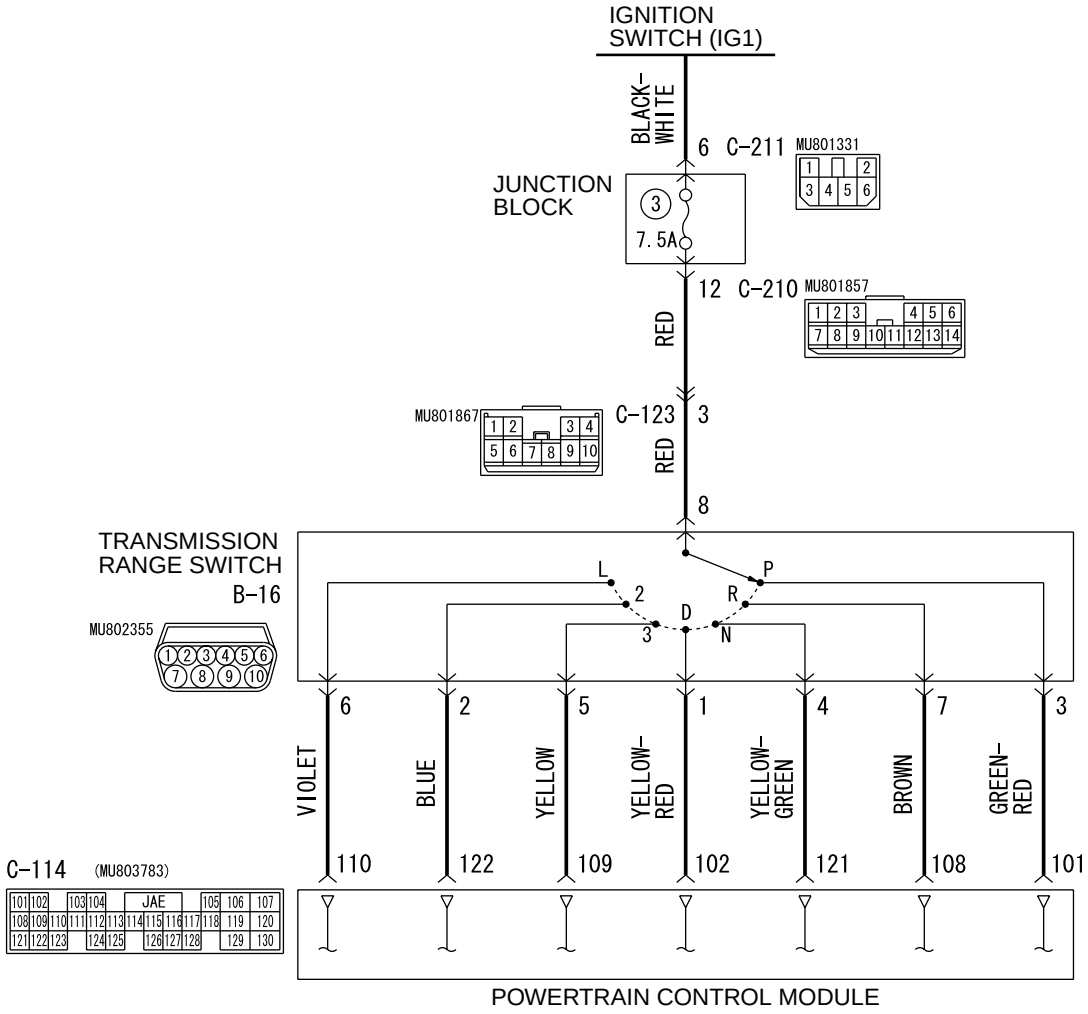
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction may be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

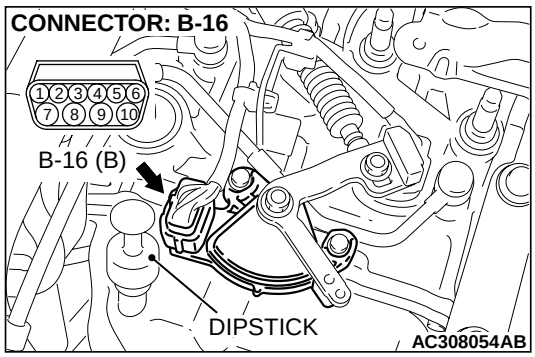
NO : Replace the PCM.

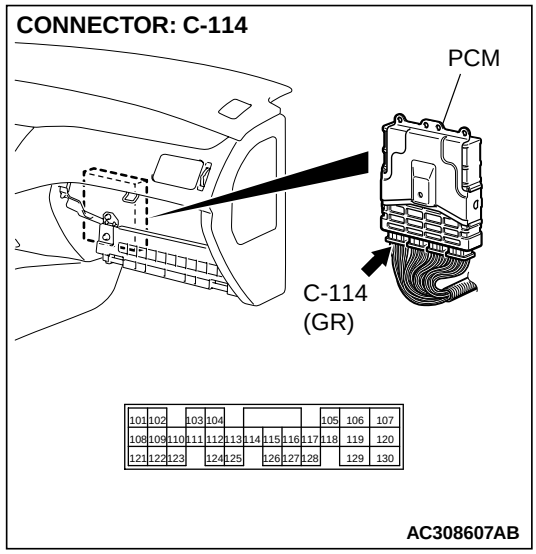
DTC 27 (P0705): Transmission Range Switch System (Open Circuit)

Transmission Range Switch System Circuit

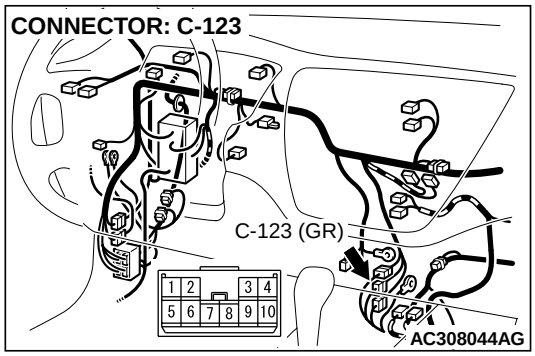


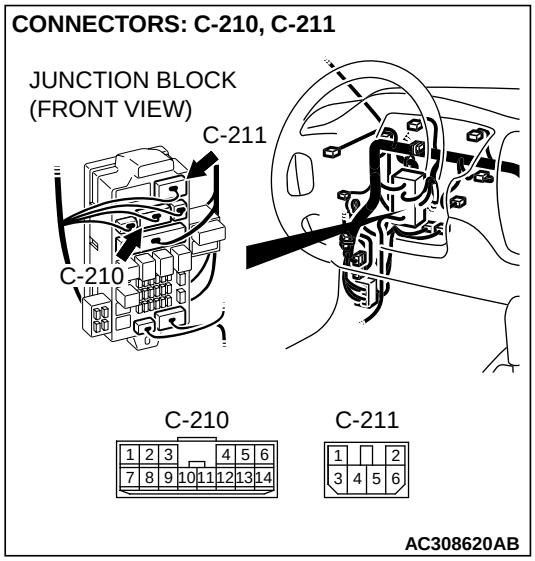
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CIRCUIT OPERATION

- Battery positive voltage is applied to the transmission range switch (terminal 8) when the ignition switch is turned "ON."
- Battery positive voltage is applied to the PCM (terminal 101) when the transmission range is in the "P" range. The PCM judges that the transmission range is in the "P" range when the battery positive voltage is applied.
- Battery positive voltage is applied to the PCM terminal 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.

DESCRIPTIONS OF MONITOR METHODS

- If no signal is input from transmission range switch for more than 30 seconds, PCM judges that transmission range switch has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

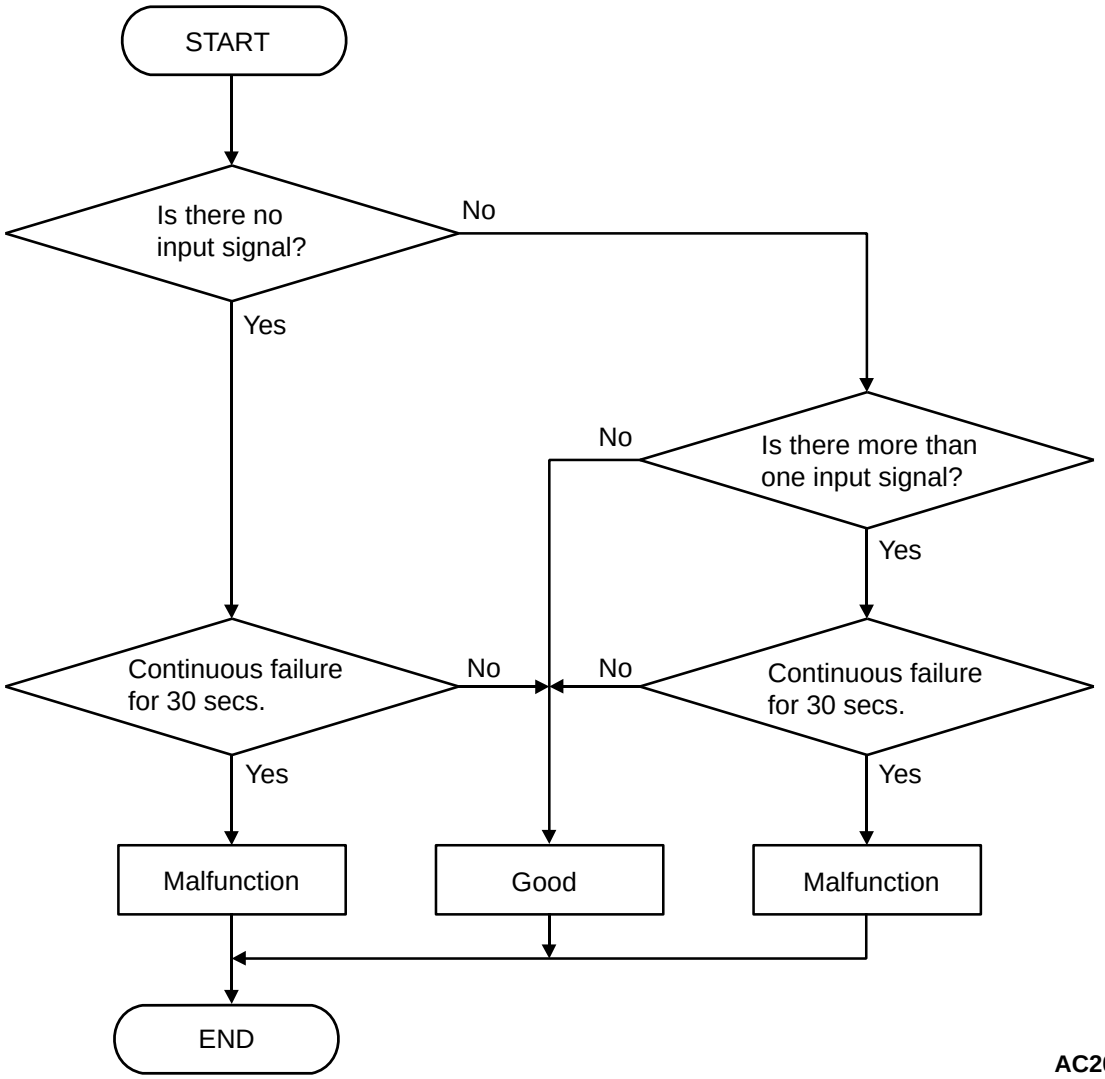
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

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LOGIC FLOW CHARTS (Monitor Sequence)



DTC SET CONDITIONS

Check Conditions, Judgement Criteria

- Transmission range switch: no signal detected. (30 seconds)

OBD-II DRIVE CYCLE PATTERN

Start the engine, keep the vehicle stopped in "P," "R," "N," "D," "3," "2" and "L" ranges respectively for more than one minute, and turn "LOCK" (OFF) the ignition switch. Then restart the engine, and stop the vehicle in "P," "R," "N," "D," "3," "2" and "L" ranges respectively for more than one minute.

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

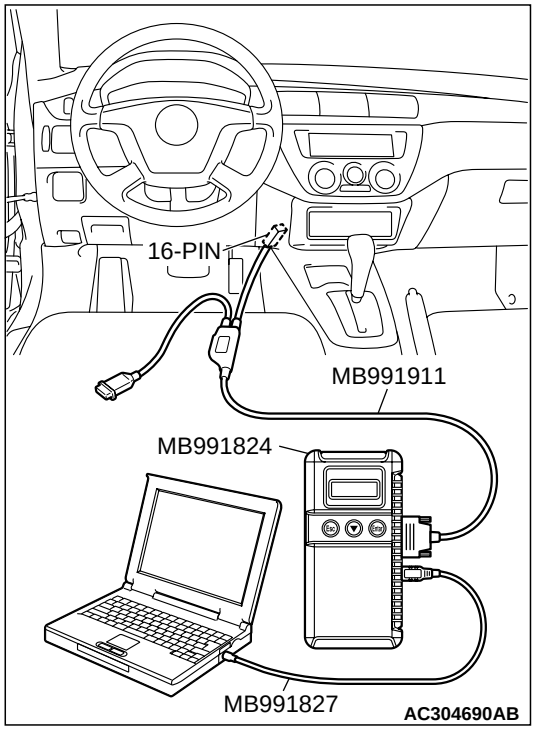
- Malfunction of the transmission range switch
- Malfunction of the ignition switch
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

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STEP 1. Using scan tool MB991958, check data list item 61: Transmission Range Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 61: Transmission Range Switch.
  - Move the selector lever to "P," "R," "N," "D," "3," "2" and "L" positions and confirm that the selected transmission range match the positions shown on scan tool MB991958.

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

Q: Does the scan tool indication correspond to the actual transmission range?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO (no correct transmission range is displayed) : Go to Step 2.

NO (Only "P" position is not displayed correctly) : Go to Step 6.

NO (Only "R" position is not displayed correctly) : Go to Step 12.

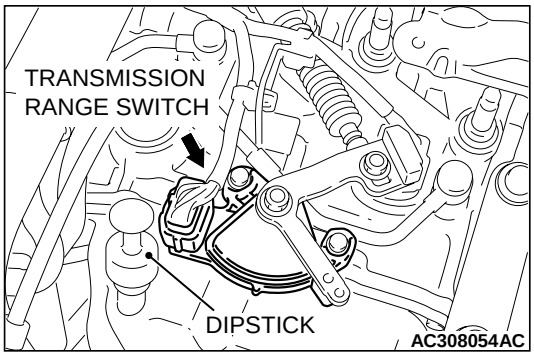
NO (Only "N" position is not displayed correctly) : Go to Step 17.

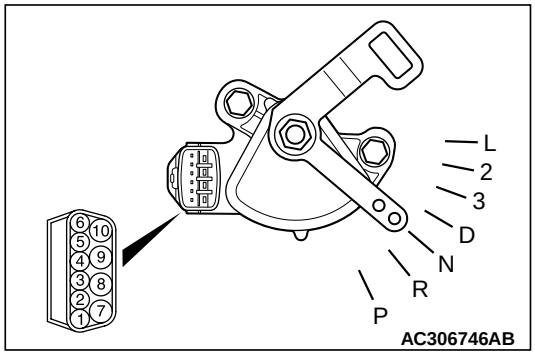
NO (Only "D" position is not displayed correctly) : Go to Step 22.

NO (Only "3" position is not displayed correctly) : Go to Step 27.

NO (Only "2" position is not displayed correctly) : Go to Step 32.

NO (Only "L" position is not displayed correctly) : Go to Step 37.





STEP 2. Check the transmission range switch.

Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

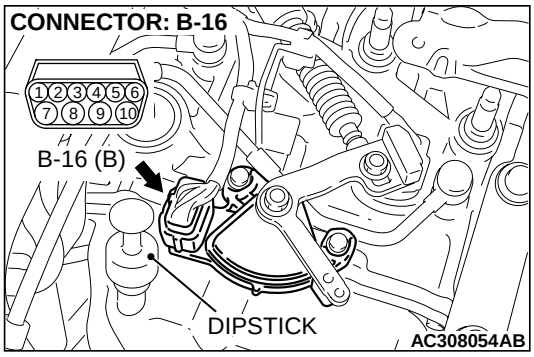
YES : Go to Step 3.

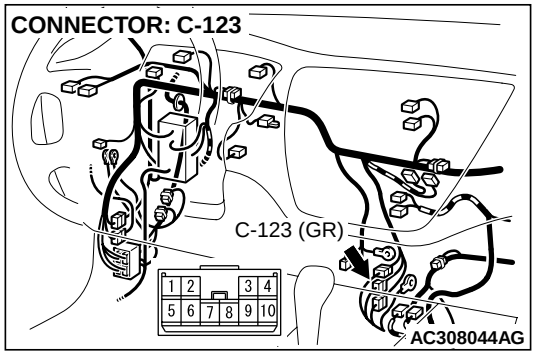
NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

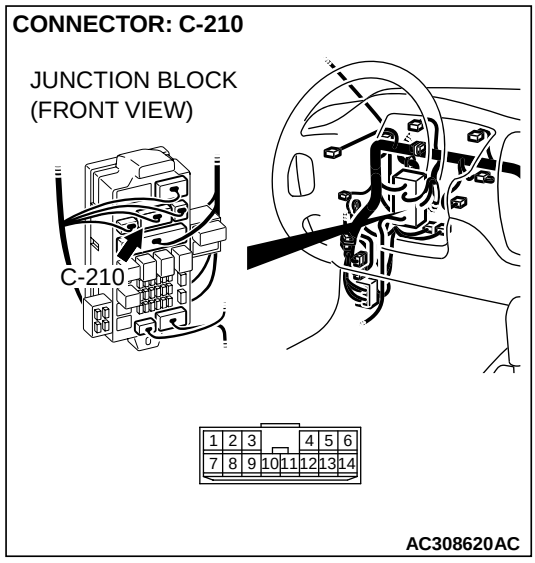
STEP 3. Check transmission range switch connector B-16, intermediate connector C-123 and junction block connector C-210 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

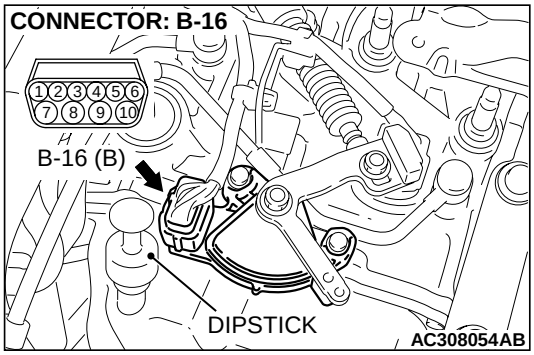
YES : Go to Step 4.

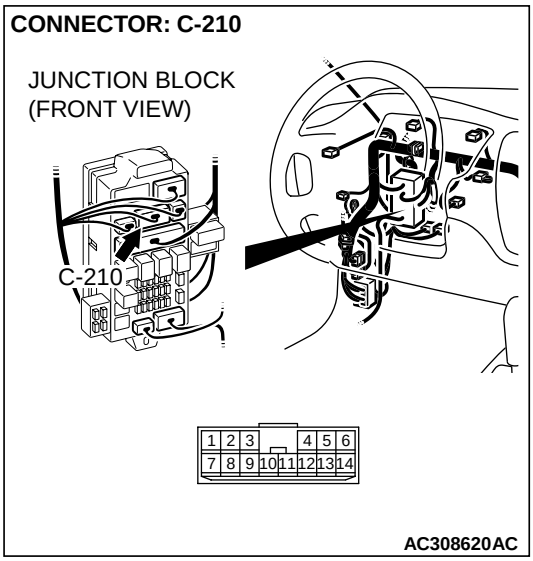
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









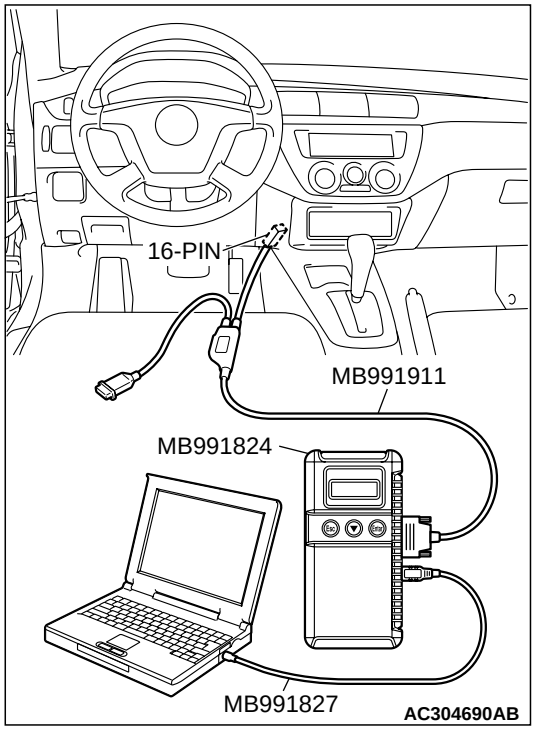


STEP 4. Check harness for open or short circuit to ground between transmission range switch connector B-16 terminal 8 and junction block connector C-210 terminal 12.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.



STEP 5. Using scan tool MB991958, check data list item 61:Transmission Range Switch.

⚠ CAUTION

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

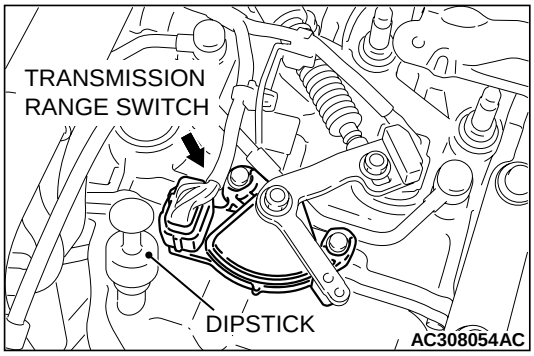
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 61: Transmission Range Switch.
  - Move the selector lever to "P," "R," "N," "D," "3," "2" and "L" positions and confirm that the selected transmission range match the positions shown on scan tool MB991958.

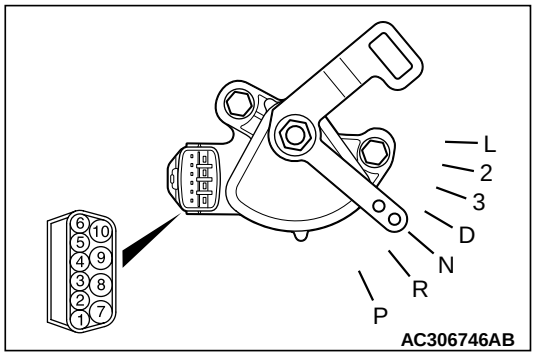
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.





STEP 6. Check the transmission range switch.

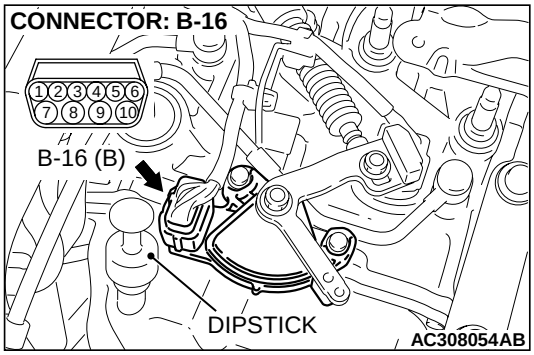
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 7.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

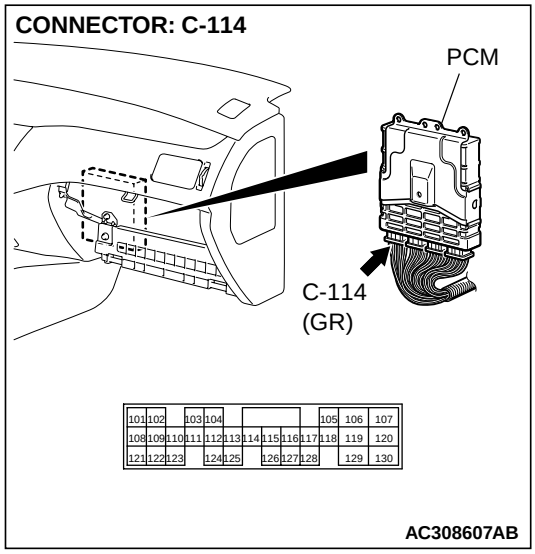


STEP 7. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 8.

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

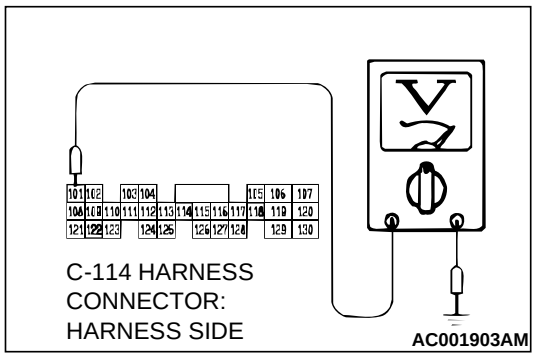


STEP 8. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.

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

(3) Move the selector lever to the "P" position.



(4) Measure the voltage between terminal 101 and ground.

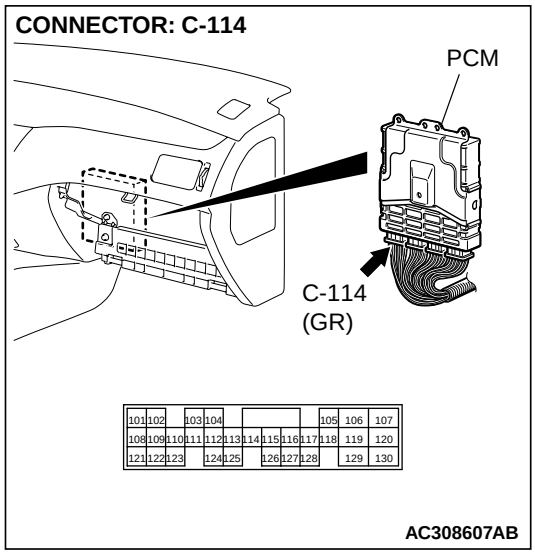
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

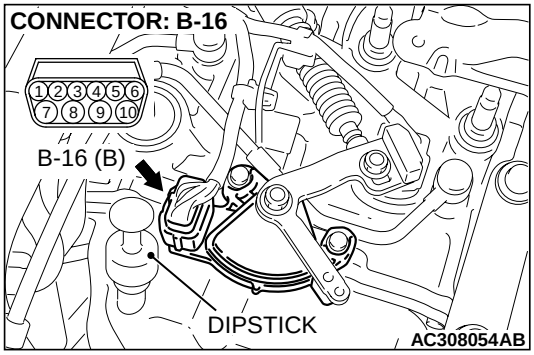


STEP 9. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 10.

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

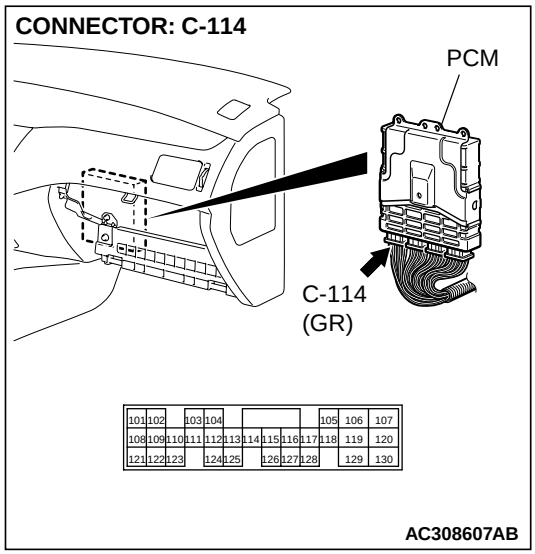


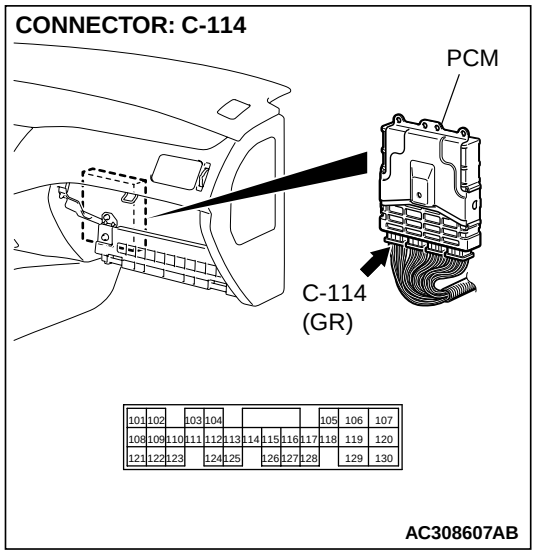
STEP 10. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 3 and PCM connector C-114 terminal 101.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.



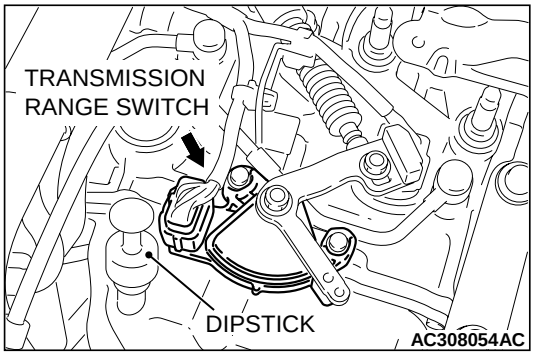


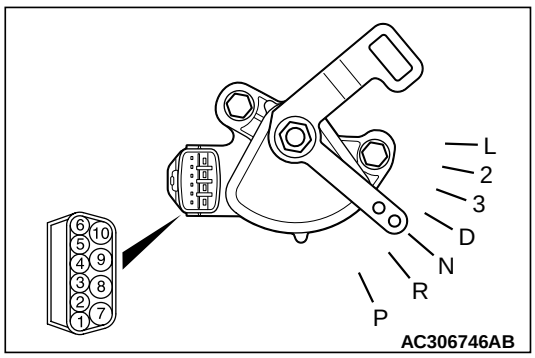
STEP 11. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 5.

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





STEP 12. Check the transmission range switch.

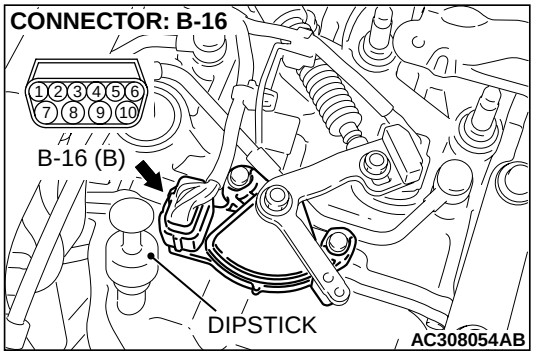
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 13.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

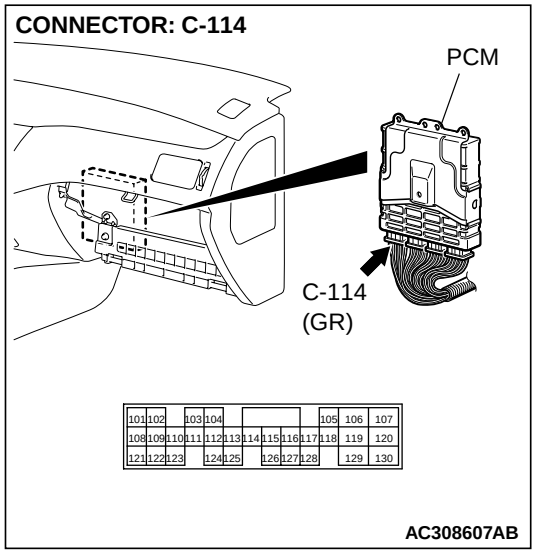


STEP 13. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 14.

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

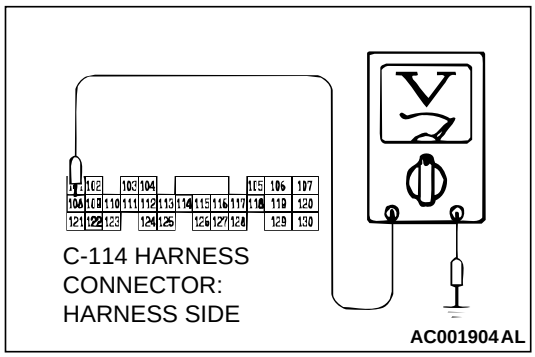


STEP 14. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.

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

(3) Move the selector lever to the "R" position.



(4) Measure the voltage between terminal 108 and ground.

- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

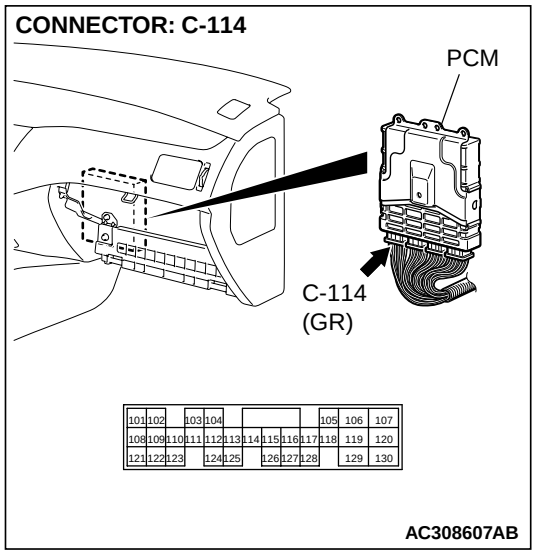
NO : Go to Step 15.

STEP 15. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 16.

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

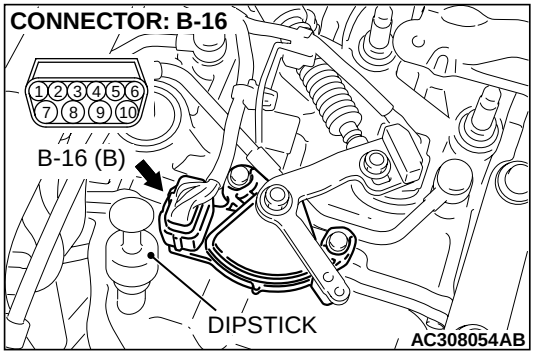


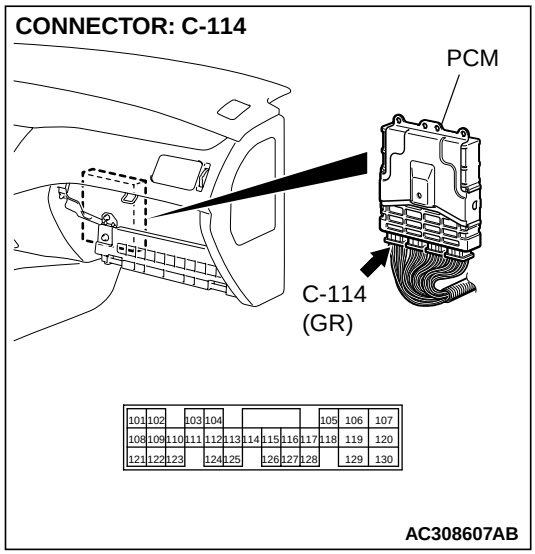
STEP 16. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 7 and PCM connector C-114 terminal 108.

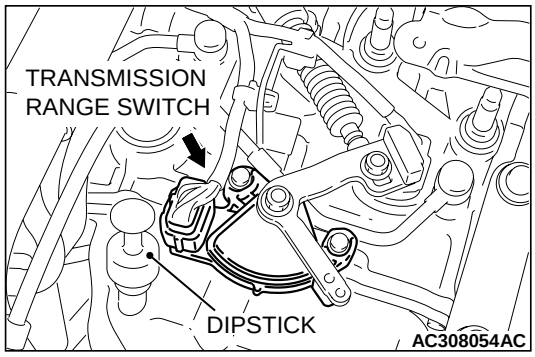
Q: Is the harness wire in good condition?

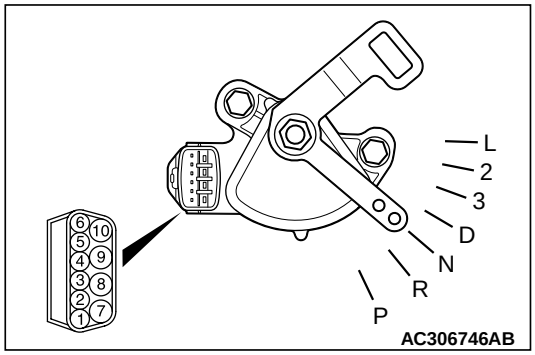
YES : Go to Step 5.

NO : Repair or replace the harness wire.









STEP 17. Check the transmission range switch.

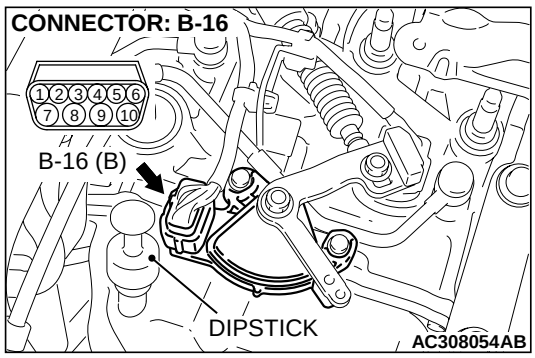
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 18.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.



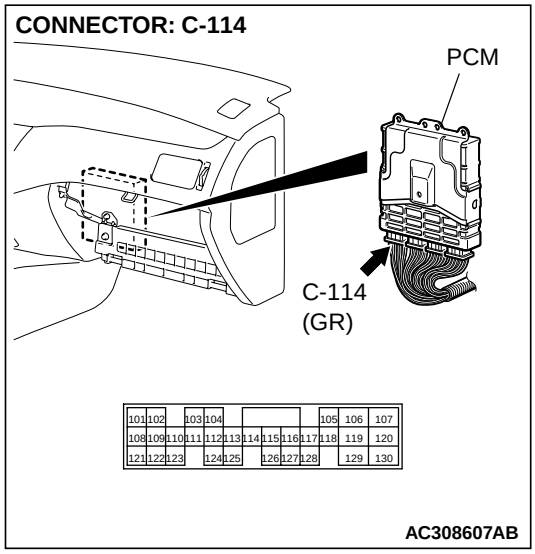
STEP 18. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

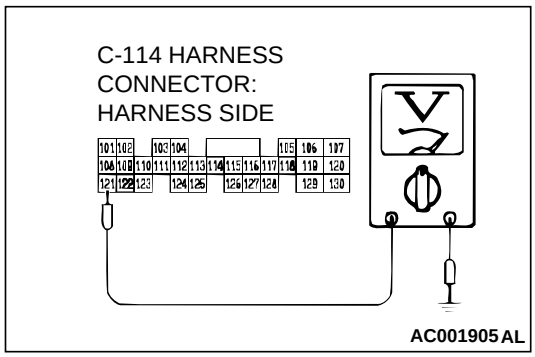
YES : Go to Step 19.

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

STEP 19. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.



(1) Do not disconnect connector C-114.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "N" position.



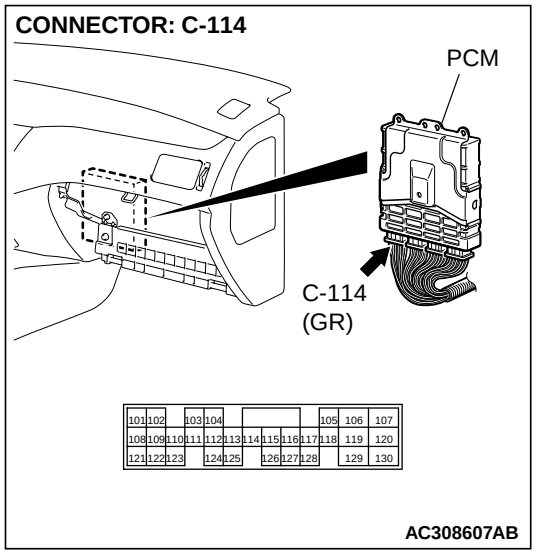
(4) Measure the voltage between terminal 121 and ground.
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

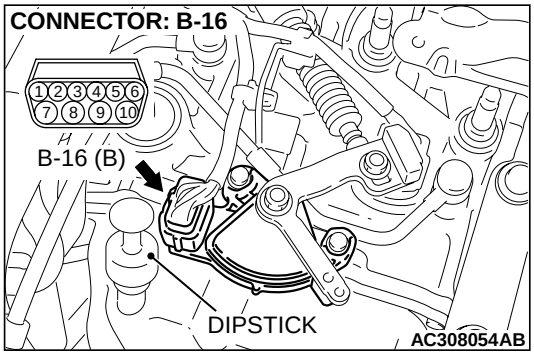
YES : Go to Step 11.
NO : Go to Step 20.

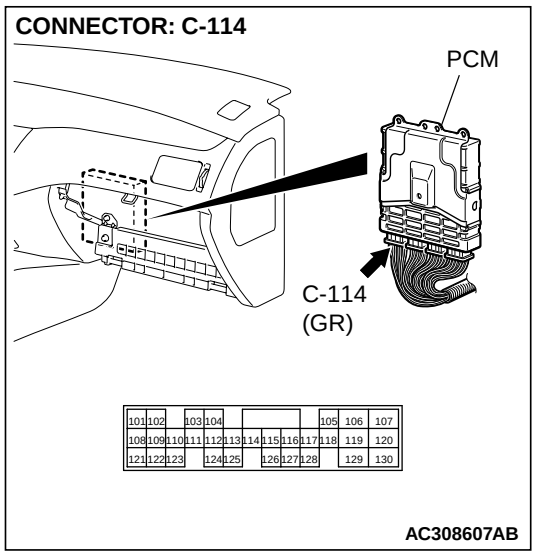
STEP 20. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

YES : Go to Step 21.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



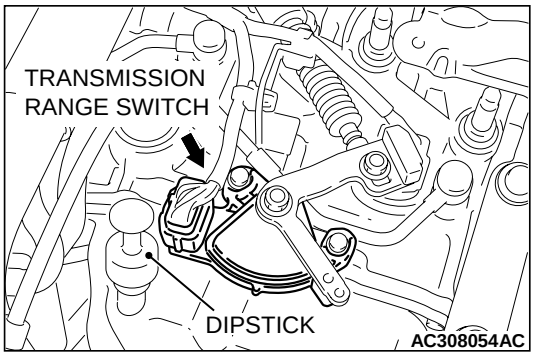


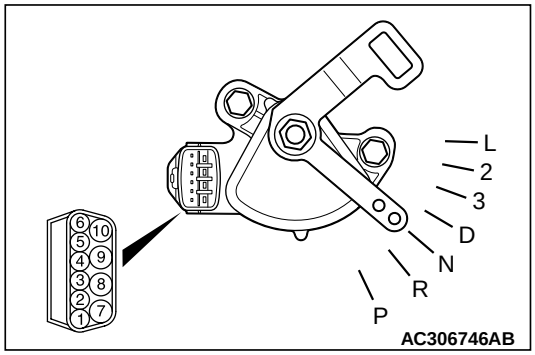
STEP 21. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 4 and PCM connector C-114 terminal 121.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.





STEP 22. Check the transmission range switch.

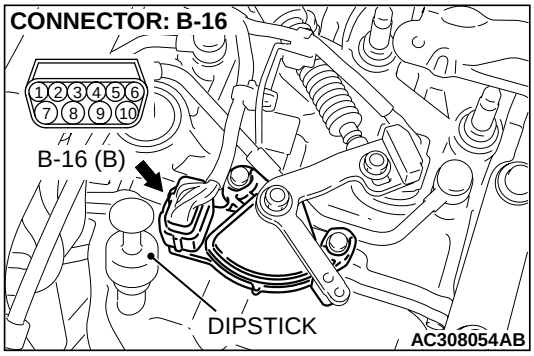
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 23.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

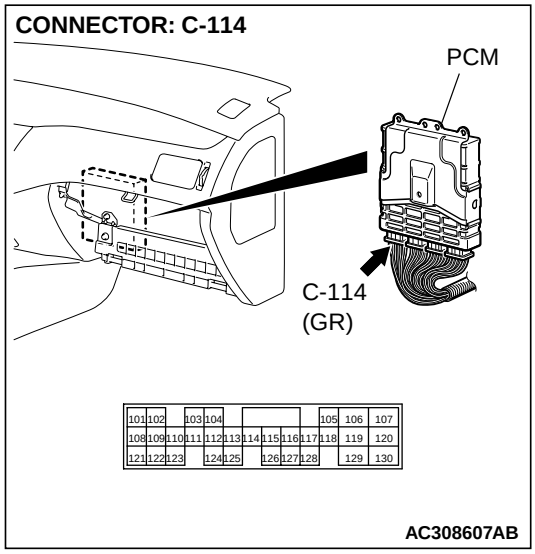


STEP 23. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

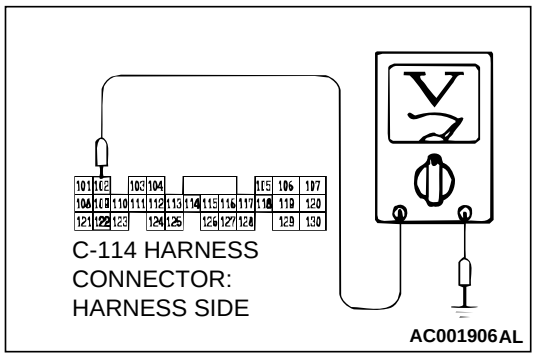
YES : Go to Step 24.

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



STEP 24. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "D" position.



(4) Measure the voltage between terminal 102 and ground.
- The voltage should be measured battery positive voltage.

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

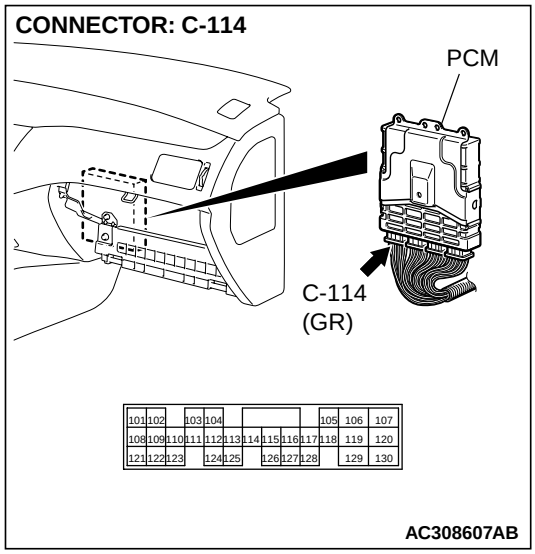
Q: Is the measured voltage battery positive voltage?

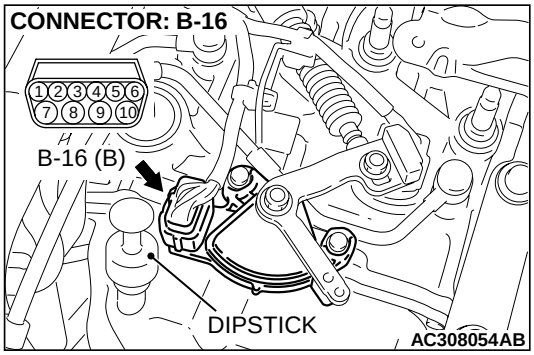
YES : Go to Step 11.
NO : Go to Step 25.

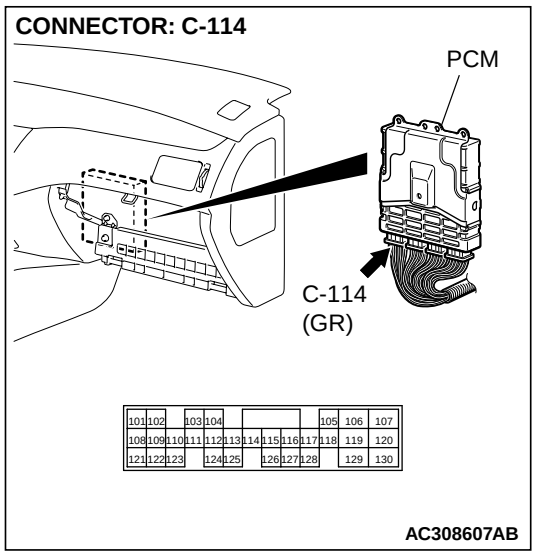
STEP 25. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 26.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





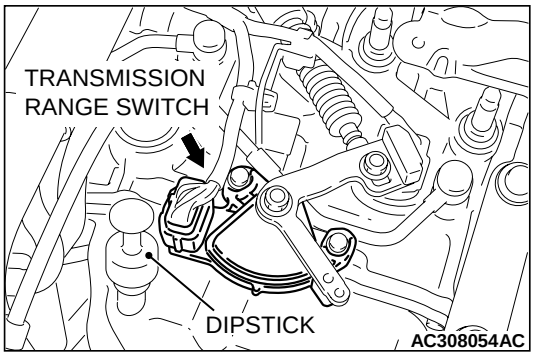


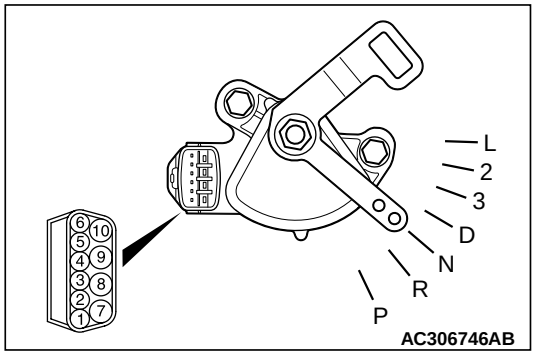
STEP 26. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 1 and PCM connector C-114 terminal 102.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.





STEP 27. Check the transmission range switch.

Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 28.

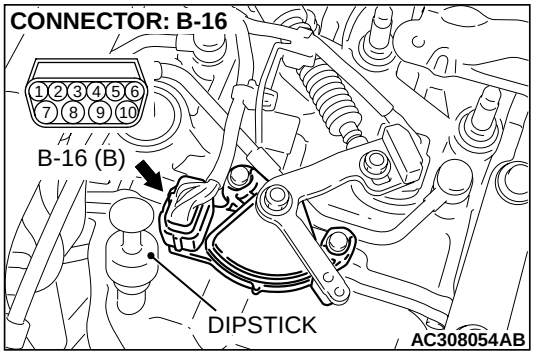
NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

STEP 28. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

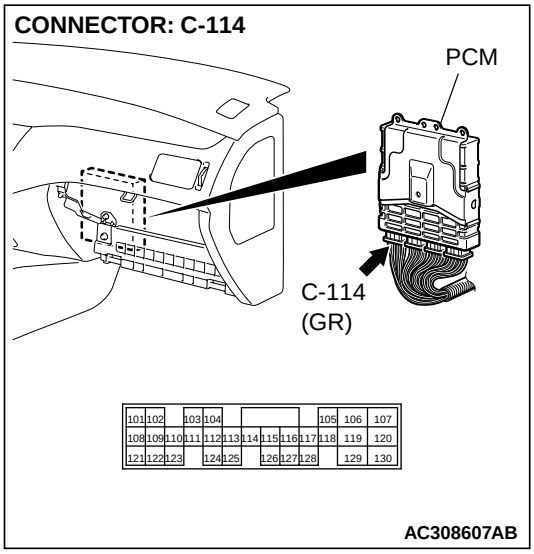
YES : Go to Step 29.

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



STEP 29. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "3" position.

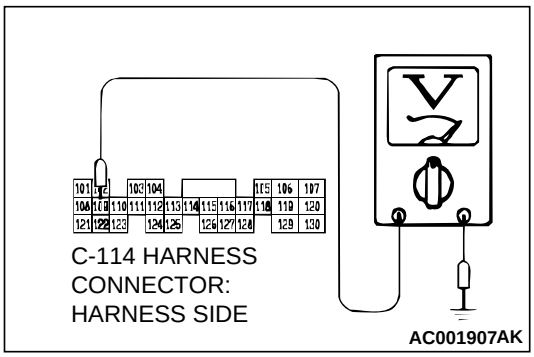


(4) Measure the voltage between terminal 109 and ground.
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

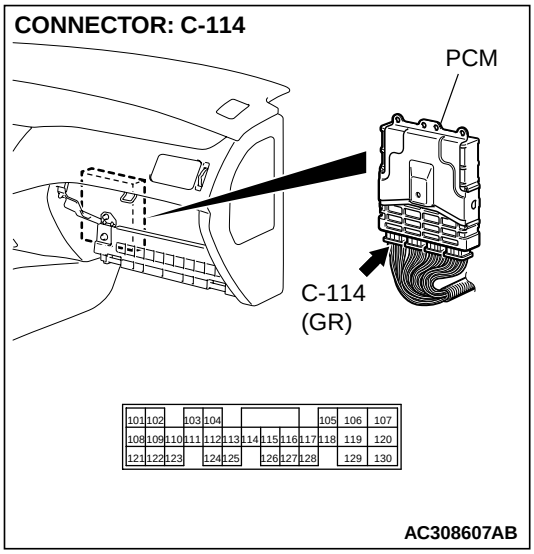
YES : Go to Step 11.
NO : Go to Step 30.

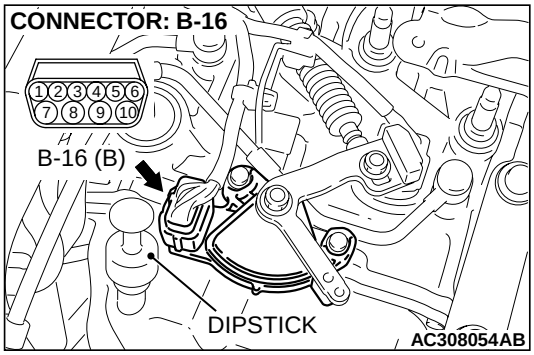


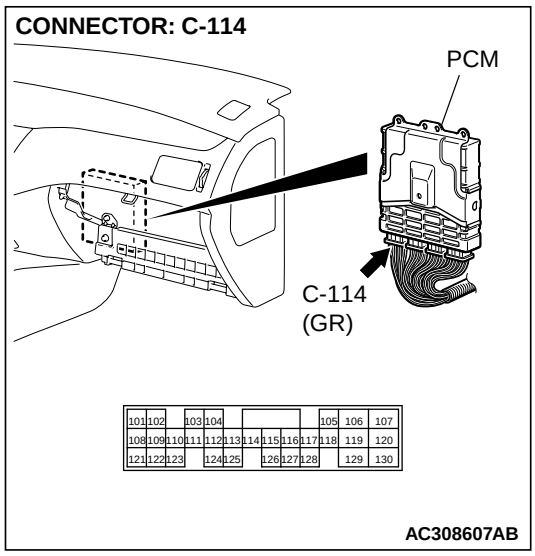
STEP 30. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 31.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





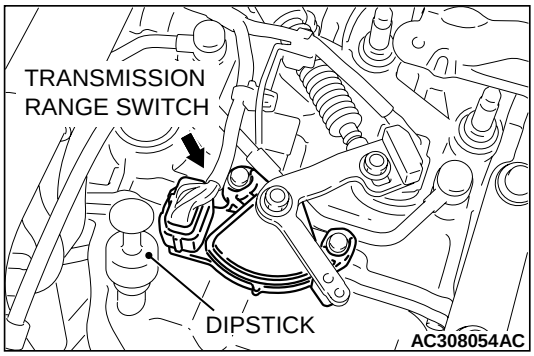


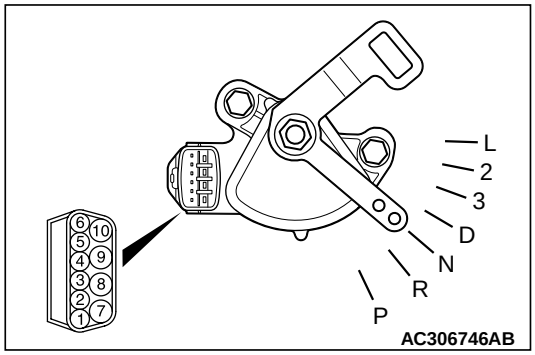
STEP 31. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 5 and PCM connector C-114 terminal 109.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.





STEP 32. Check the transmission range switch.

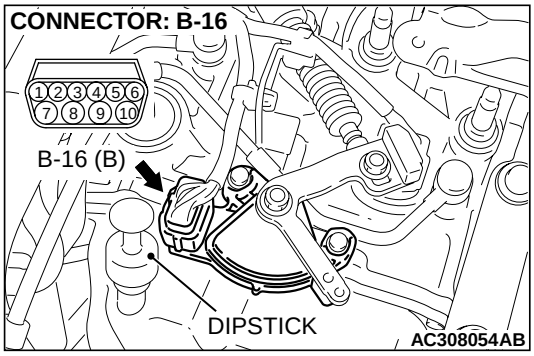
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 33.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

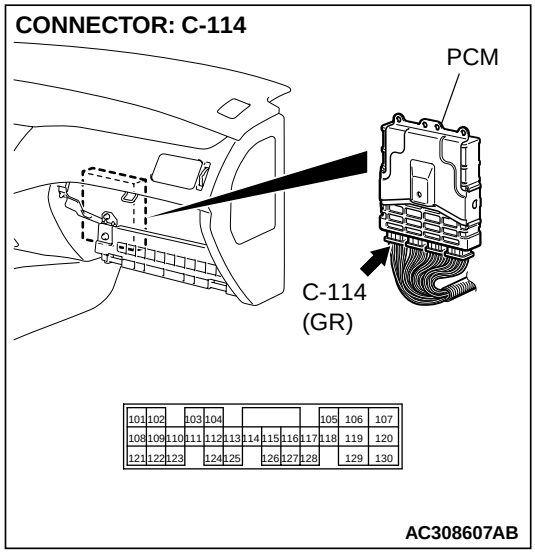


STEP 33. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

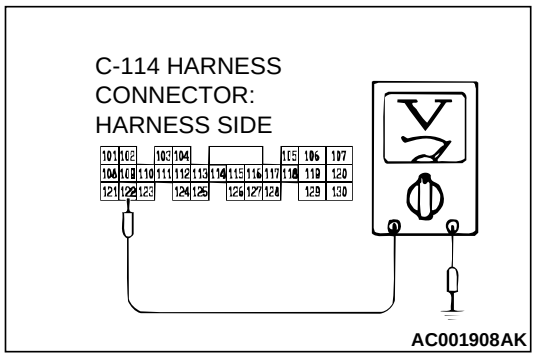
YES : Go to Step 34.

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



STEP 34. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.

(1) Do not disconnect connector C-114.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "2" position.



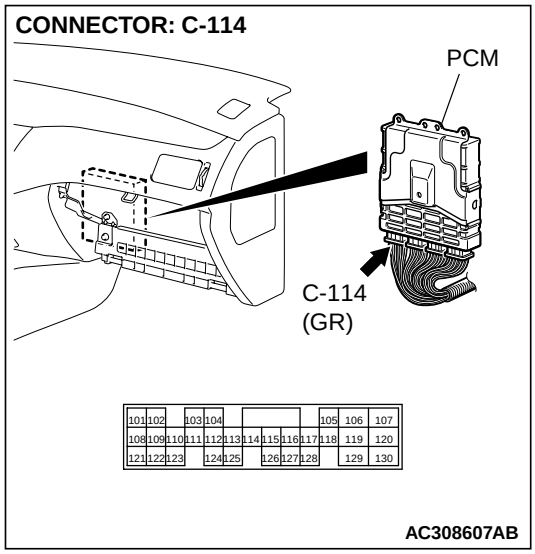
(4) Measure the voltage between terminal 122 and ground.
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

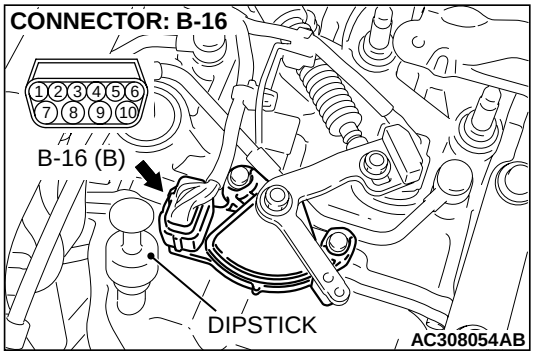
YES : Go to Step 11.
NO : Go to Step 35.

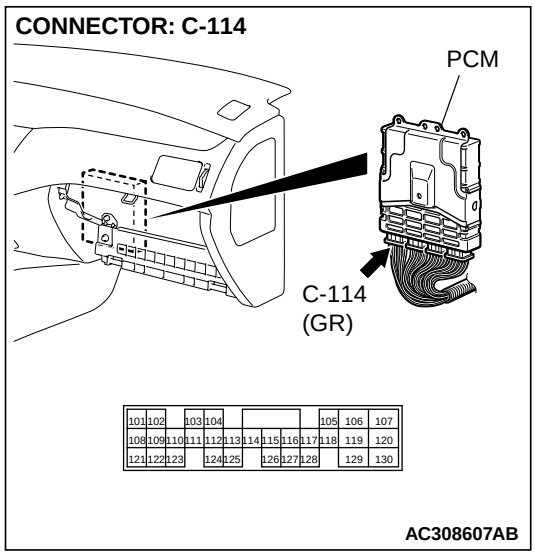
STEP 35. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

YES : Go to Step 36.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



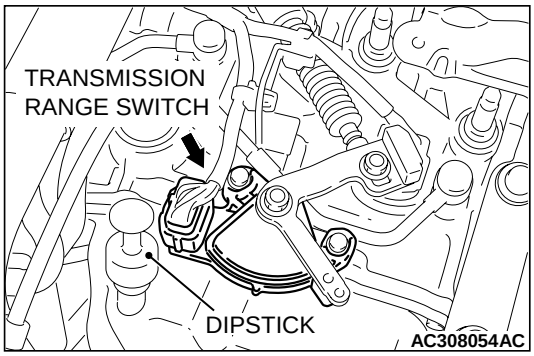


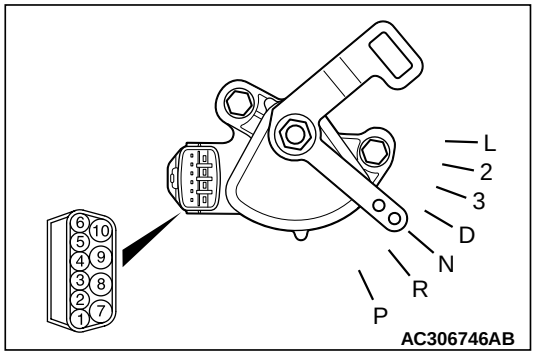
STEP 36. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 2 and PCM connector C-114 terminal 122.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.





STEP 37. Check the transmission range switch.

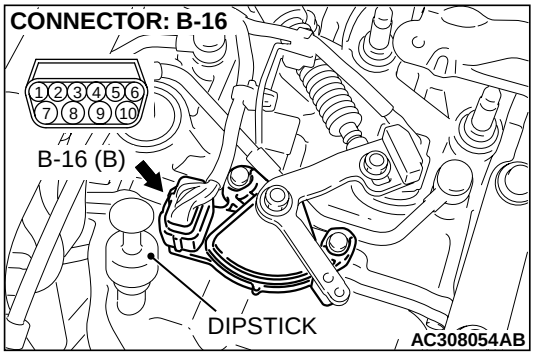
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each transmission range?

YES : Go to Step 38.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.



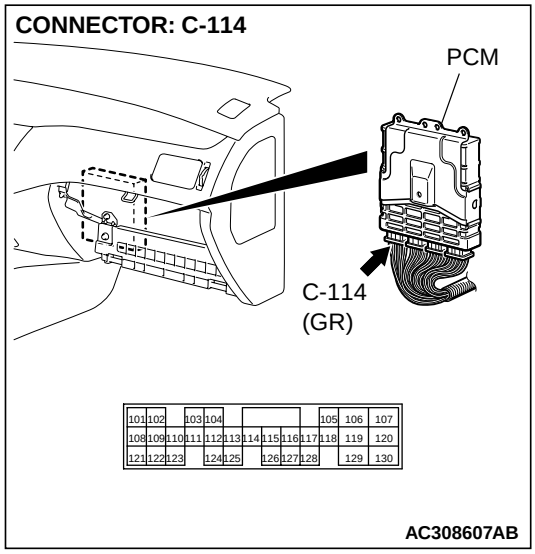
STEP 38. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

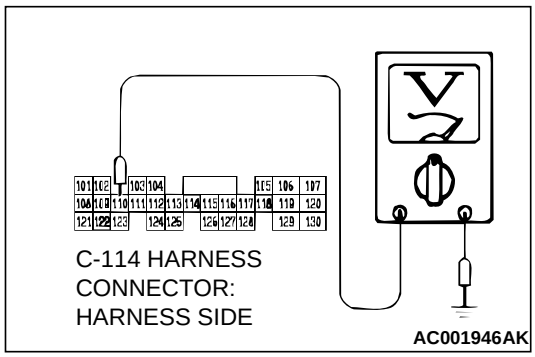
YES : Go to Step 39.

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

STEP 39. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing.



(1) Do not disconnect connector C-114.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "L" position.



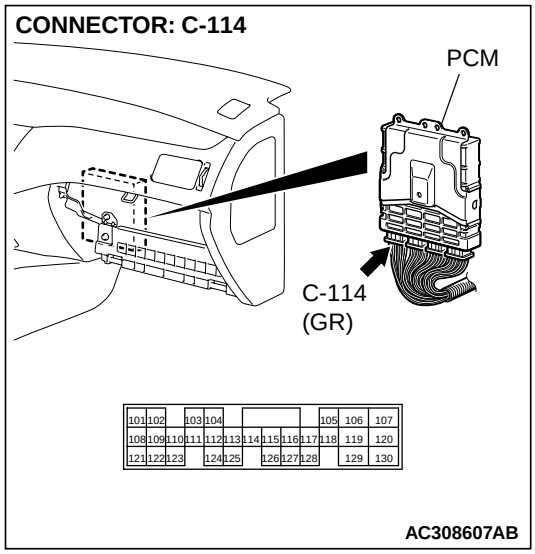
(4) Measure the voltage between terminal 110 and ground.
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

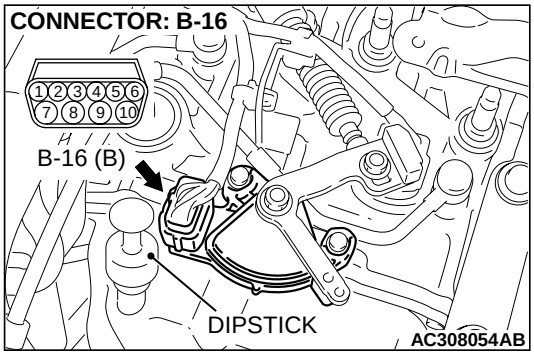
YES : Go to Step 11.
NO : Go to Step 40.

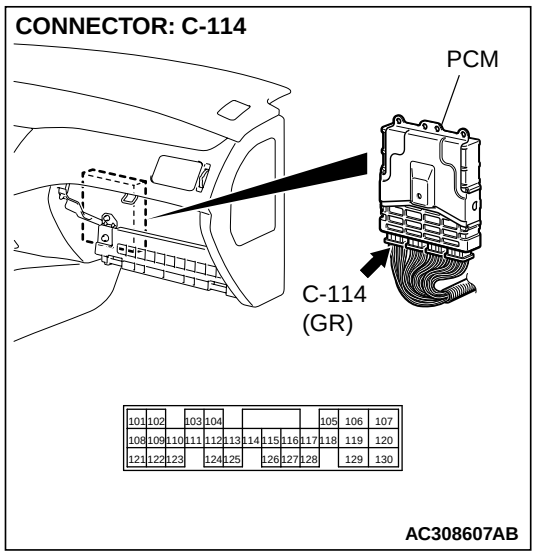
STEP 40. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

YES : Go to Step 41.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 41. Check harness for open circuit or short circuit to ground between transmission range switch connector B-16 terminal 6 and PCM connector C-114 terminal 110.
Q: Is the harness wire in good condition?

YES : Go to Step 5.
NO : Repair or replace the harness wire.

DTC 28 (P0705): Transmission Range Switch System (Short Circuit)

Transmission Range Switch System Circuit
Refer to P.23A-109.

CIRCUIT OPERATION
Refer to P.23A-109.

DESCRIPTIONS OF MONITOR METHODS
- If two types or more of signals are input from transmission range switch for more than 30 seconds, PCM judges that transmission range switch has a failure.

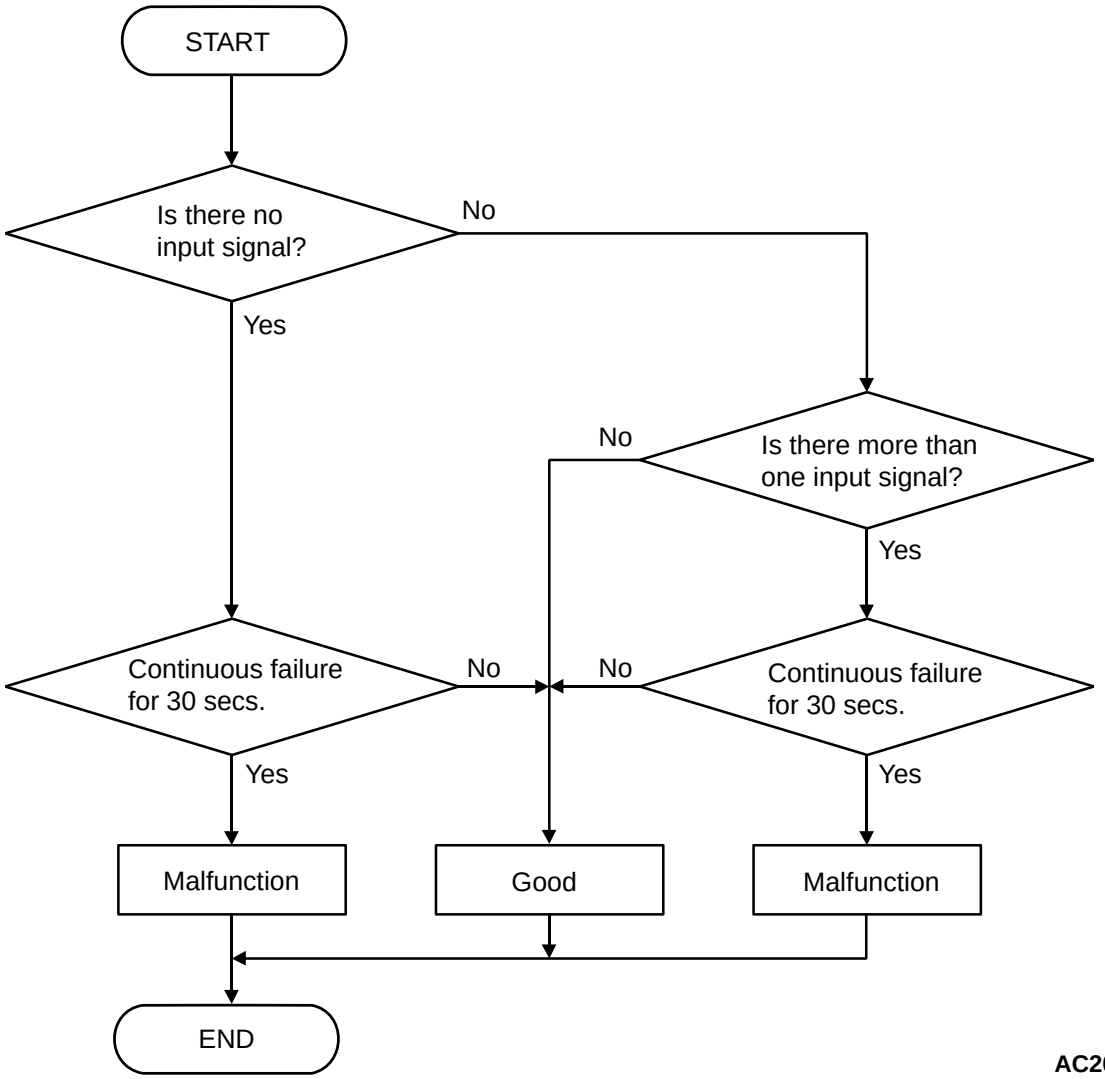
MONITOR EXECUTION
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- Not applicable

Sensor (The sensor below is determined to be normal)
- Not applicable

LOGIC FLOW CHARTS (Monitor Sequence)



AC205064

DTC SET CONDITIONS

Check Conditions, Judgement Criteria

- Transmission range switch: multiple signal. (30 seconds)

OBD-II DRIVE CYCLE PATTERN

Start the engine, keep the vehicle stopped in "P," "R," "N," "D," "3," "2" and "L" ranges respectively for more than one minute, and turn "LOCK" (OFF) the ignition switch. Then restart the engine, and stop the vehicle in "P," "R," "N," "D," "3," "2" and "L" ranges respectively for more than one minute.

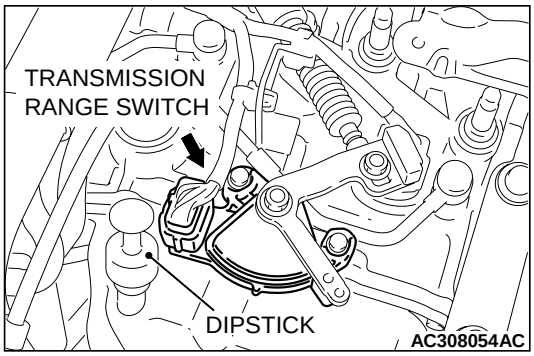
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

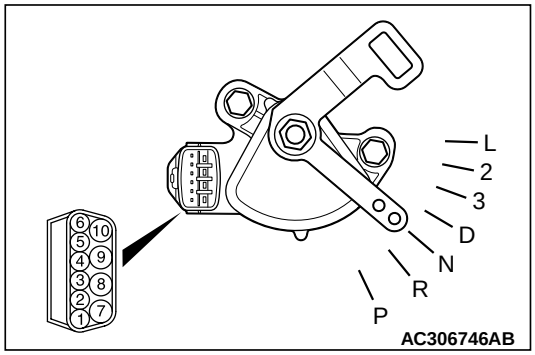
- Malfunction of the transmission range switch circuit
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main harness B





STEP 1. Check the transmission range switch.

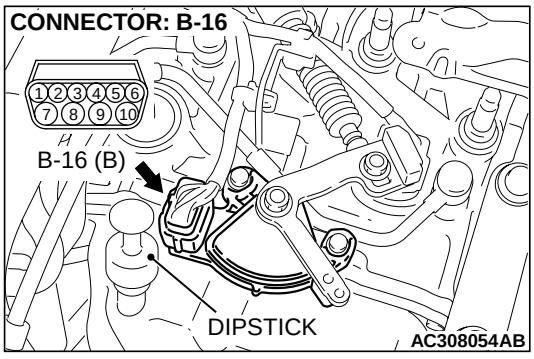
Measure the resistance between the terminals for each transmission range as indicated in the table below.

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

Q: Is the measured resistance less than 2 ohms for each selector position?

YES : Go to Step 2.

NO : Replace the transmission range switch. Refer to GROUP 23C, Transaxle P.23C-9.

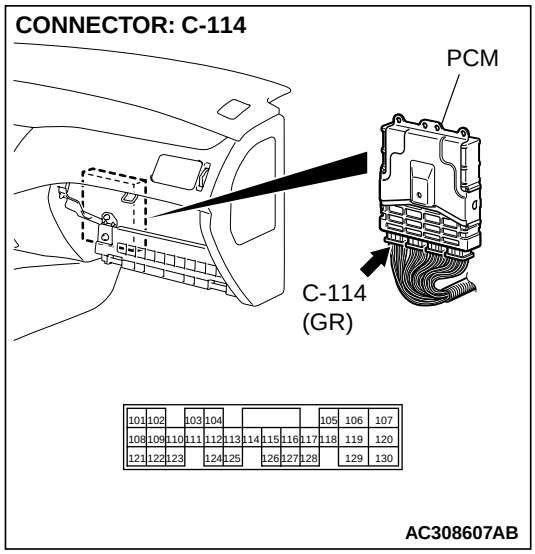


STEP 2. Check transmission range switch connector B-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 3.

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



STEP 3. Check PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

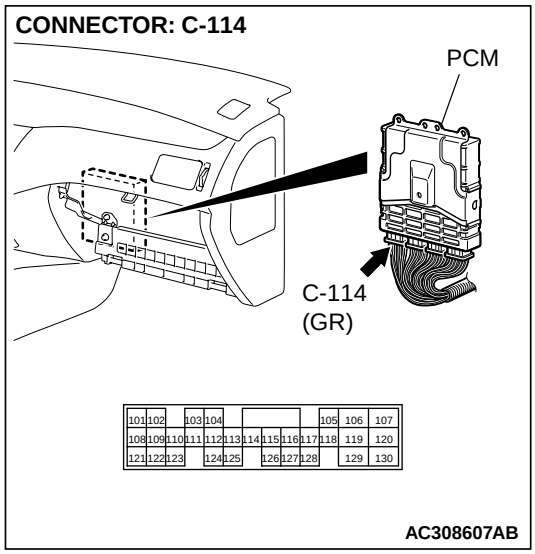
YES : Go to Step 4.

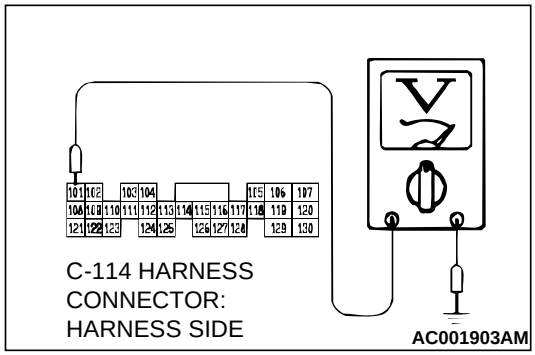
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("P" position)

(1) Do not disconnect connector C-114.

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





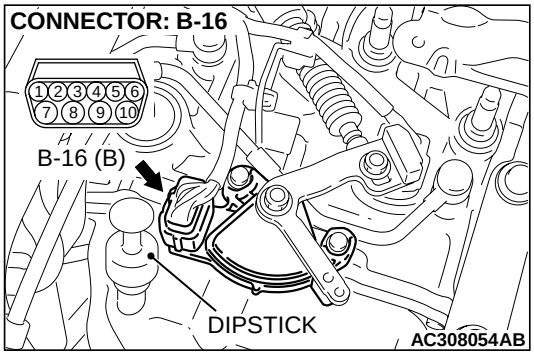
(3) Measure the voltage between terminal 101 and ground.

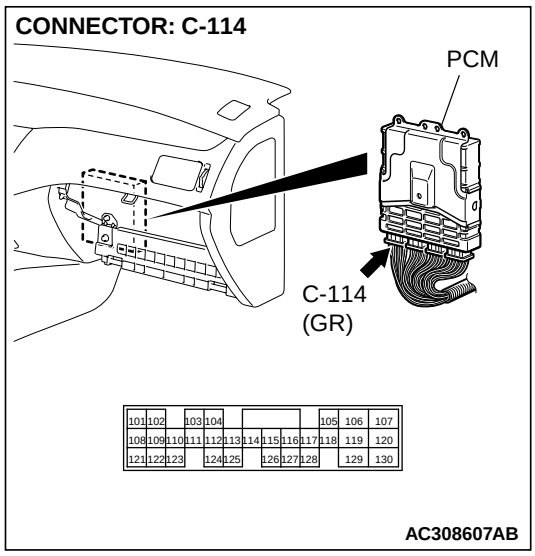
- When transmission range is "P," voltage should equal battery positive voltage.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 6.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 5.



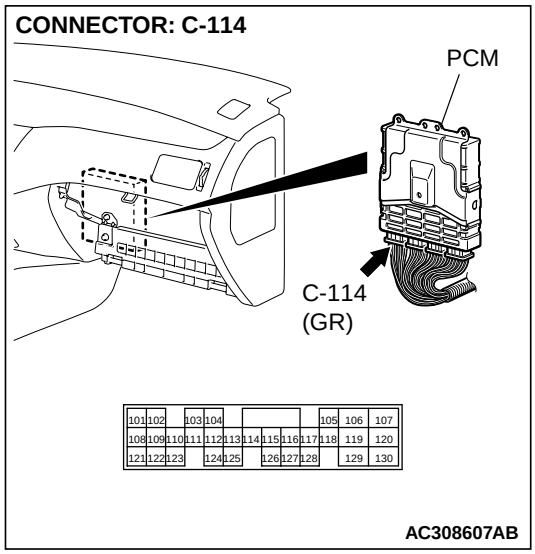


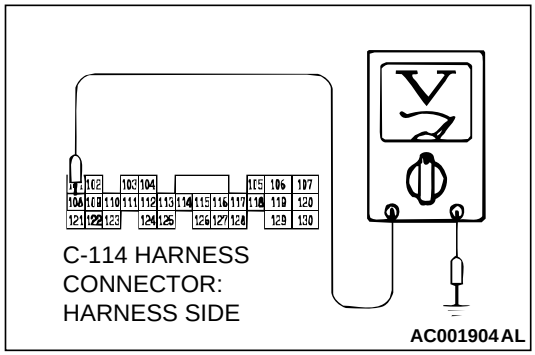
STEP 5. Check harness for damage between transmission range switch connector B-16 terminal 3 and PCM connector C-114 terminal 101.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 6. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("R" position)

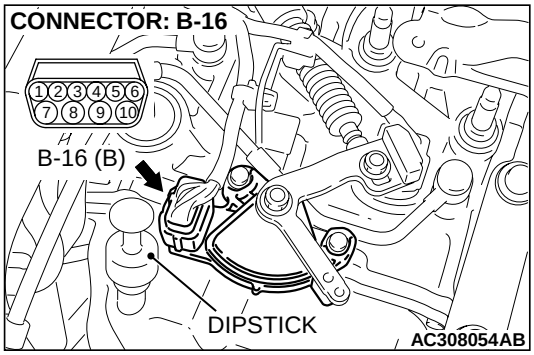
Measure the voltage between terminal 108 and ground.

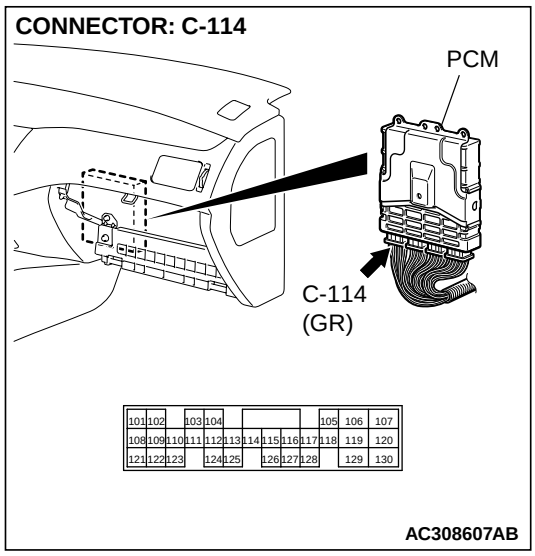
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should equal battery positive voltage.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 8.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 7.



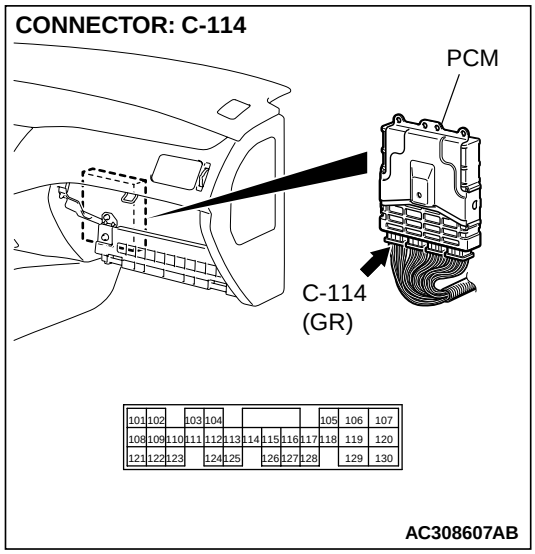


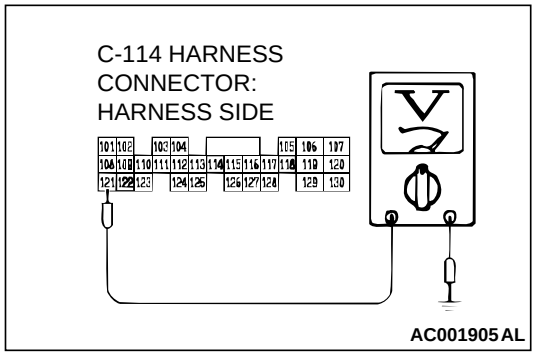
STEP 7. Check the harness for damage between transmission range switch connector B-16 terminal 7 and PCM connector C-114 terminal 108.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 8. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("N" position)

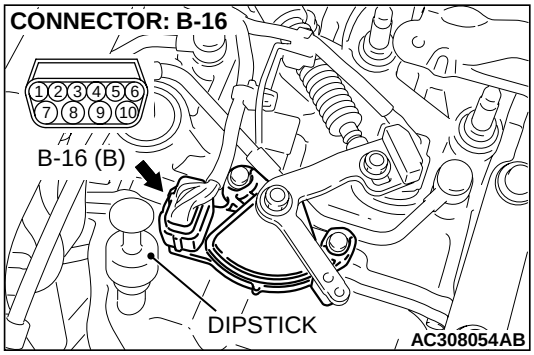
Measure the voltage between terminal 121 and ground.

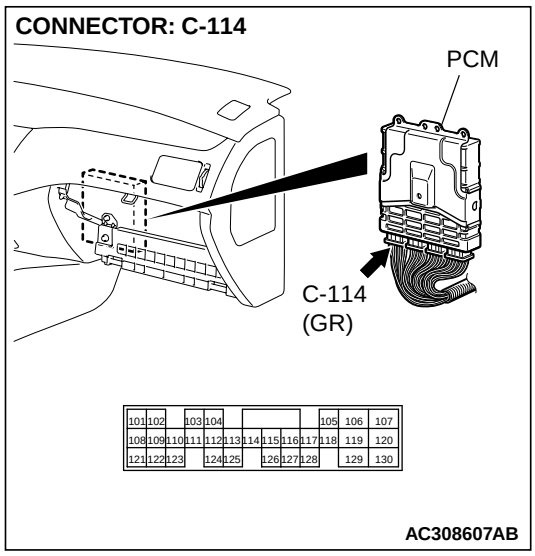
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should equal battery positive voltage.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 10.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 9.



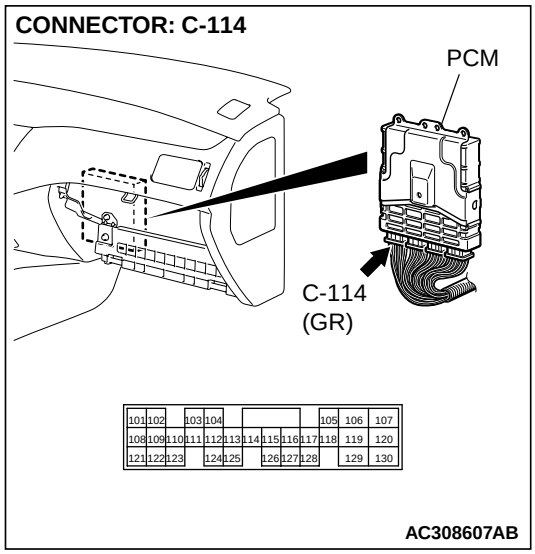


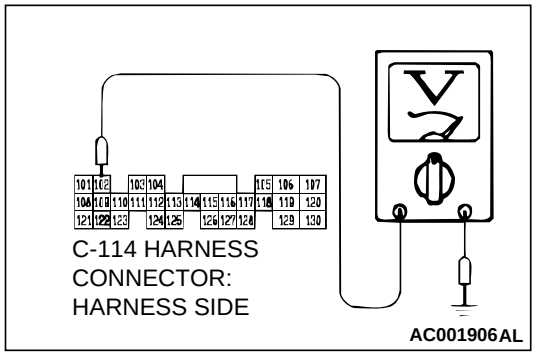
STEP 9. Check the harness for damage between and transmission range switch connector B-16 terminal 4 PCM connector C-114 terminal 121.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 10. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("D" position)

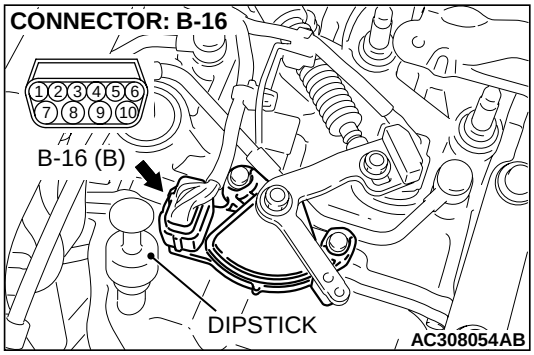
Measure the voltage between terminal 102 and ground.

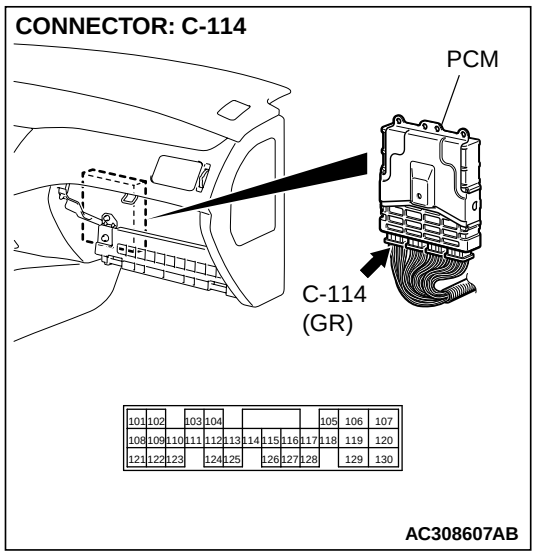
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should equal battery positive voltage.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 12.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 11.



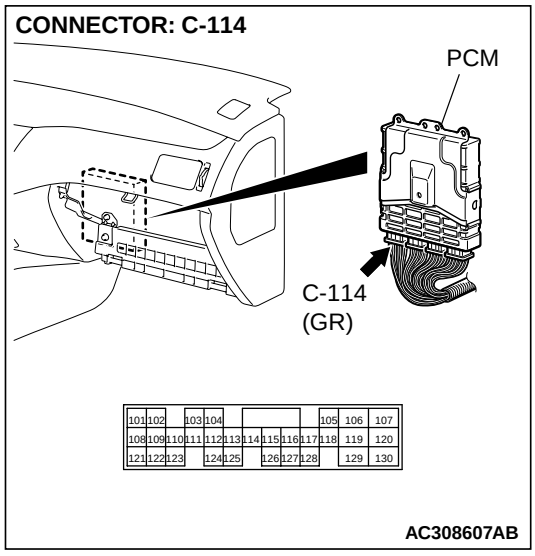


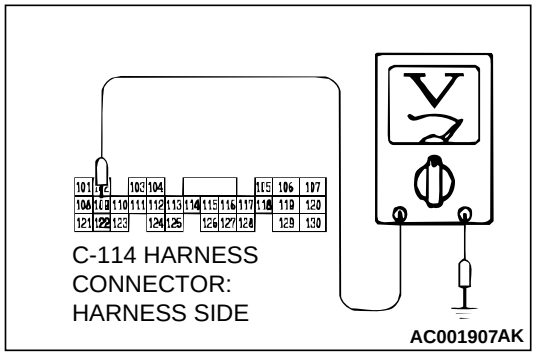
STEP 11. Check the harness for damage between transmission range switch connector B-16 terminal 1 and PCM connector C-114 terminal 102.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 12. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("3" position)

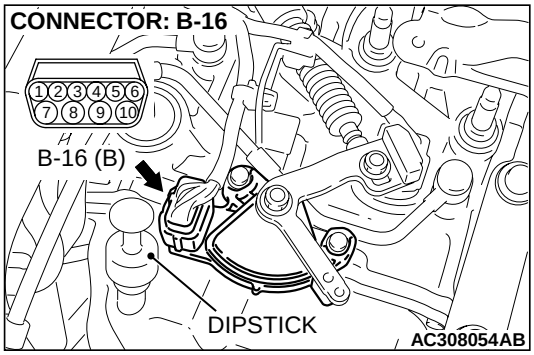
Measure the voltage between terminal 109 and ground.

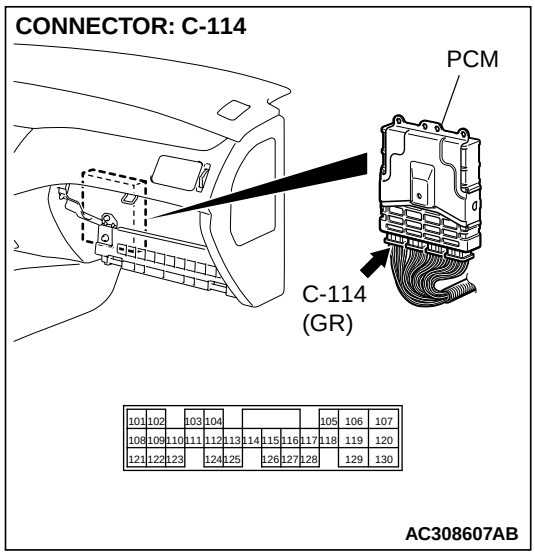
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should equal battery positive voltage.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 14.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 13.



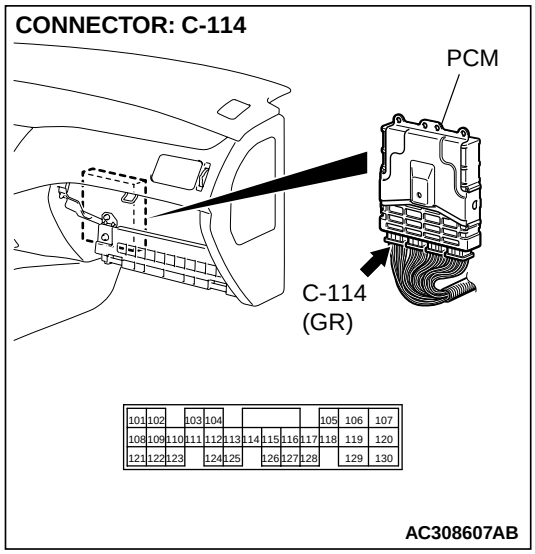


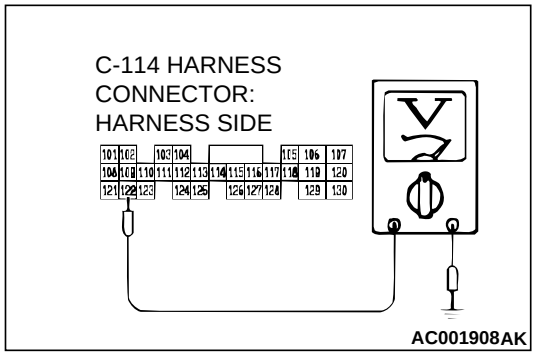
STEP 13. Check the harness for damage between transmission range switch connector B-16 terminal 5 and PCM connector C-114 terminal 109.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 14. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("2" position)

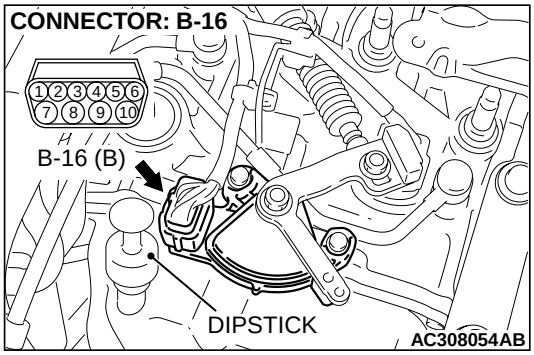
Measure the voltage between terminal 122 and ground.

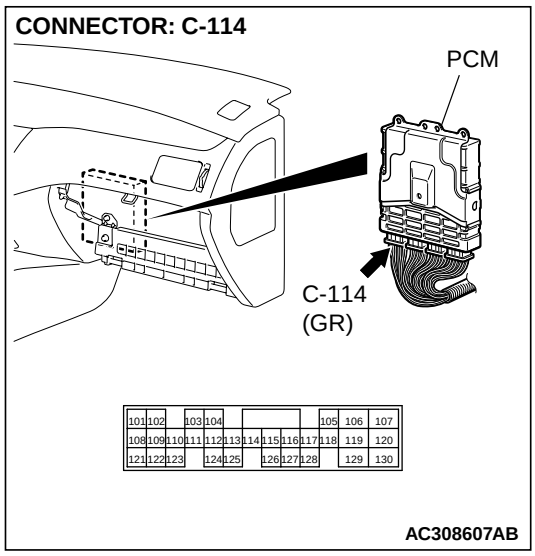
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should equal battery positive voltage.
- When transmission range is "L," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 16.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 15.



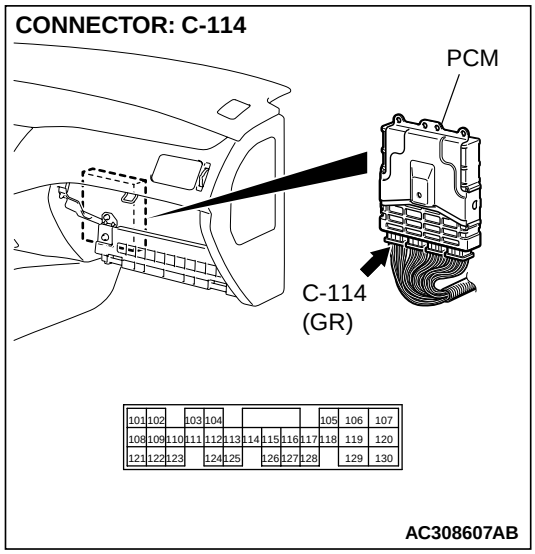


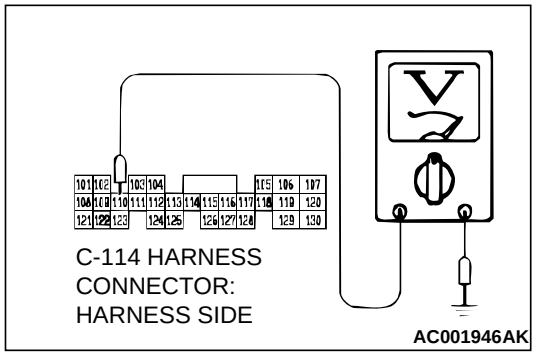
STEP 15. Check the harness for damage between transmission range switch connector B-16 terminal 2 and PCM connector C-114 terminal 122.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.





STEP 16. Measure the transmission range switch output voltage at PCM connector C-114 by backprobing. ("L" position)

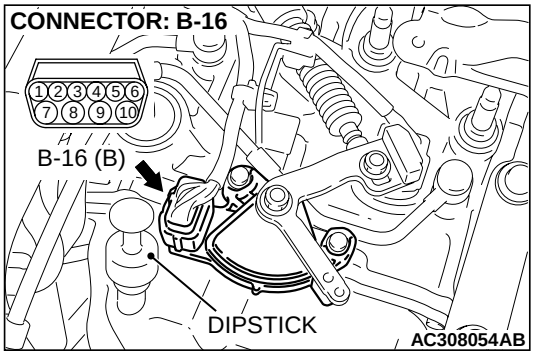
Measure the voltage between terminal 110 and ground.

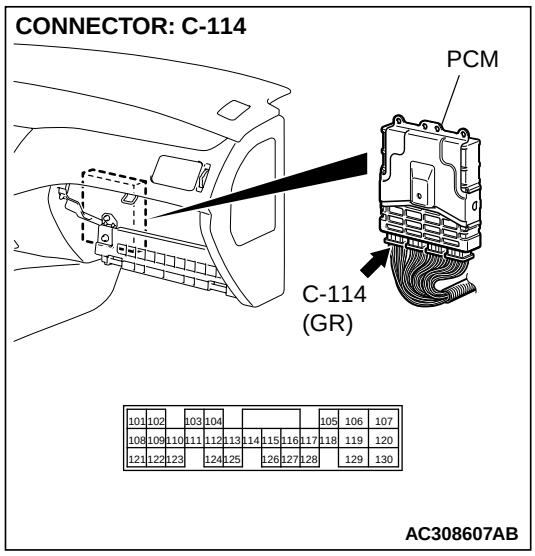
- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.
- When transmission range is "3," voltage should measure 0.5 volt or less.
- When transmission range is "2," voltage should measure 0.5 volt or less.
- When transmission range is "L," voltage should equal battery positive voltage.

Q: Is the measured voltage within the specified range?

YES : Go to Step 18.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 17.



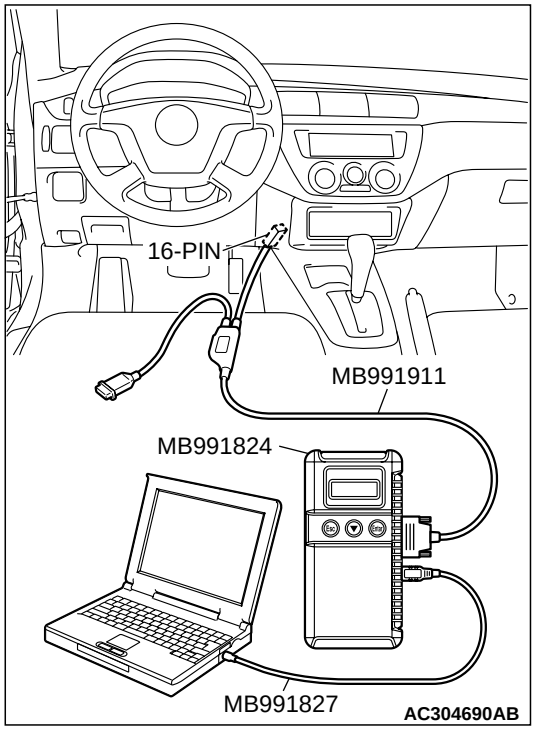


STEP 17. Check the harness for damage between transmission range switch connector B-16 terminal 6 and PCM connector C-114 terminal 110.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair or replace the harness wire.



STEP 18. Using scan tool MB991958, check data list item 61: Transmission Range Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to data reading mode.
- Item 61: Transmission Range Switch.
  - Move the selector lever to "P," "R," "N," "D," "3," "2" and "L" positions and confirm that the selected transmission range match the positions shown on scan tool MB991958.

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

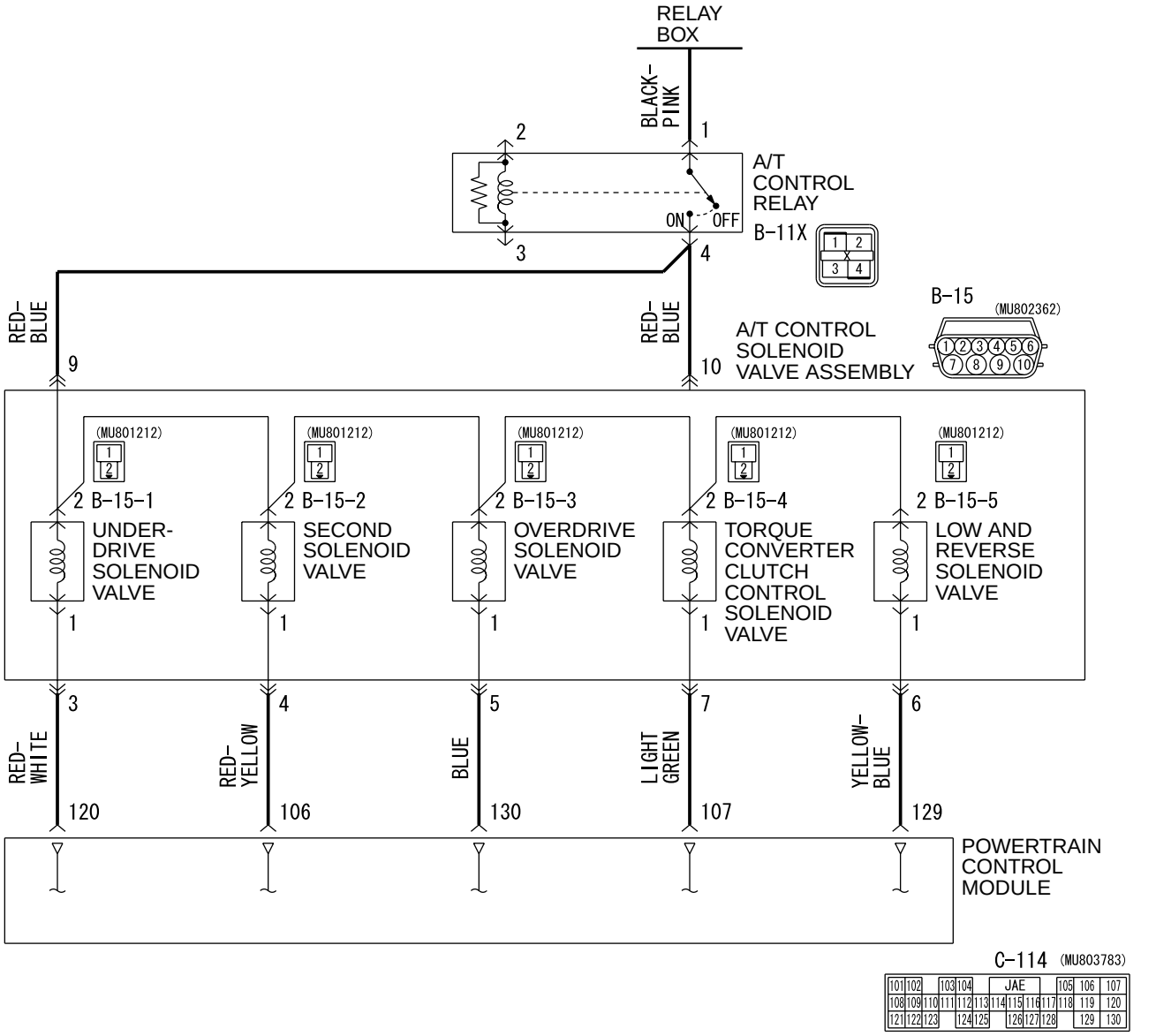
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

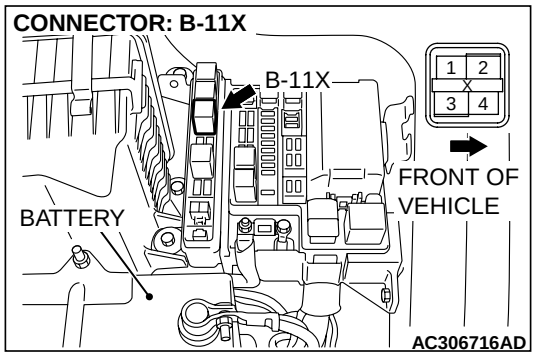
NO : Replace the PCM.

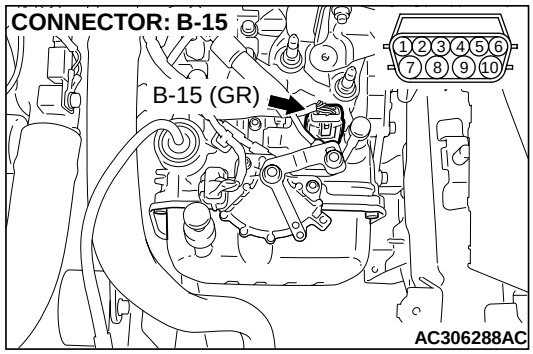
DTC 31 (P0753): Low-Reverse Solenoid Valve System

Solenoid Valve System Circuit

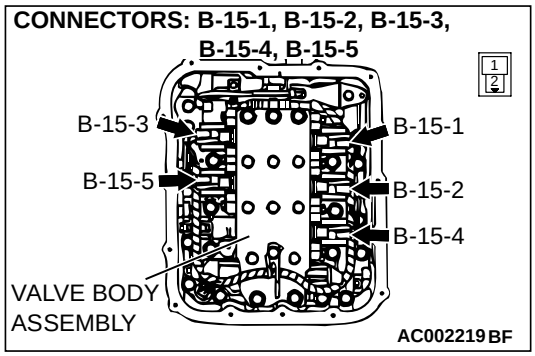


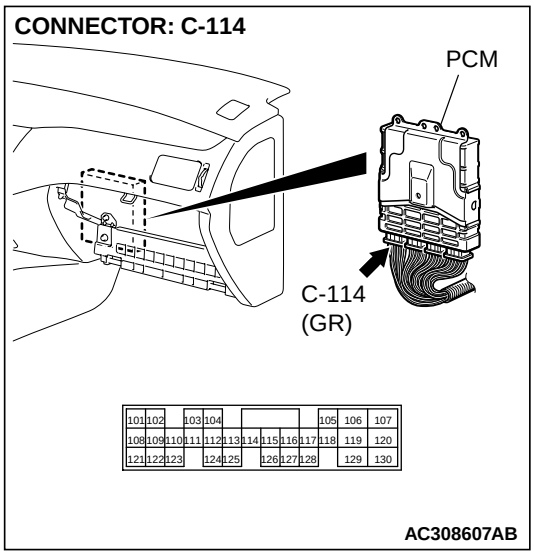
AC307930AC





TSB Revision





CIRCUIT OPERATION

- The A/T control relay supplies battery positive voltage to the solenoid valve assembly (terminals 9 and 10).
- The solenoid valve closes when energized (on), and opens when not energized (off). The PCM energizes the solenoid valve based on input data from sensors such as the Throttle Position Sensor, Transmission Range Switch, Stoplight Switch, Input Shaft Speed Sensor, Output Shaft Speed Sensor, and Transmission Fluid Temperature Sensor.
- The PCM provides the ground to energize the solenoid. The amount of time that the circuit is grounded is displayed on scan tool MB991958 in percent.
- When the solenoid is energized or de-energized, fluid passes through the valve body and transaxle passages to apply and release components.

DESCRIPTIONS OF MONITOR METHODS

- If solenoid terminal voltage is below specified value when shift control is not in progress, PCM judges that low-reverse solenoid valve has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

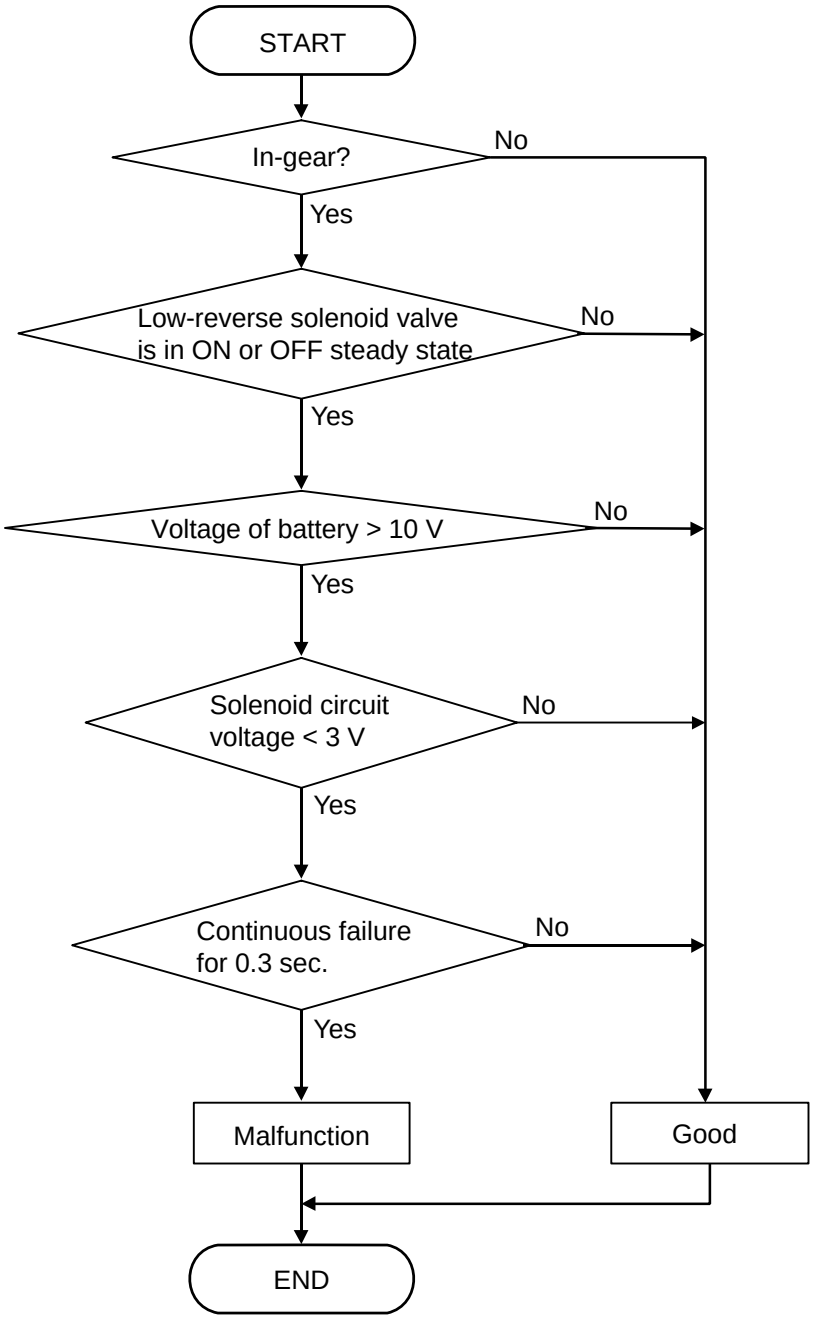
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Torque converter clutch solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

TSB Revision

LOGIC FLOW CHARTS (Monitor Sequence)



AC205281AB

DTC SET CONDITIONS

Check Conditions

- Solenoid status: either solid ON or OFF.
- Shift status: in-gear.
- Voltage of battery: 10 volts or more.

Judgement Criteria

- Solenoid voltage: 3 volts or less. (0.3 second)
- If DTC 31 (P0753) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

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

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

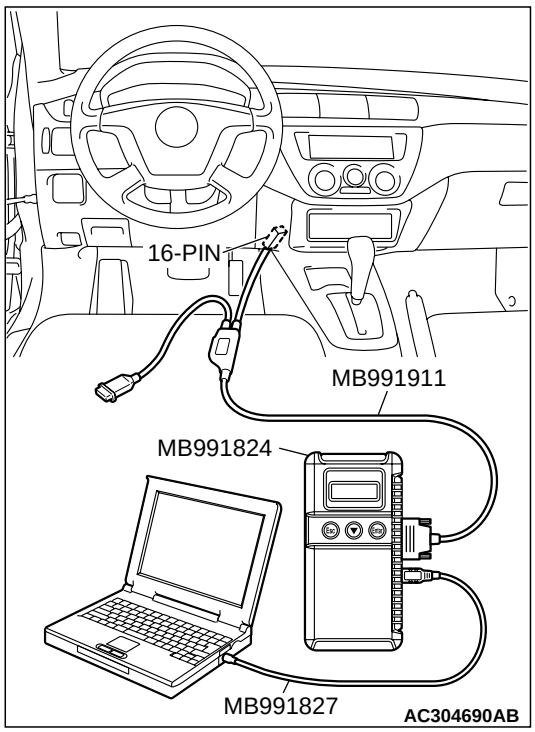
TSB Revision

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 01: Low-Reverse Solenoid Valve.



⚠ CAUTION

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

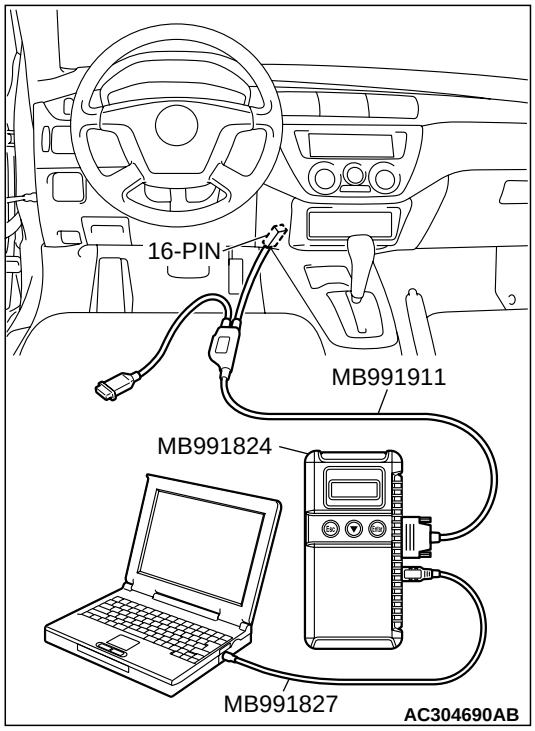
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 01: Low-Reverse Solenoid Valve.
  - An audible clicking or buzzing should be heard when the low-reverse solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

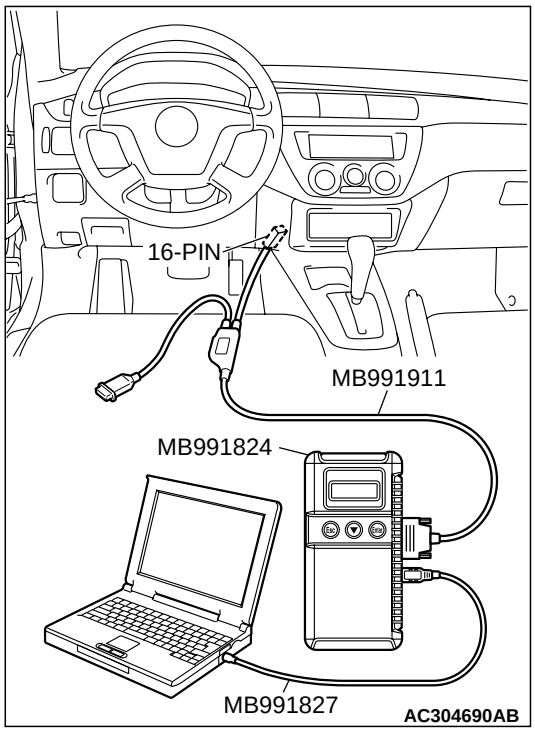


STEP 2. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs).

YES : Refer to P.23A-238 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



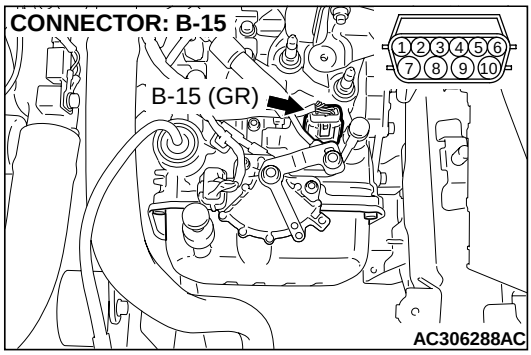
STEP 3. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

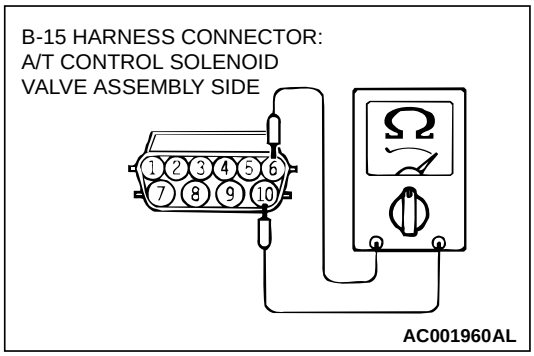
Q: Is DTC 36 set?

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

STEP 4. Measure the low-reverse solenoid valve resistance at A/T control solenoid valve assembly connector B-15.



(1) Disconnect connector B-15 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector B-15 terminals 6 and 10.

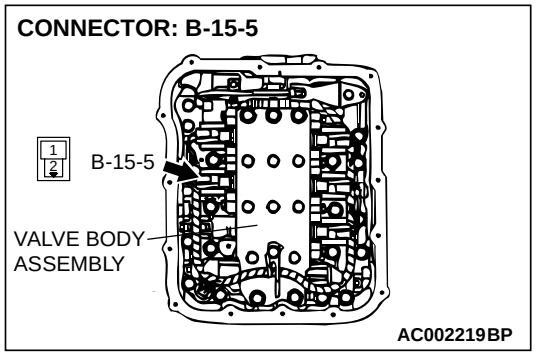
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)]?

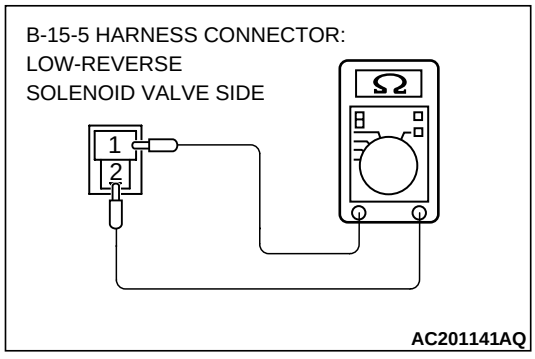
YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the low-reverse solenoid valve assembly inside the transaxle.



(1) Disconnect connector B-15-5 and measure at the solenoid valve side.



(2) Measure the resistance between low-reverse solenoid valve terminals 1 and 2.

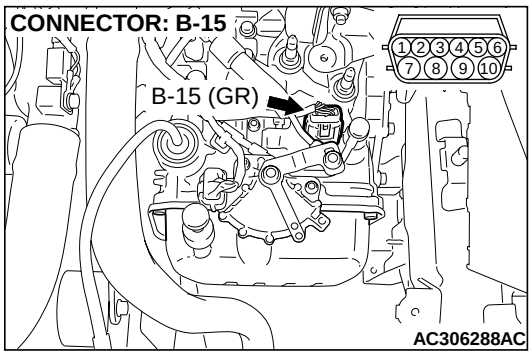
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

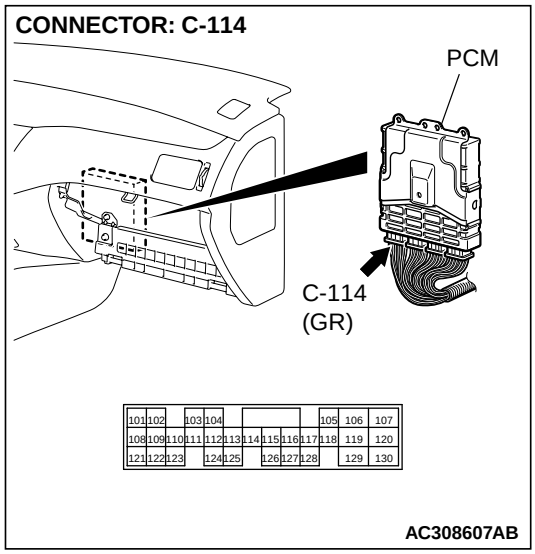
Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector B-15 and the solenoid valves.

NO : Replace the low-reverse solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75.

TSB Revision



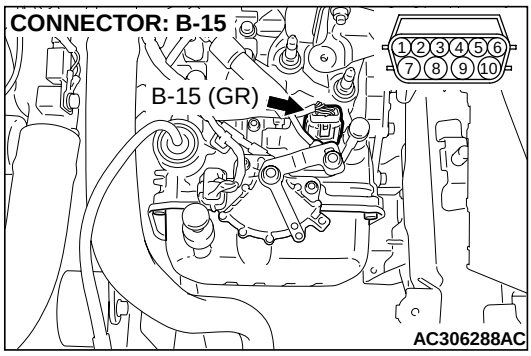


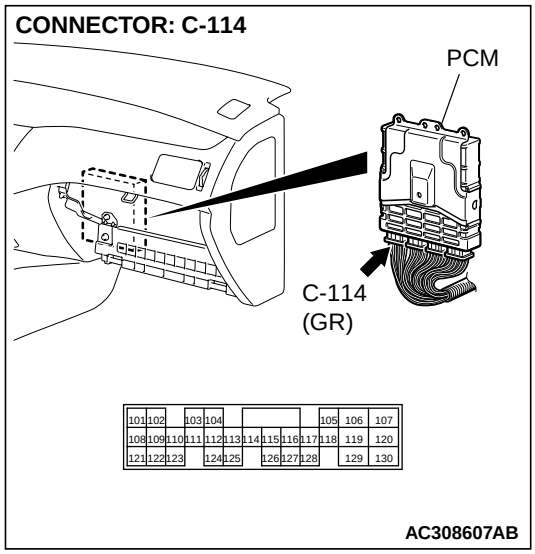
STEP 6. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

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



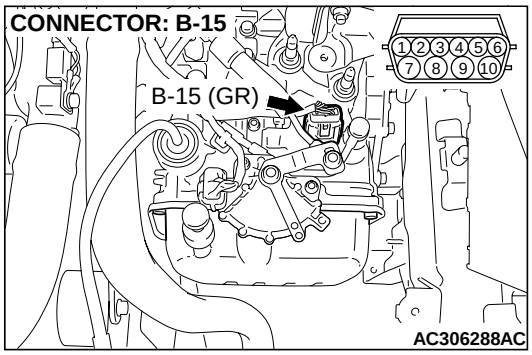


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 terminal 6 and PCM connector C-114 terminal 129.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

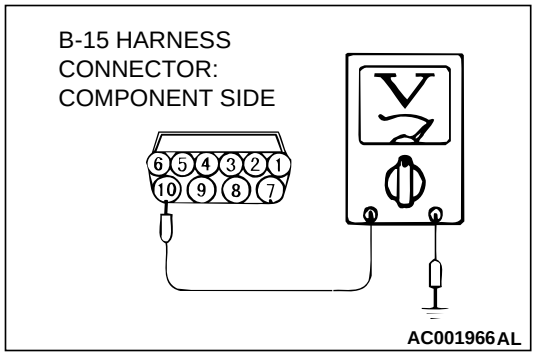
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect solenoid valve assembly harness connector B-15.

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



(3) Measure the voltage between harness connector B-15 terminal 10 and ground.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

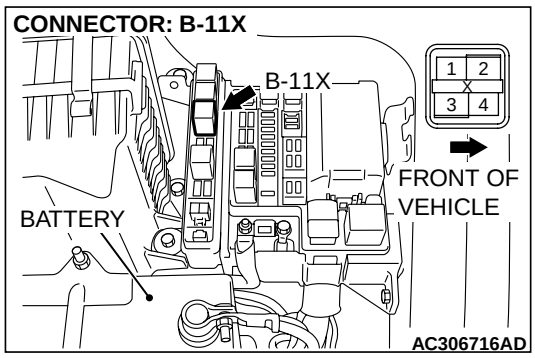
NO : Go to Step 9.

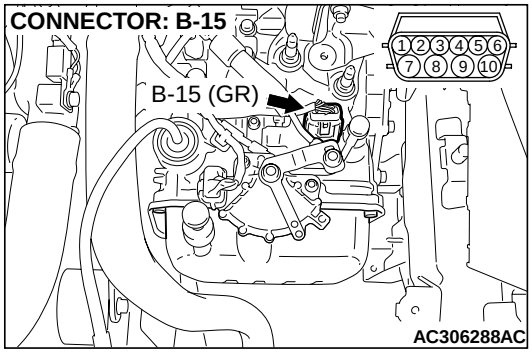
STEP 9. Check A/T control relay connector B-11X in the engine component relay box and A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

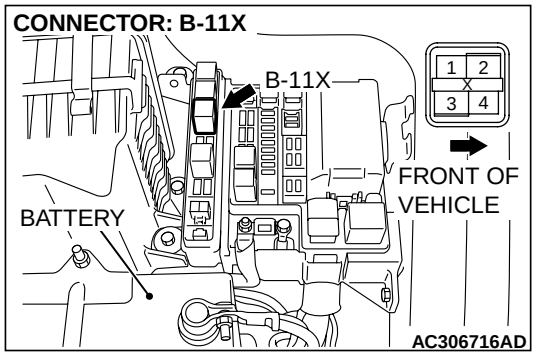
Q: Are the connectors and terminals in good condition?

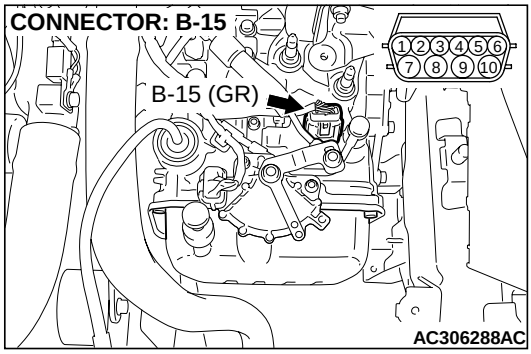
YES : Go to Step 10.

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







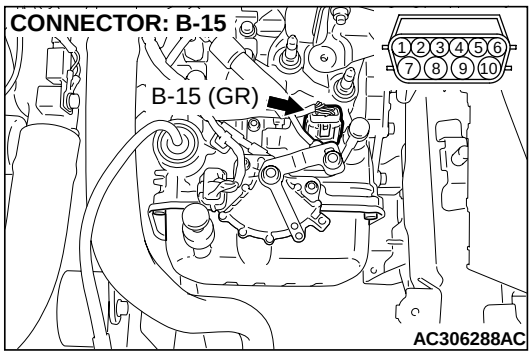


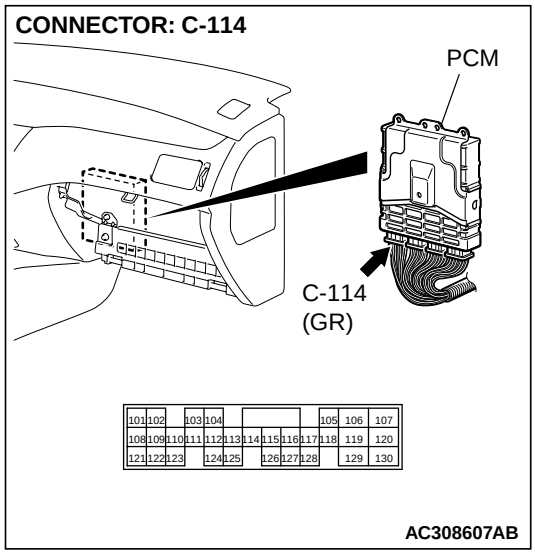
STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control relay connector B-11X terminal 4 in the engine component relay box and A/T control solenoid valve assembly connector B-15 terminal 10.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



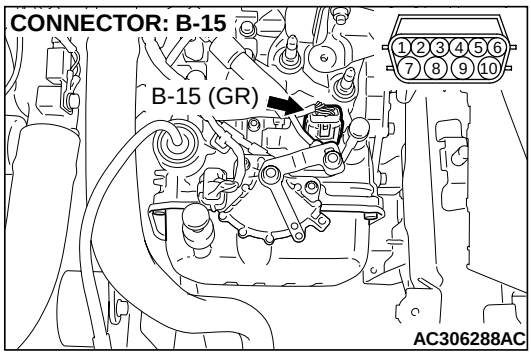


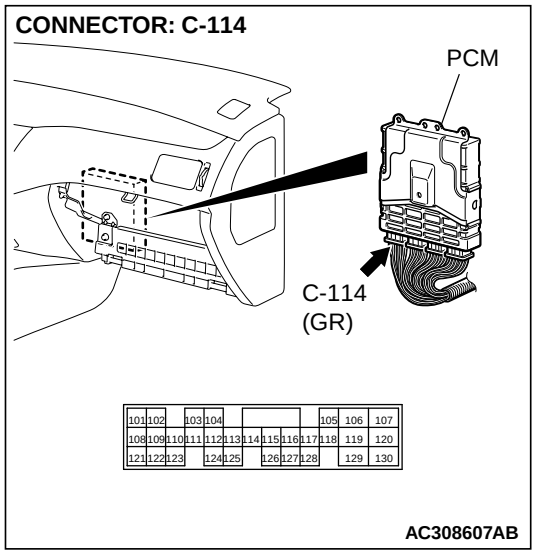
STEP 11. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

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





STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 6 and 7) and PCM connector C-114 (terminals 129 and 107).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

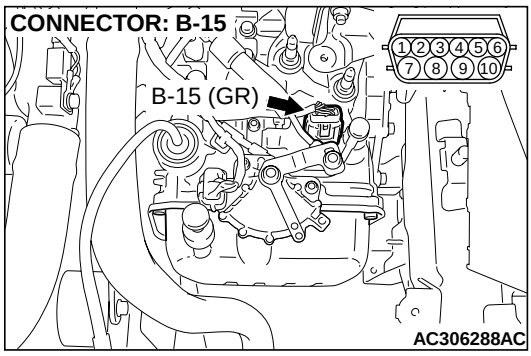
NO : Repair or replace the harness wire.

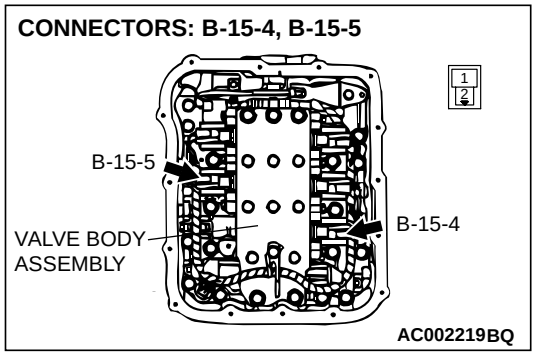
STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 6, 7, and 10) and solenoid valve connectors B-15-4 and B-15-5.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.





DTC 32 (P0758): Underdrive Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-155.

CIRCUIT OPERATION
Refer to P.23A-155.

DESCRIPTIONS OF MONITOR METHODS
- If solenoid terminal voltage is below specified value when shift control is not in progress, PCM judges that underdrive solenoid valve has a failure.

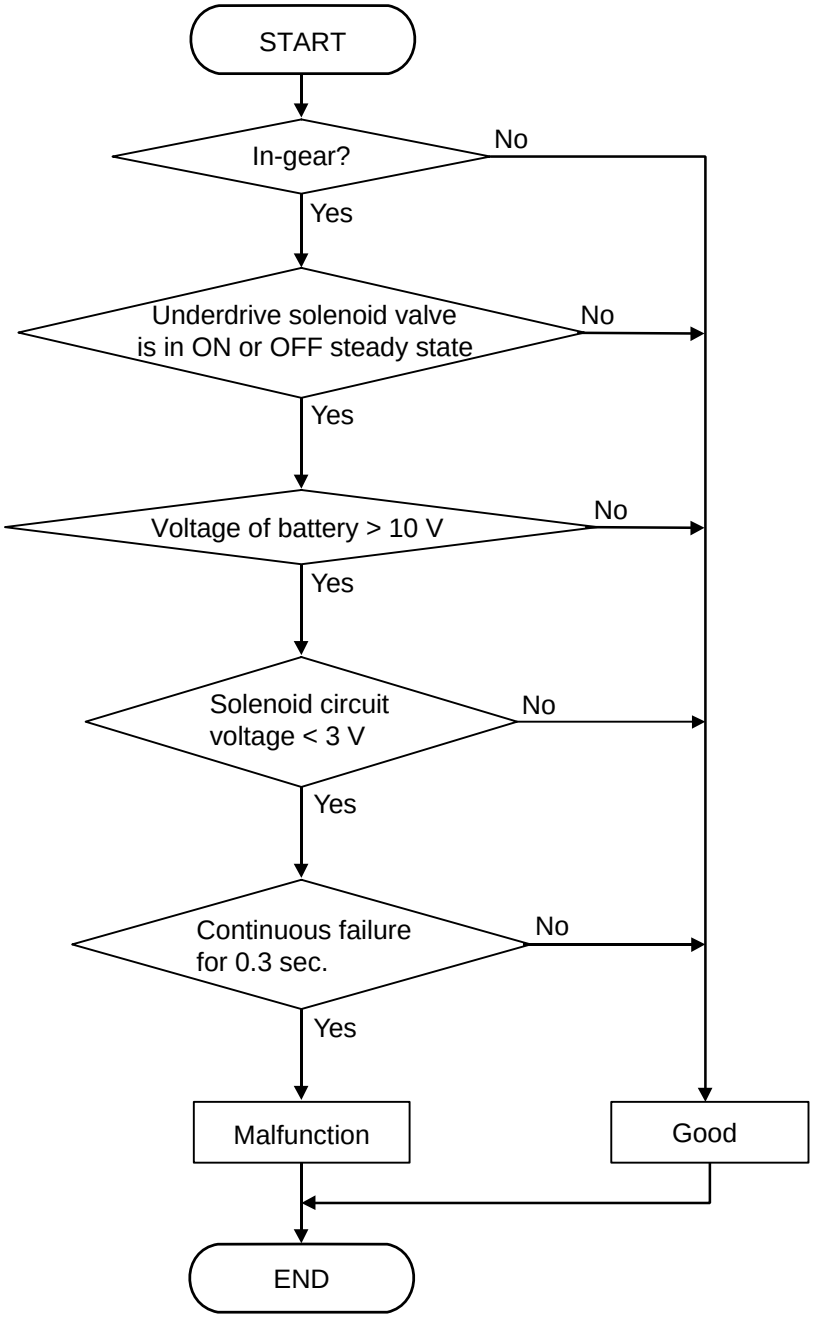
MONITOR EXECUTION
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)
- Torque converter clutch solenoid
- Low-reverse solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



AC205282AB

DTC SET CONDITIONS

Check Conditions

- Solenoid status: either solid ON or OFF.
- Shift status: in-gear.
- Voltage of battery: 10 volts or more.

Judgement Criteria

- Solenoid voltage: 3 volts or less. (0.3 second)
- If DTC 32 (P0758) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

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

- Malfunction of the underdrive solenoid valve
- Damaged harness or connector
- Malfunction of the PCM

TSB Revision

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 02: Underdrive Solenoid Valve.

⚠ CAUTION

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

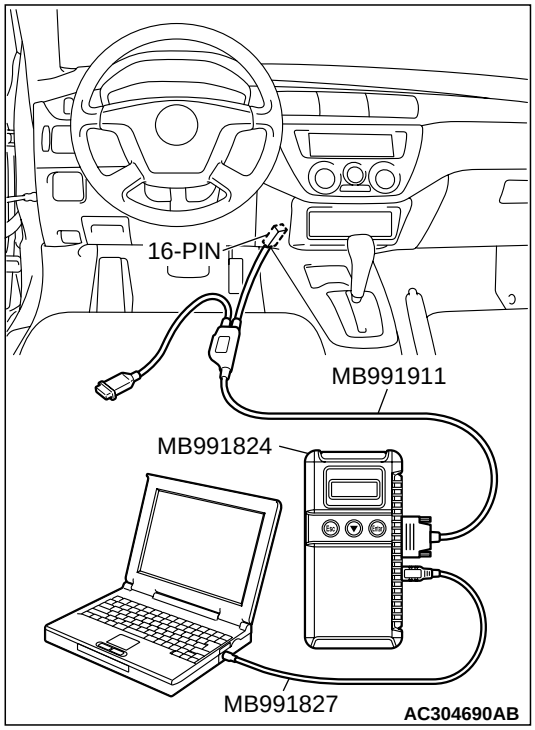
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 02: Underdrive Solenoid Valve.
  - An audible clicking or buzzing should be heard when the underdrive solenoid valve is energized.

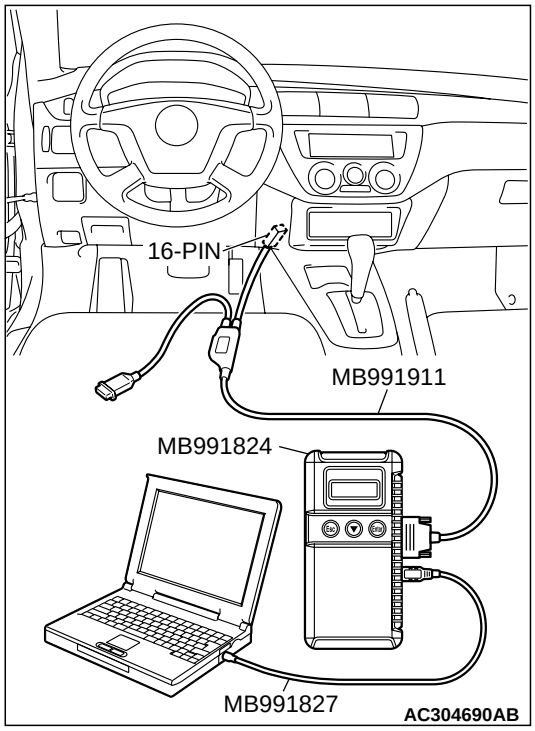
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.



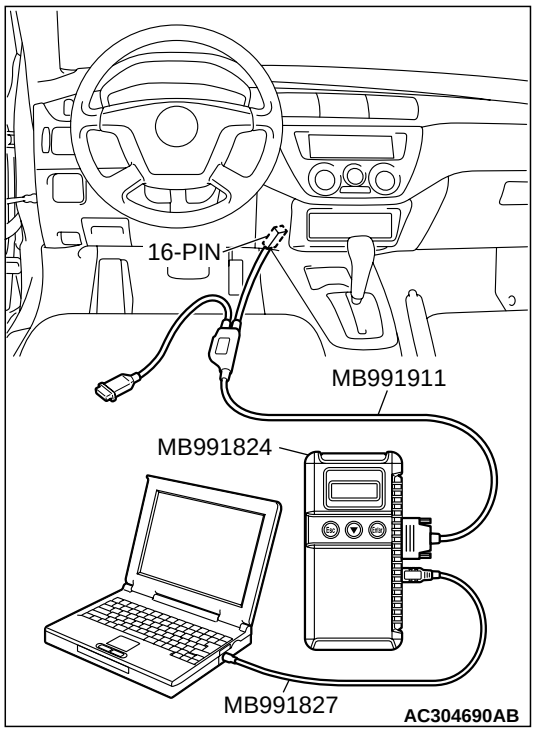


STEP 2. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs).

YES : Refer to P.23A-238 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



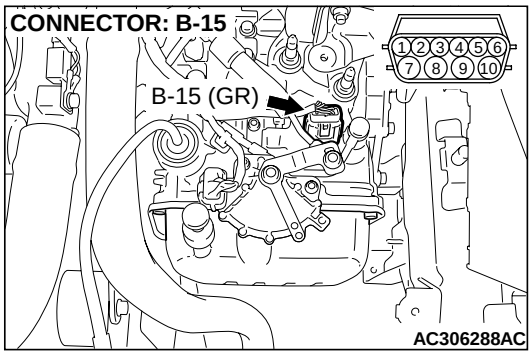
STEP 3. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

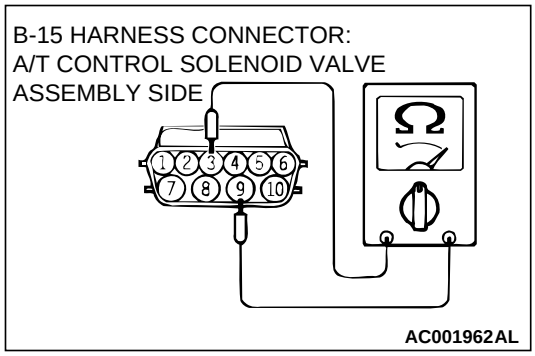
Q: Are DTC 33 and DTC 34 set? (Multiple DTCs may be set).

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

STEP 4. Measure the underdrive solenoid valve resistance at A/T control solenoid valve assembly connector B-15.



(1) Disconnect connector B-15 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector B-15 terminals 3 and 9.

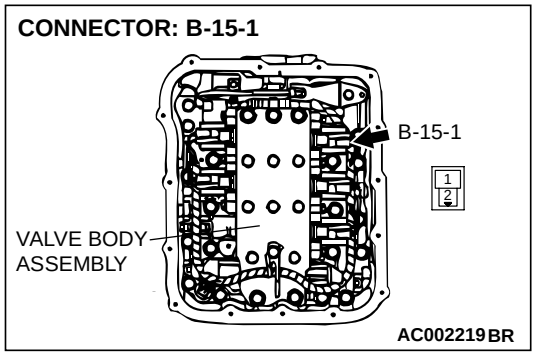
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)]?

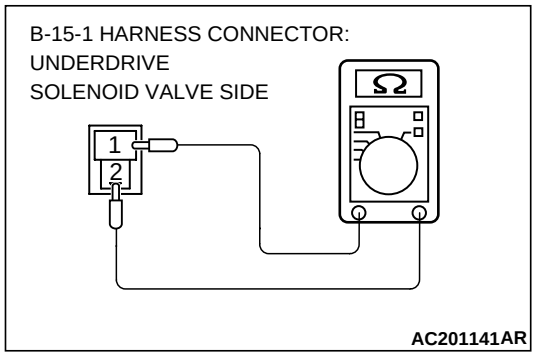
YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the underdrive solenoid valve assembly inside the transaxle.



(1) Disconnect connector B-15-1 and measure at the solenoid valve side.



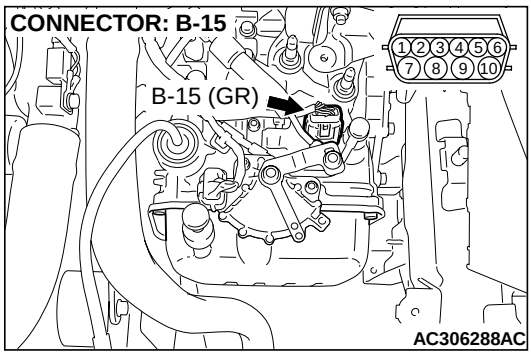
(2) Measure the resistance between Underdrive solenoid valve terminals 1 and 2.

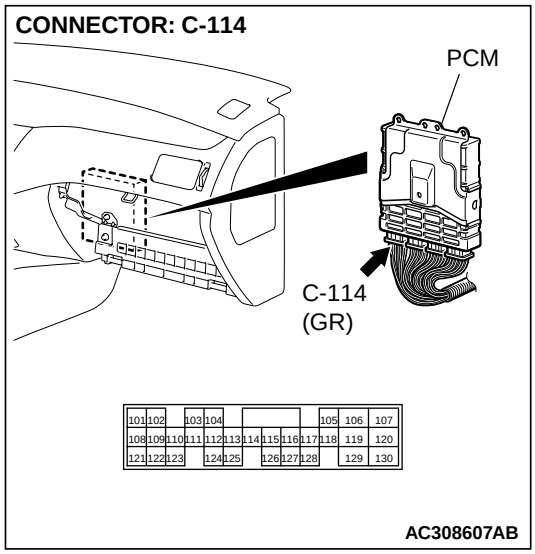
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector B-15 and the solenoid valves.

NO : Replace the Underdrive solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75.



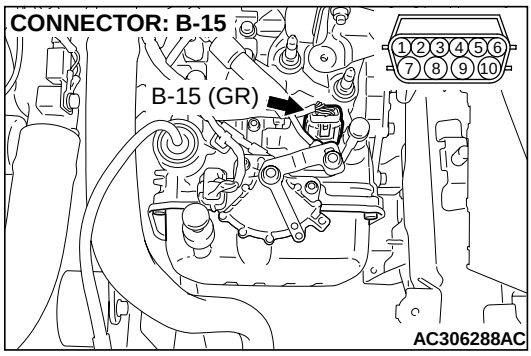


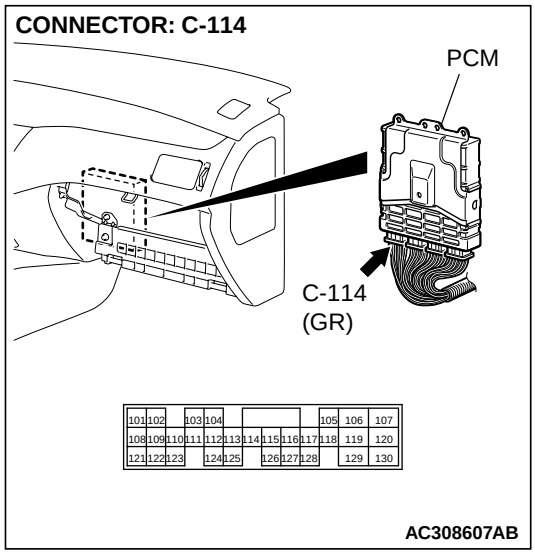
STEP 6. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

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





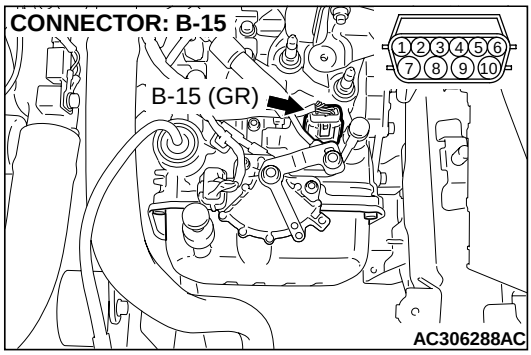
STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 terminal 3 and PCM connector C-114 terminal 120.

Q: Is the harness wire in good condition?

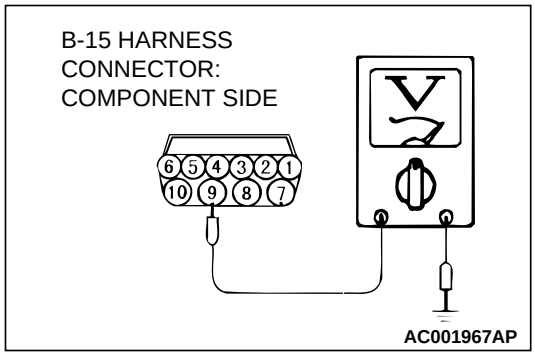
YES : Replace the PCM.

NO : Repair or replace the harness wire.

STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector B-15.



(1) Disconnect solenoid valve assembly harness connector B-15.
(2) Turn the ignition switch to the "ON" position.



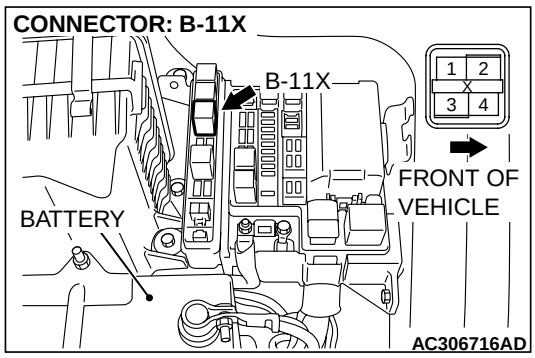
(3) Measure the voltage between harness connector B-15 terminal 9 and ground.
- The voltage should equal battery positive voltage.

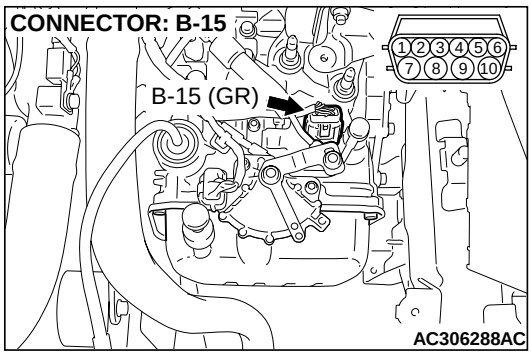
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.
NO : Go to Step 9.

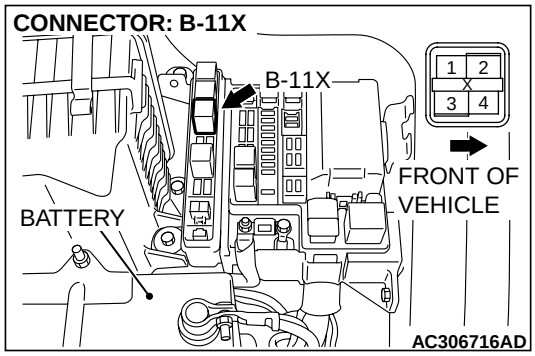
STEP 9. Check A/T control relay connector B-11X in the engine component relay box and A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

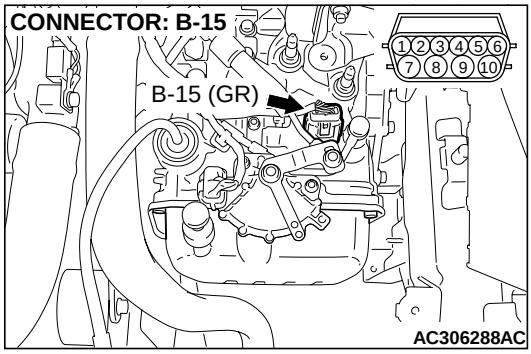




Q: Are the connectors and terminals in good condition?

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



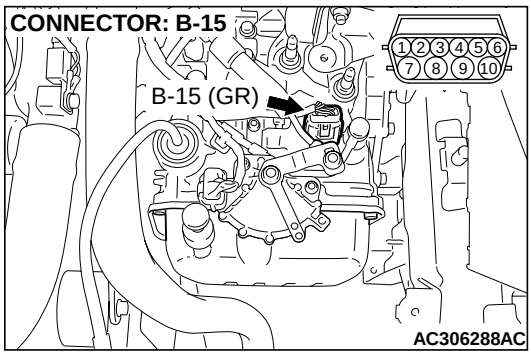


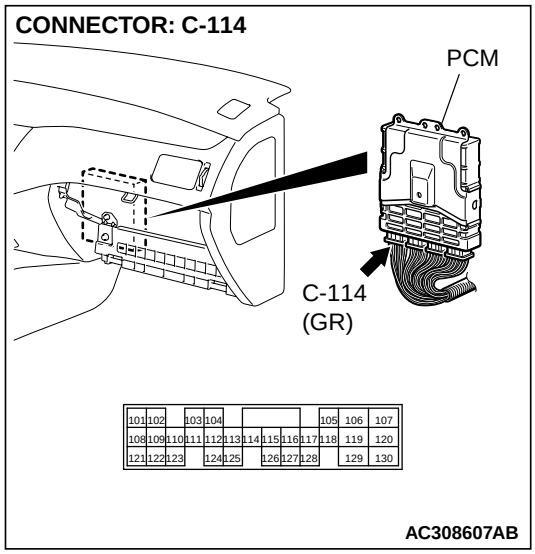
STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control relay connector B-11X terminal 4 in the engine component relay box and A/T control solenoid valve assembly connector B-15 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



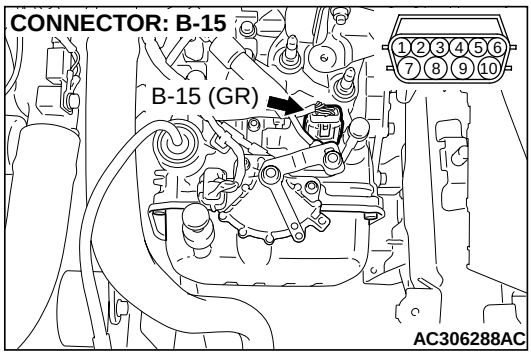


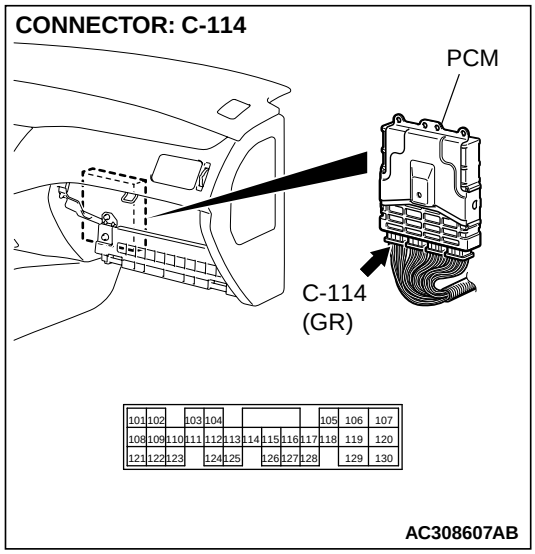
STEP 11. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

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



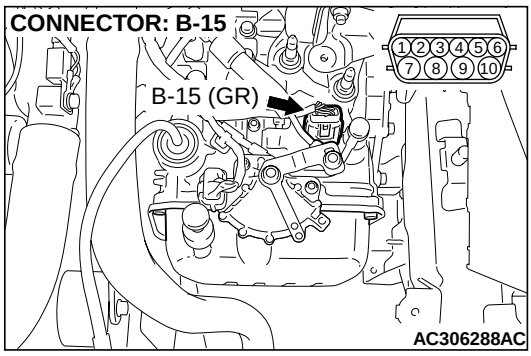


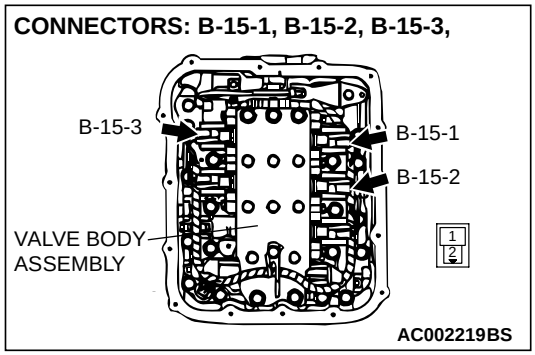
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4 and 5) and PCM connector C-110 (terminals 120, 106 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire.





STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4, 5, and 9) and solenoid valve connectors B-15-1, B-15-2 and B-15-3.
Q: Is the harness wire in good condition?

YES : Replace the PCM.
NO : Replace the harness wire.

DTC 33 (P0763): Second Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-155.

CIRCUIT OPERATION
Refer to P.23A-155.

DESCRIPTIONS OF MONITOR METHODS
- If solenoid terminal voltage is below specified value when shift control is not in progress, PCM judges that second solenoid valve has a failure.

MONITOR EXECUTION
- Continuous

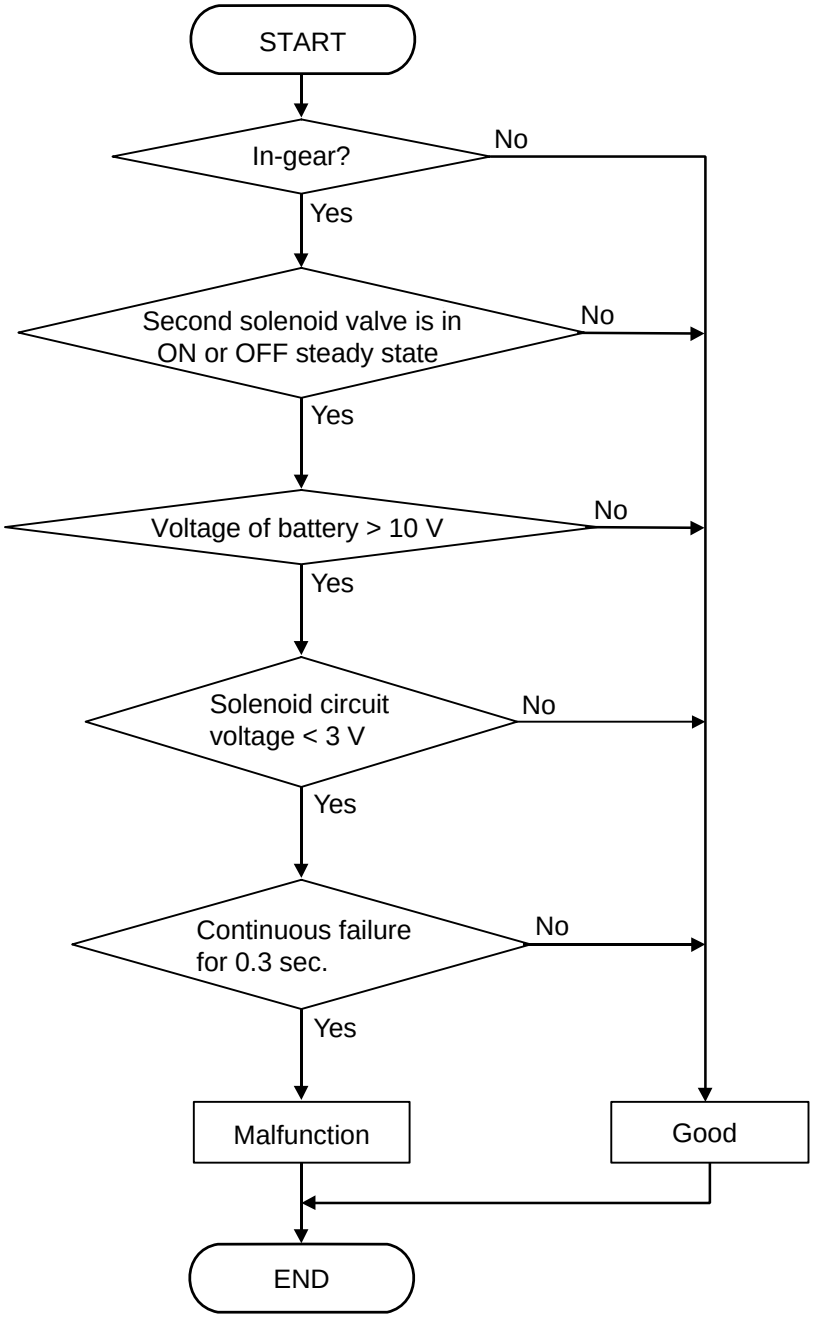
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Overdrive solenoid
- A/T control relay

TSB Revision

LOGIC FLOW CHARTS (Monitor Sequence)



AC205283AB

DTC SET CONDITIONS

Check Conditions

- Solenoid status: either solid ON or OFF.
- Shift status: in-gear.
- Voltage of battery: 10 volts or more.

Judgement Criteria

- Solenoid voltage: 3 volts or less. (0.3 second)
- If DTC 33 (P0763) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

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

- Malfunction of the second solenoid valve
- Damaged harness or connector
- Malfunction of the PCM

TSB Revision

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 03: Second Solenoid Valve.

⚠ CAUTION

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

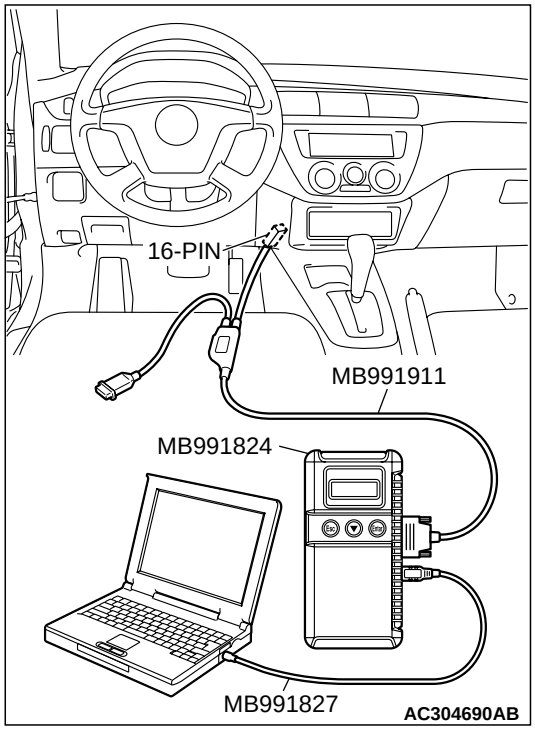
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
  - Item 03: Second Solenoid Valve.
    - An audible clicking or buzzing should be heard when the second solenoid valve is energized.

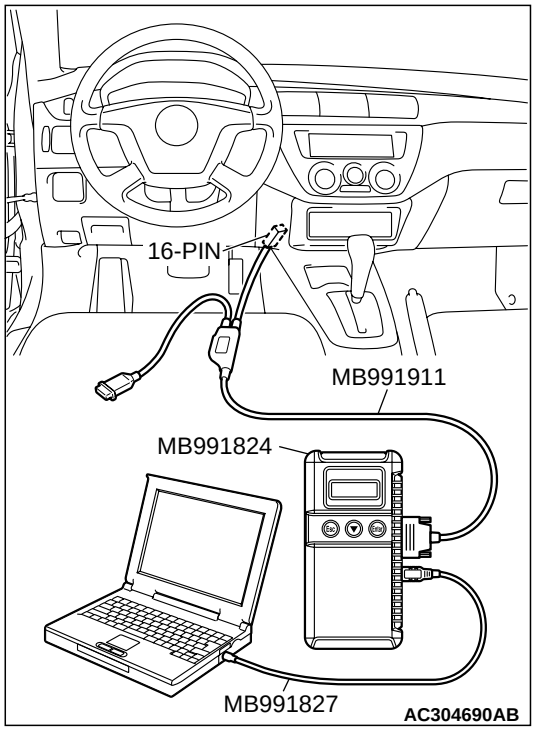
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.



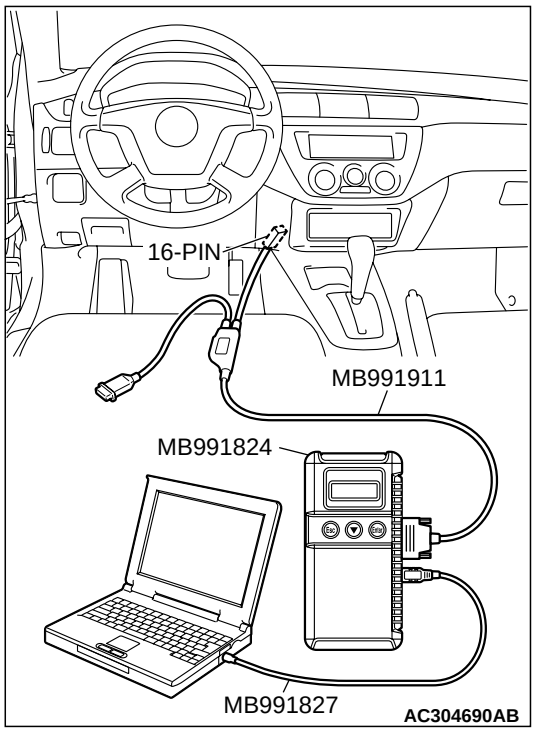


STEP 2. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs).

YES : Refer to P.23A-238 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



STEP 3. Using scan tool MB991958, read the A/T diagnostic trouble code.

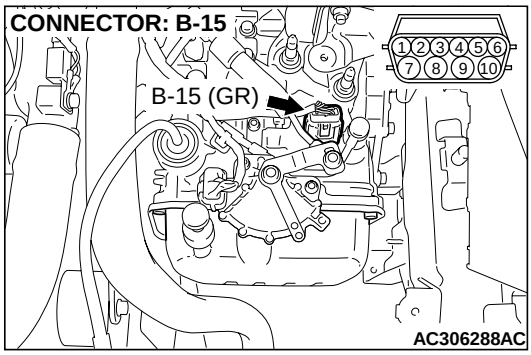
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

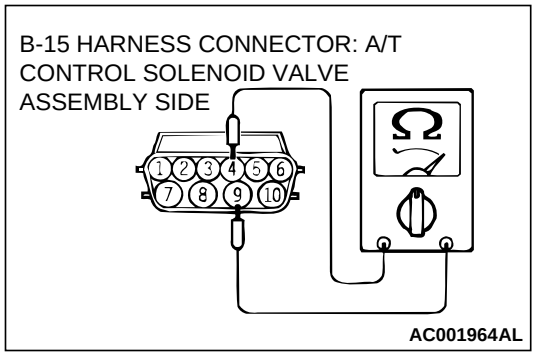
Q: Are DTC 32 and DTC 34 set? (Multiple DTCs may be set).

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

STEP 4. Measure the Second solenoid valve resistance at A/T control solenoid valve assembly connector B-15.

(1) Disconnect connector B-15 and measure at the solenoid valve side.





(2) Measure the resistance between solenoid valve assembly connector B-15 terminals 4 and 9.

Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

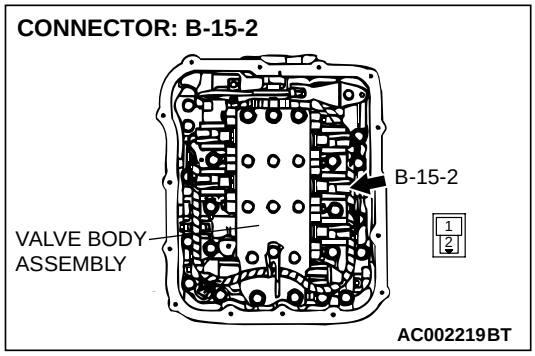
Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)]?

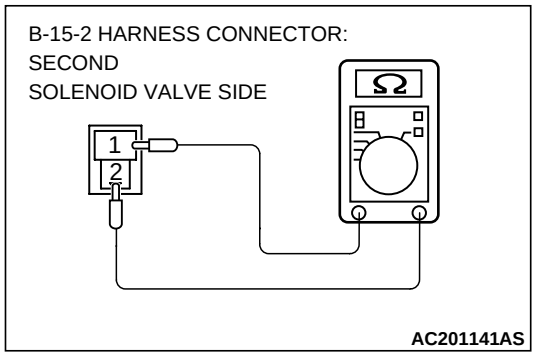
YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the second solenoid valve assembly inside the transaxle.

(1) Disconnect connector B-15-2 and measure at the solenoid valve side.





(2) Measure the resistance between Second solenoid valve terminals 1 and 2.

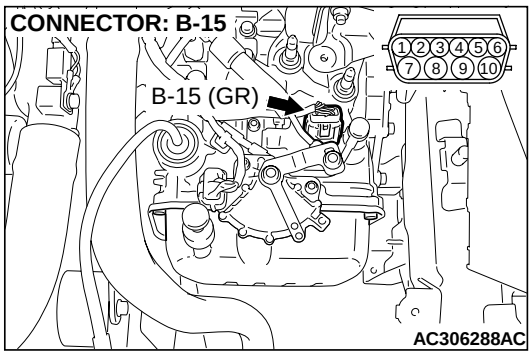
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

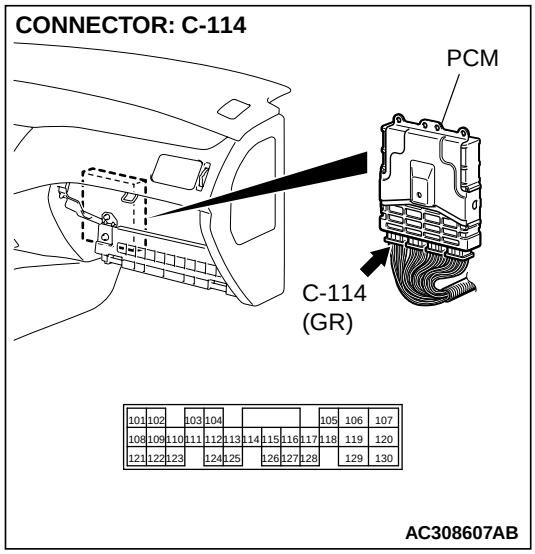
Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector B-15 and the solenoid valves.

NO : Replace the Second solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75.

TSB Revision



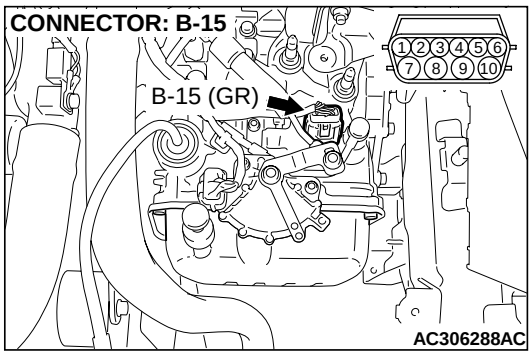


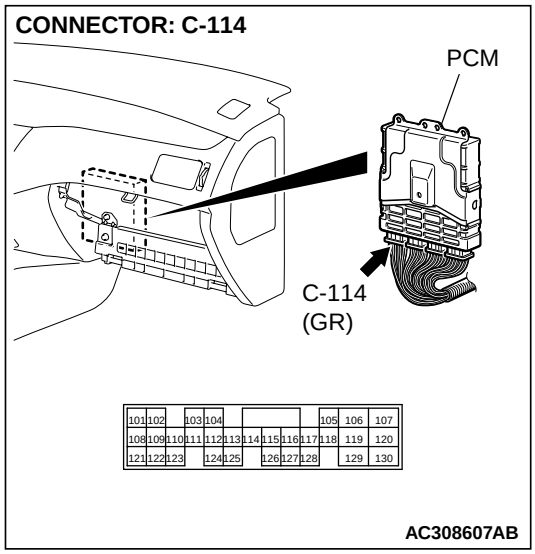
STEP 6. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

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



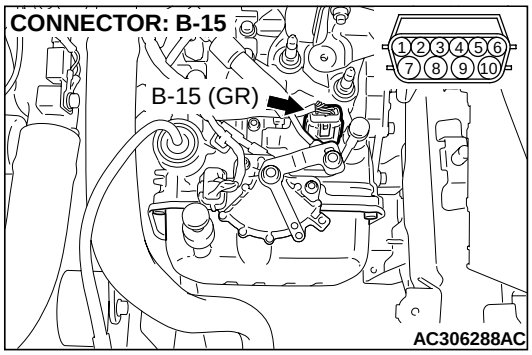


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 terminal 4 and PCM connector C-114 terminal 106.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

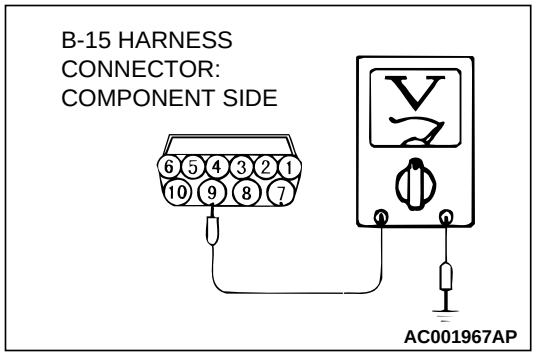
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect solenoid valve assembly harness connector B-15.

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



(3) Measure the voltage between harness connector B-15 terminal 9 and ground.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

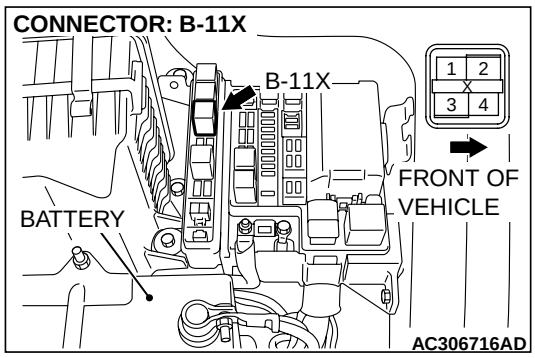
NO : Go to Step 9.

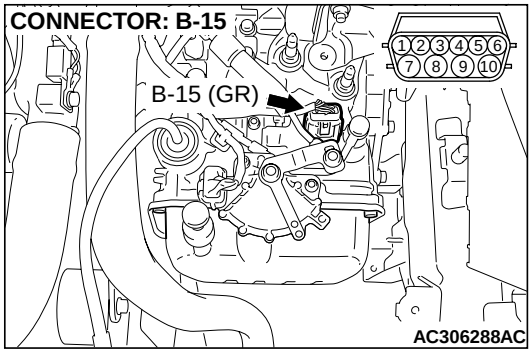
STEP 9. Check A/T control relay connector B-11X in the engine component relay box and A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

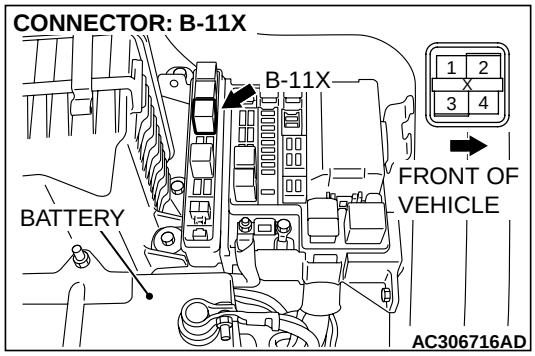
Q: Are the connectors and terminals in good condition?

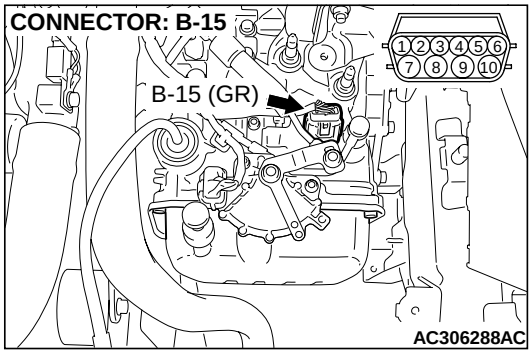
YES : Go to Step 10.

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







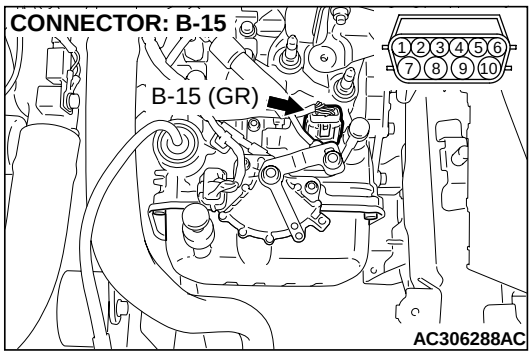


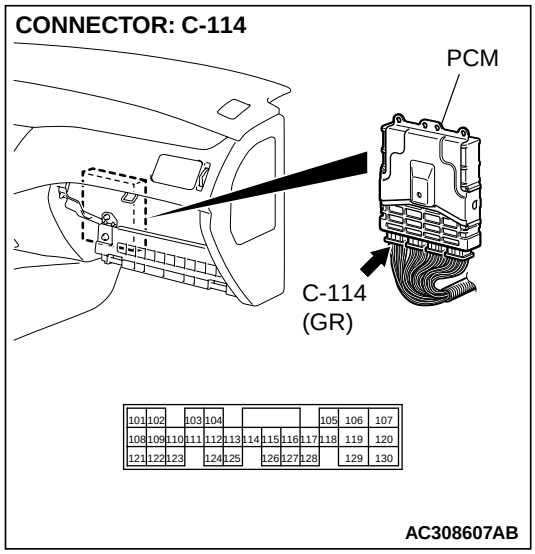
STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control relay connector B-11X terminal 4 in the engine component relay box and A/T control solenoid valve assembly connector B-15 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



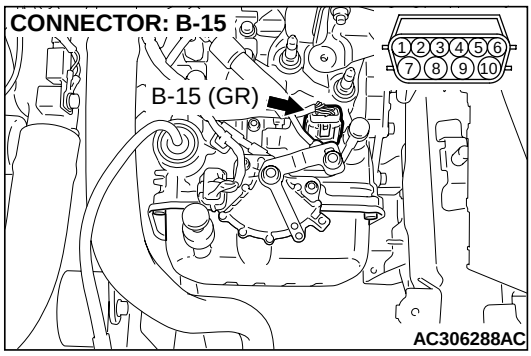


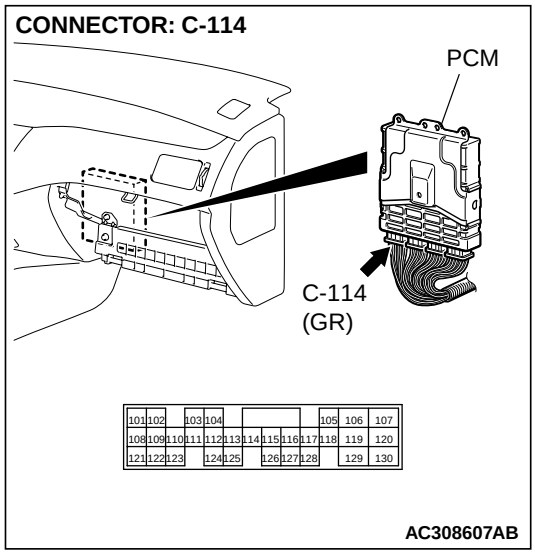
STEP 11. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

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



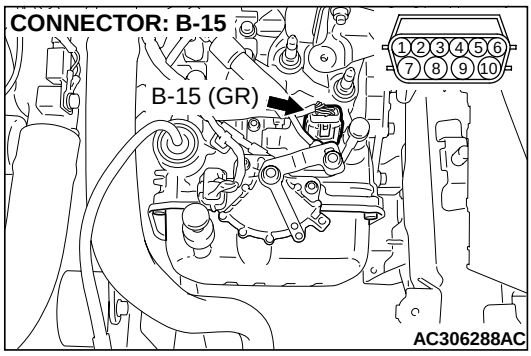


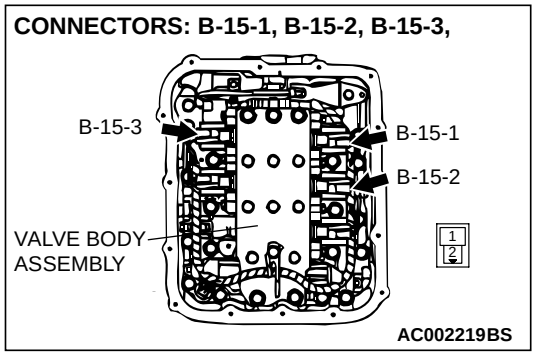
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4 and 5) and PCM connector C-114 (terminals 120, 106 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire.





STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4, 5, and 9) and solenoid valve connectors B-15-1, B-15-2 and B-15-3.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 34 (P0768): Overdrive Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-155.

CIRCUIT OPERATION
Refer to P.23A-155.

DESCRIPTIONS OF MONITOR METHODS
- If solenoid terminal voltage is below specified value when shift control is not in progress, PCM judges that overdrive solenoid valve has a failure.

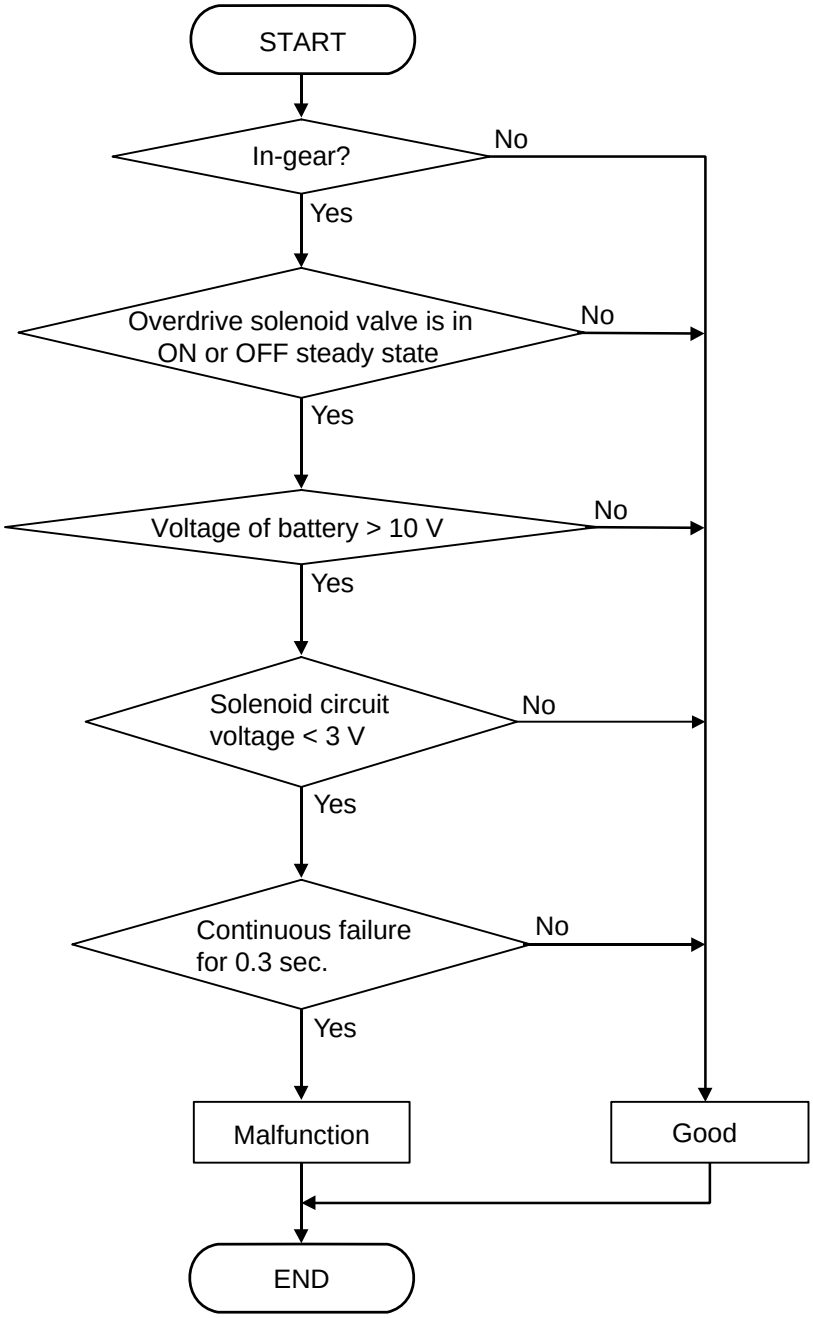
MONITOR EXECUTION
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



AC205284AB

DTC SET CONDITIONS

Check Conditions

- Solenoid status: either solid ON or OFF.
- Shift status: in-gear.
- Voltage of battery: 10 volts or more.

Judgement Criteria

- Solenoid voltage: 3 volts or less. (0.3 second)
- If DTC 34 (P0768) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

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

- Malfunction of the overdrive solenoid valve
- Damaged harness or connector
- Malfunction of the PCM

TSB Revision

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 04: Overdrive Solenoid Valve.

⚠ CAUTION

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

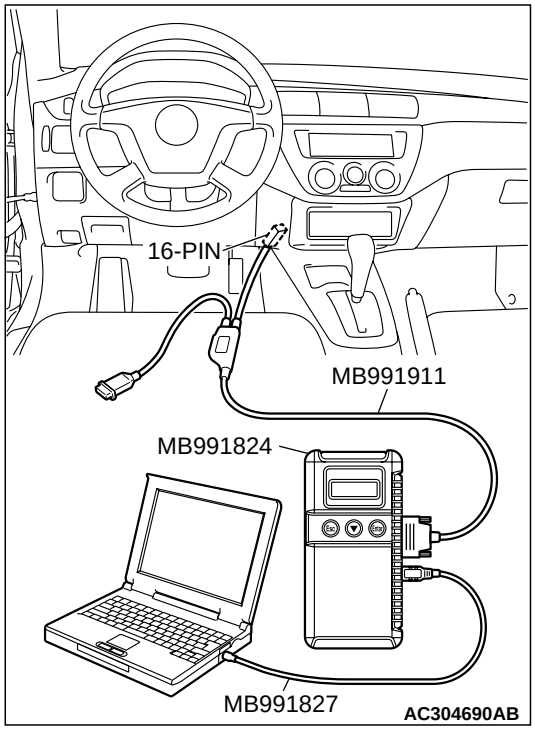
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 04: Overdrive Solenoid Valve.
  - An audible clicking or buzzing should be heard when the overdrive solenoid valve is energized.

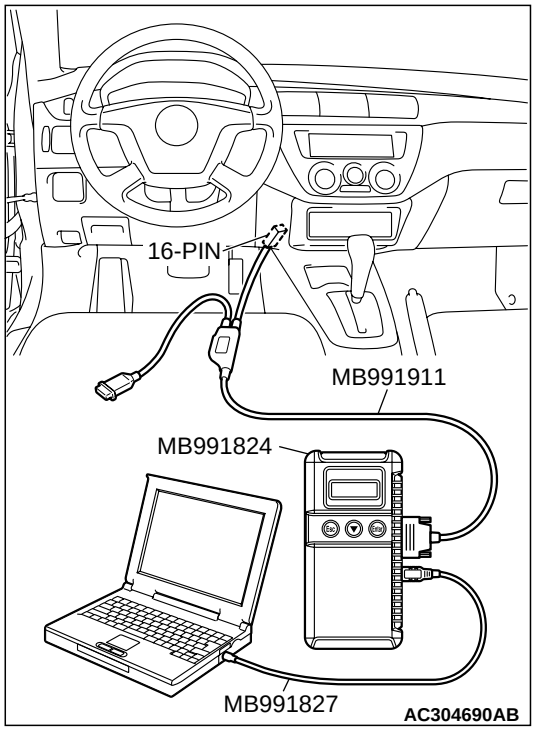
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.



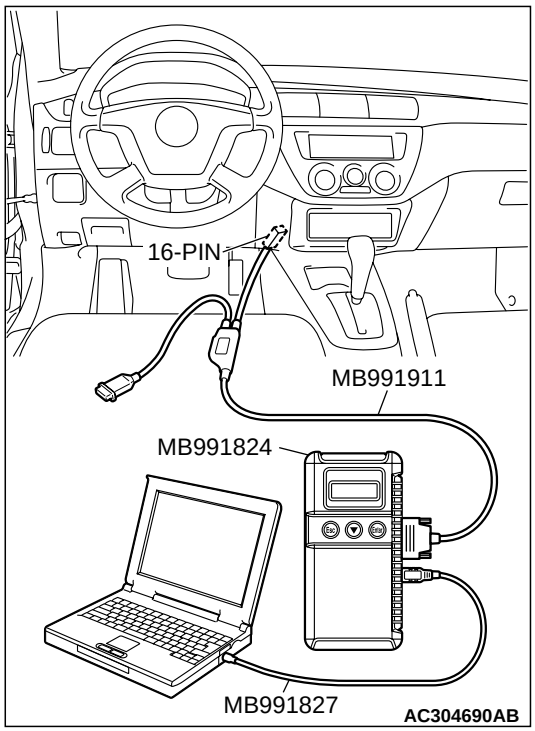


STEP 2. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs).

YES : Refer to P.23A-238 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



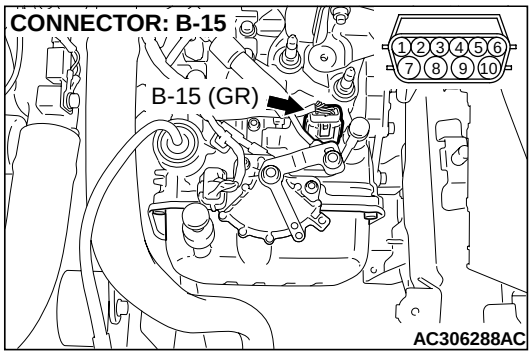
STEP 3. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

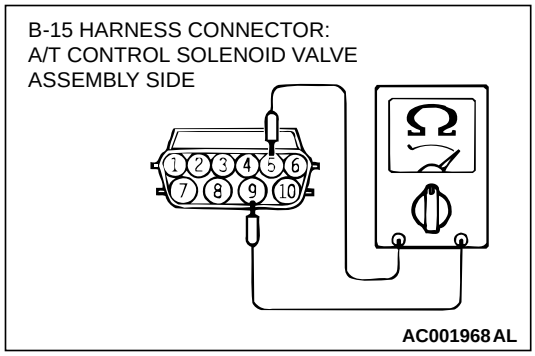
Q: Are DTC 32 and DTC 33 set? (Multiple DTCs may be set).

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

STEP 4. Measure the Overdrive solenoid valve resistance at A/T control solenoid valve assembly connector B-15.



(1) Disconnect connector B-15 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector B-15 terminals 5 and 9.

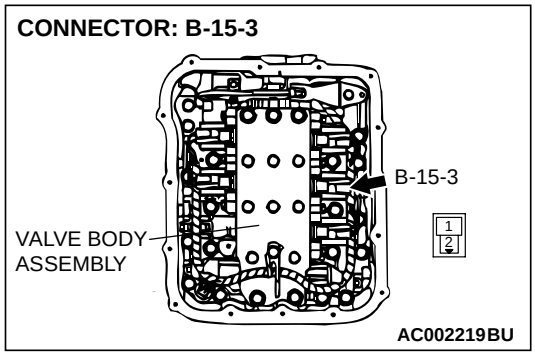
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)]?

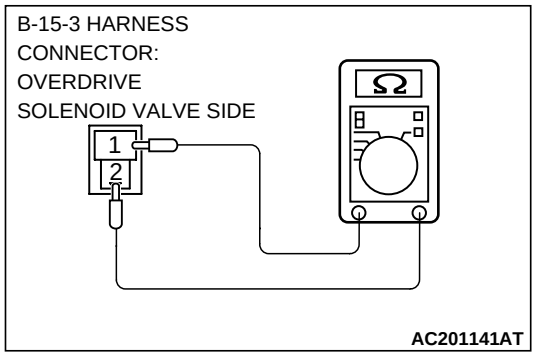
YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the overdrive solenoid valve assembly inside the transaxle.



(1) Disconnect connector B-15-3 and measure at the solenoid valve side.



(2) Measure the resistance between Overdrive solenoid valve terminals 1 and 2.

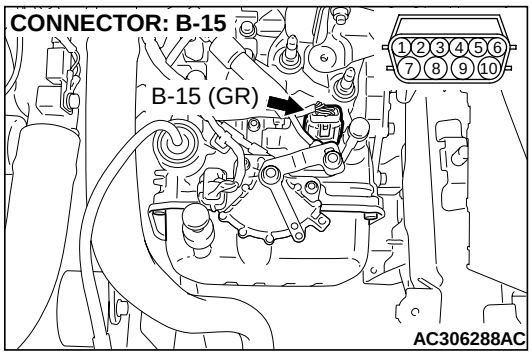
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

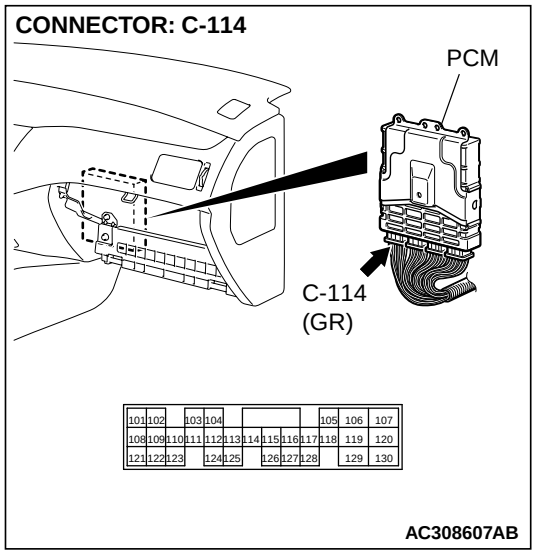
Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector B-15 and the solenoid valves.

NO : Replace the Overdrive solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75.

TSB Revision



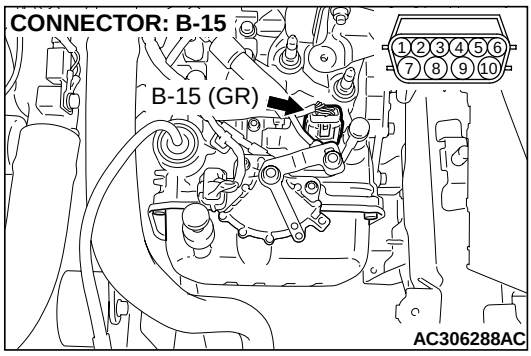


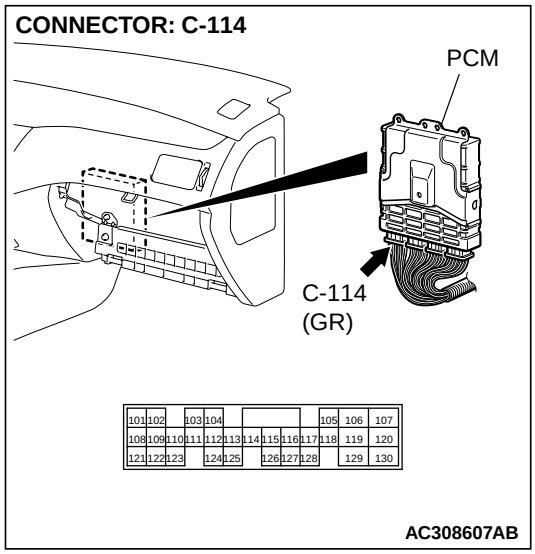
STEP 6. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

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



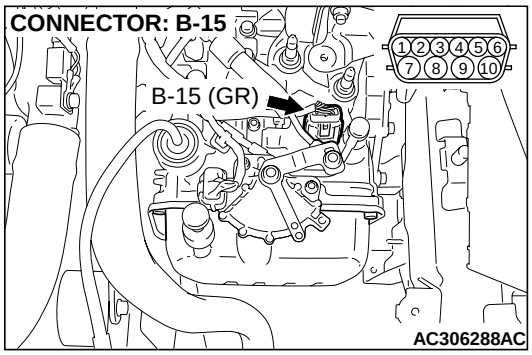


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 terminal 5 and PCM connector C-114 terminal 130.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

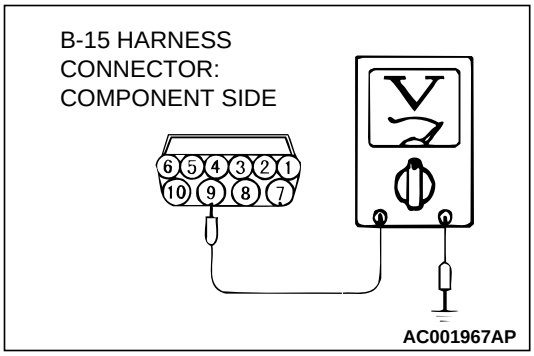
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect solenoid valve assembly harness connector B-15.

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



(3) Measure the voltage between harness connector B-15 terminal 9 and ground.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

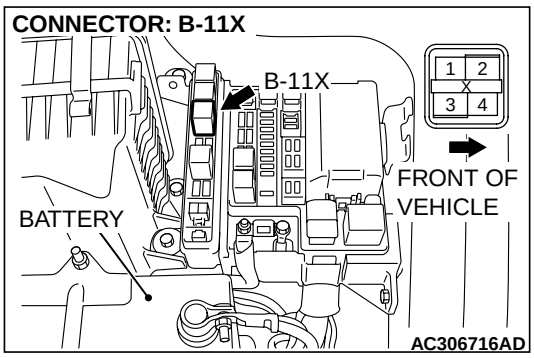
NO : Go to Step 9.

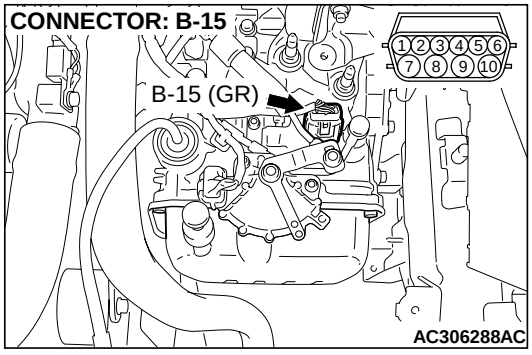
STEP 9. Check A/T control relay connector B-11X in the engine component relay box and A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

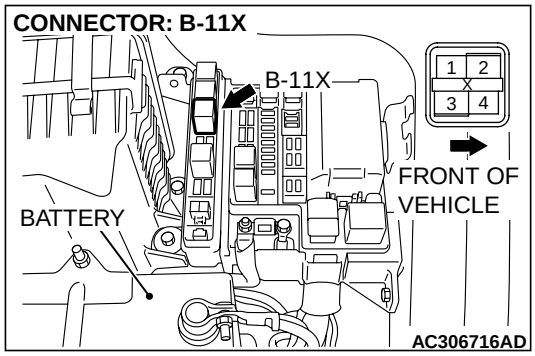
Q: Are the connectors and terminals in good condition?

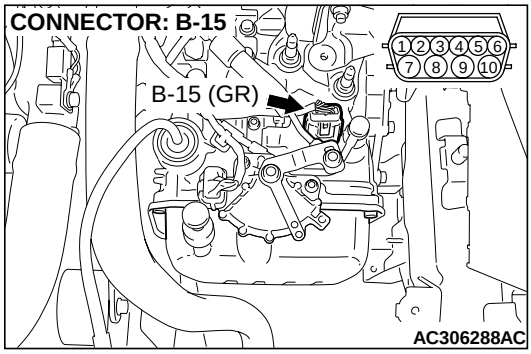
YES : Go to Step 10.

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







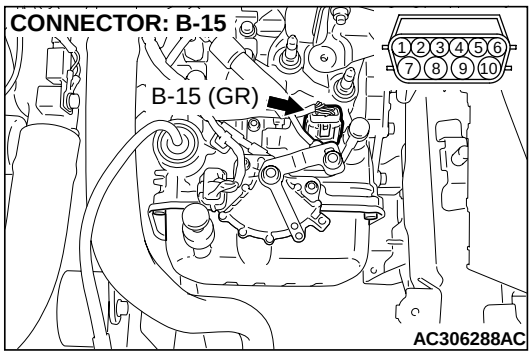


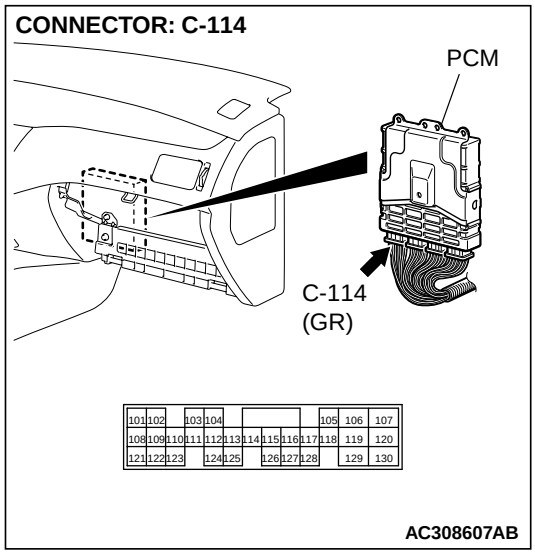
STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control relay connector B-11X terminal 4 in the engine component relay box and A/T control solenoid valve assembly connector B-15 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



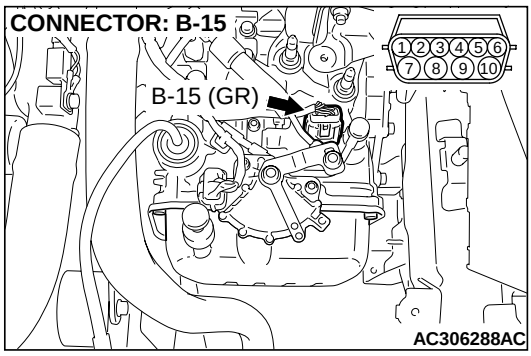


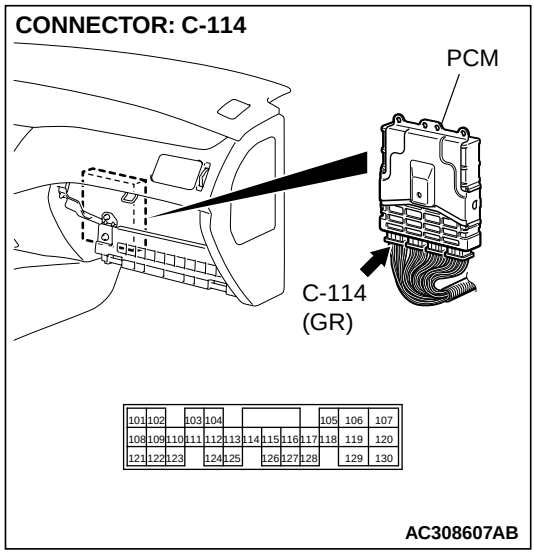
STEP 11. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

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



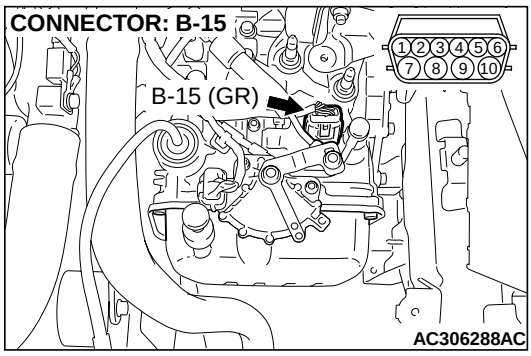


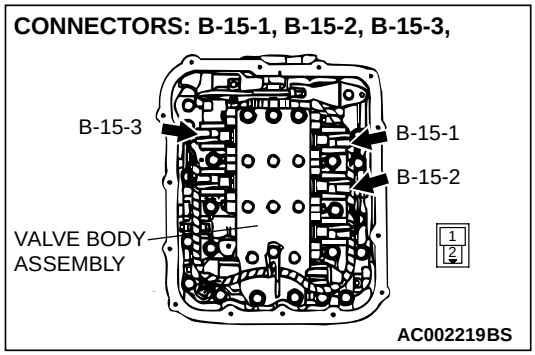
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4 and 5) and PCM connector C-114 (terminals 120, 106 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire.





STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 3, 4, 5, and 9) and solenoid valve connectors B-15-1, B-15-2 and B-15-3.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 36 (P0743): Torque Converter Clutch Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23A-155.

CIRCUIT OPERATION
Refer to P.23A-155.

DESCRIPTIONS OF MONITOR METHODS
- If lock-up is not engaged, and solenoid terminal voltage is below specified value, PCM judges that torque converter clutch solenoid valve has a failure.

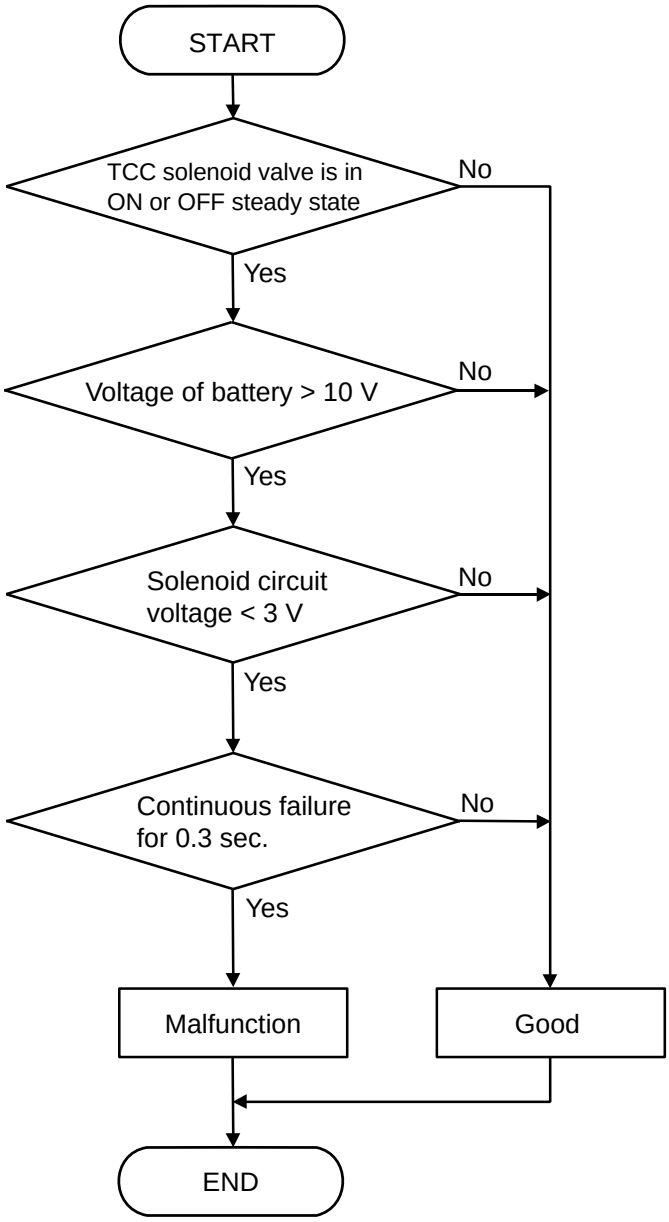
MONITOR EXECUTION
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



AC205240AC

DTC SET CONDITIONS

Check Conditions

- Solenoid status: either solid ON or OFF.
- Voltage of battery: 10 volts or more.

Judgement Criteria

- Solenoid voltage: 3 volts or less. (0.3 second)
- If DTC 36 (P0743) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

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

- Malfunction of the torque converter clutch solenoid valve
- Damaged harness or connector
- Malfunction of the PCM

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DIAGNOSIS

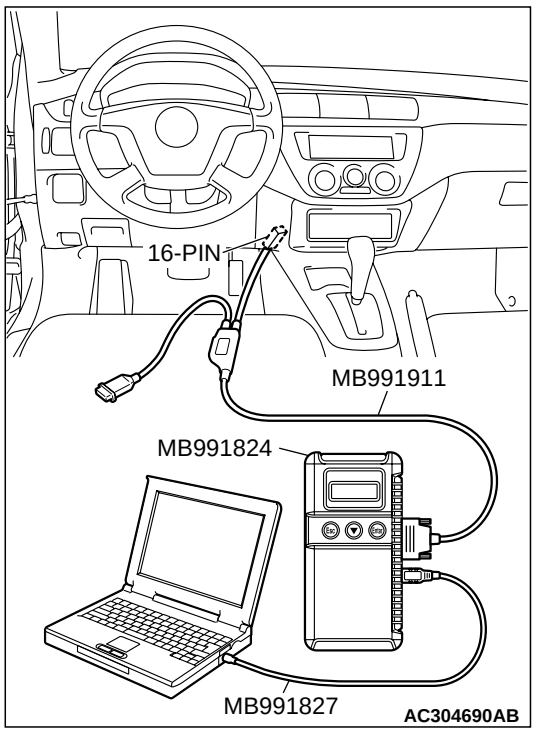
Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

⚠ CAUTION

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



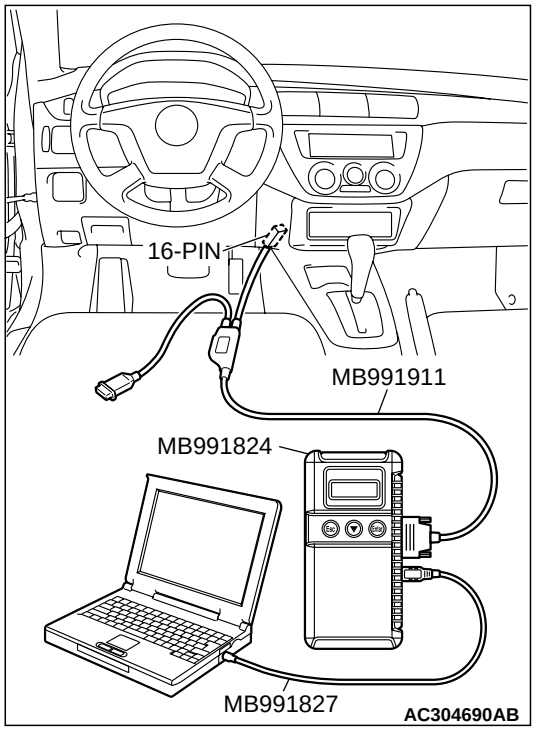
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
  - Item 06: Torque Converter Clutch Solenoid Valve.
    - An audible clicking or buzzing should be heard when the torque converter clutch solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

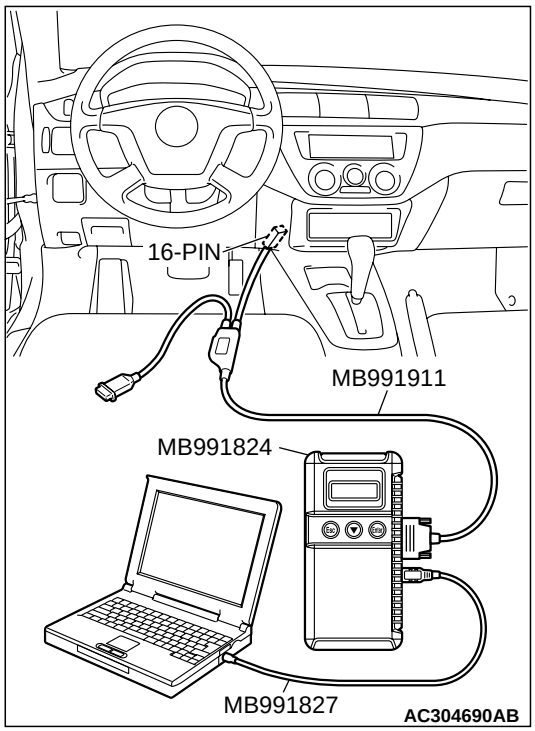


STEP 2. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs).

YES : Refer to P.23A-238 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



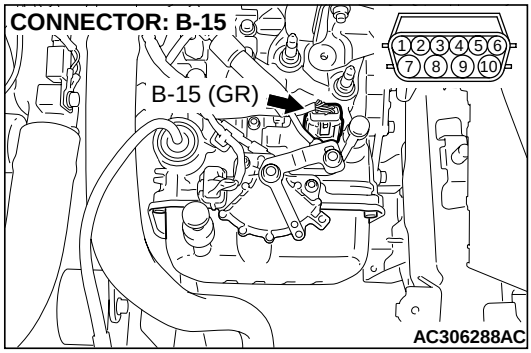
STEP 3. Using scan tool MB991958, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

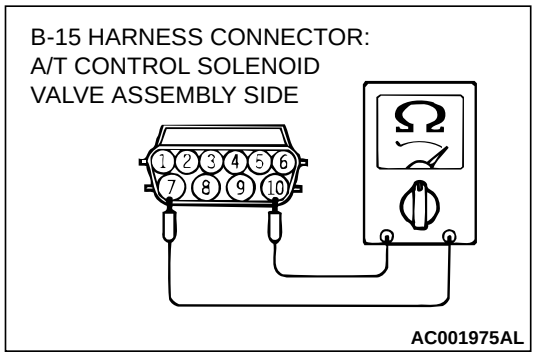
Q: Is DTC 31 set?

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

STEP 4. Measure the torque converter clutch solenoid valve resistance at A/T control solenoid valve assembly connector B-15.



(1) Disconnect connector B-15 and measure at the solenoid valve side.



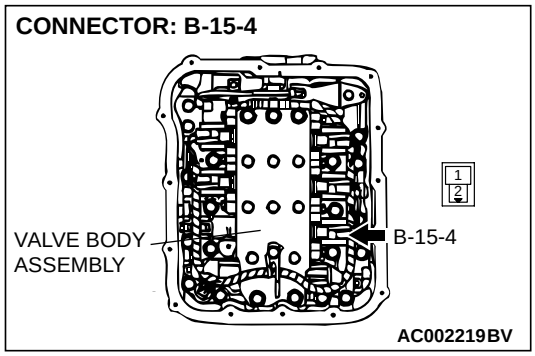
(2) Measure the resistance between solenoid valve assembly connector B-15 terminals 7 and 10.

Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

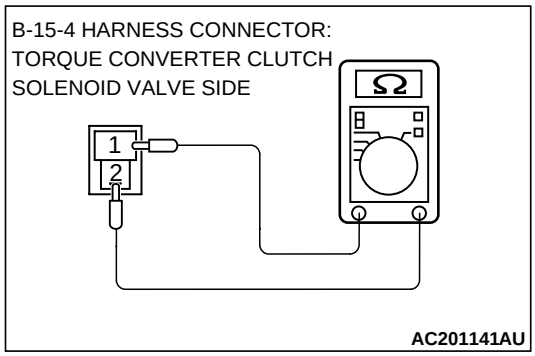
Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)]?

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the torque converter clutch solenoid valve assembly inside the transaxle.



(1) Disconnect connector B-15-4 and measure at the solenoid valve side.



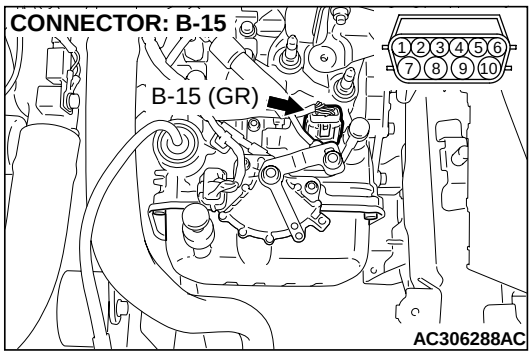
(2) Measure the resistance between torque converter clutch solenoid valve terminals 1 and 2.

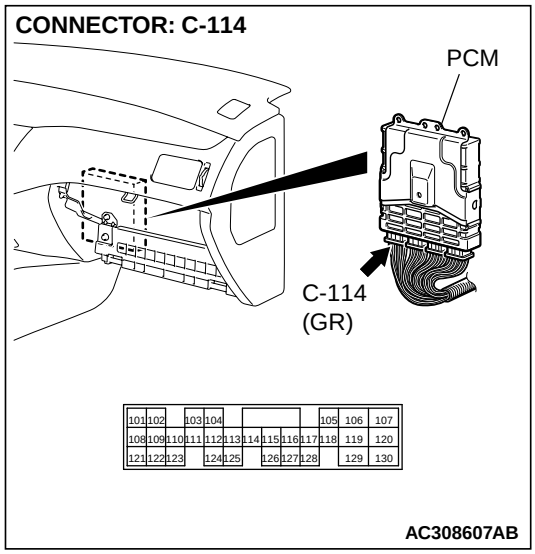
Resistance value: 2.7–3.4 Ω [at 20°C (68°F)]

Q: Is the measured resistance 2.7–3.4 Ω [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector B-15 and the solenoid valves.
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75.

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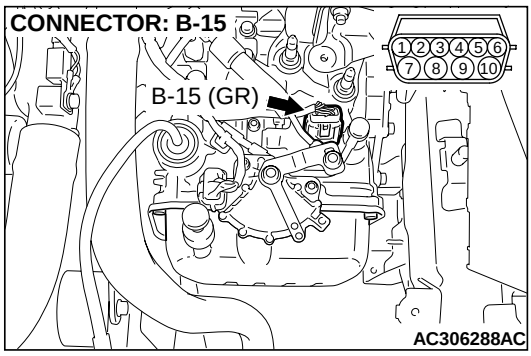


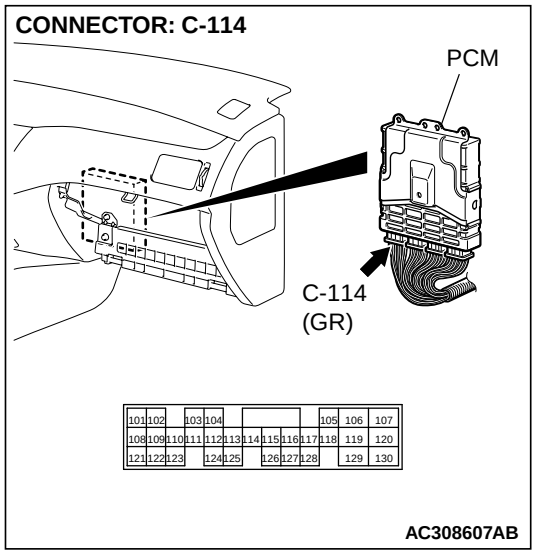
STEP 6. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

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



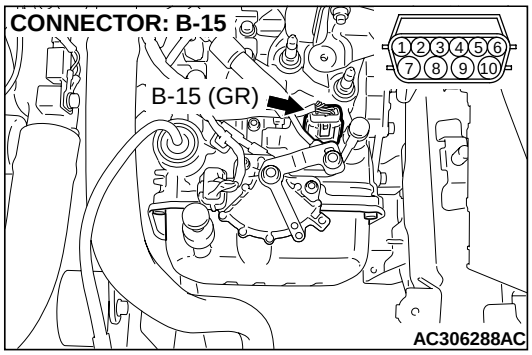


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 terminal 7 and PCM connector C-114 terminal 107.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

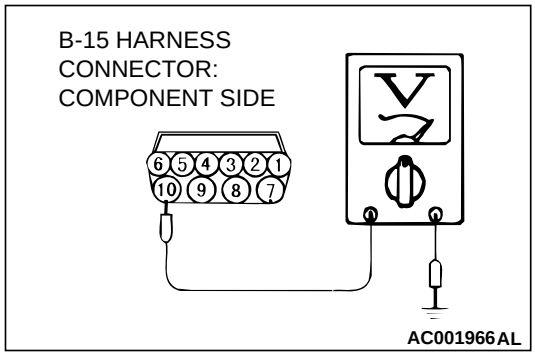
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector B-15.

(1) Disconnect solenoid valve assembly harness connector B-15.

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



(3) Measure the voltage between harness connector B-15 terminal 10 and ground.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

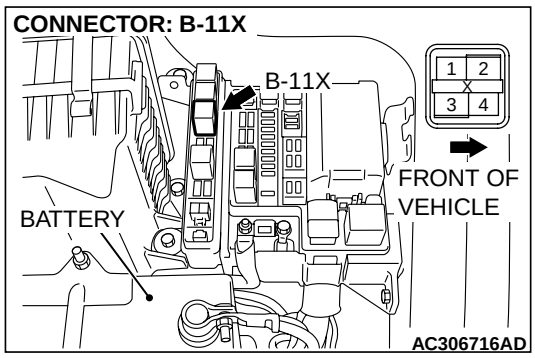
NO : Go to Step 9.

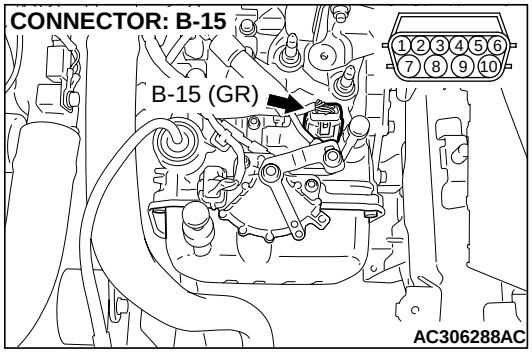
STEP 9. Check A/T control relay connector B-11X in the engine component relay box and A/T control solenoid valve assembly connector B-15 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

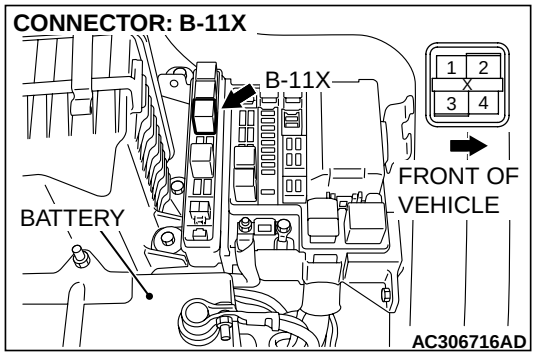
Q: Are the connectors and terminals in good condition?

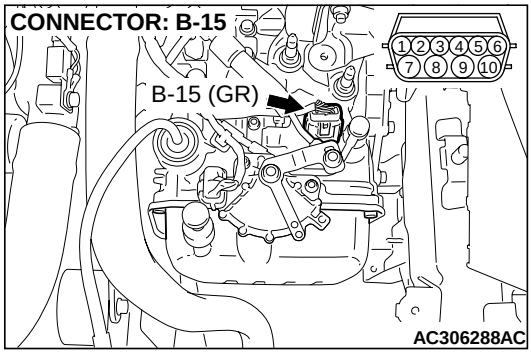
YES : Go to Step 10.

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







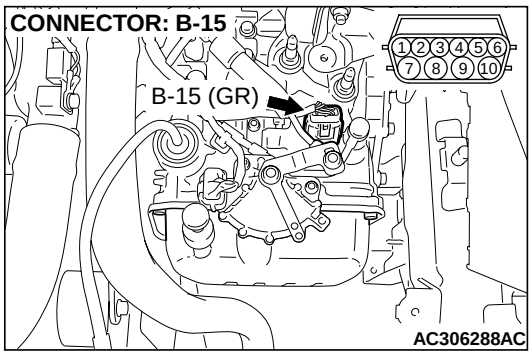


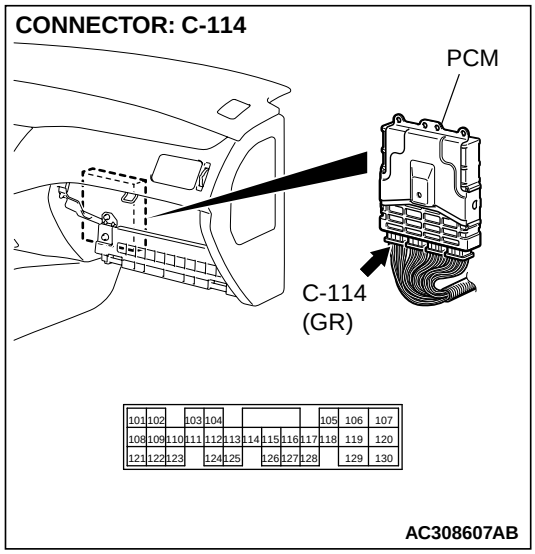
STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control relay connector B-11X terminal 4 in the engine component relay box and A/T control solenoid valve assembly connector B-15 terminal 10.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



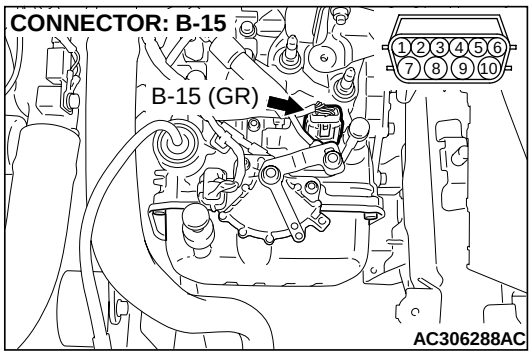


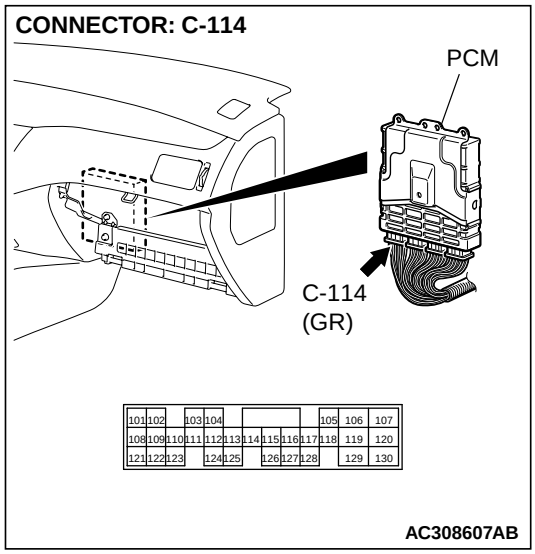
STEP 11. Check A/T control solenoid valve assembly connector B-15 and PCM connector C-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

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



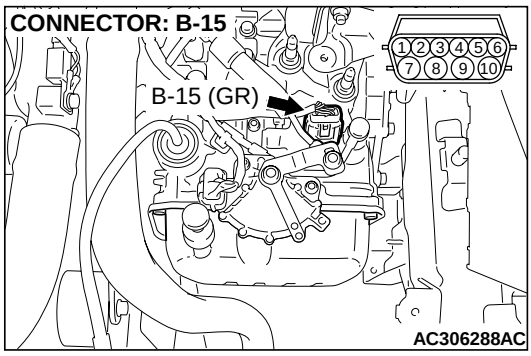


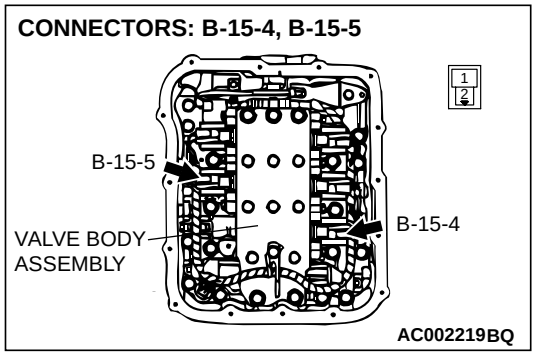
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 6 and 7) and PCM connector C-114 (terminals 129 and 107).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire.





STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector B-15 (terminals 6, 7, and 10) and solenoid valve connectors B-15-4 and B-15-5.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 41 (P0731): 1st Gear Incorrect Ratio
DTC 42 (P0732): 2nd Gear Incorrect Ratio
DTC 43 (P0733): 3rd Gear Incorrect Ratio
DTC 44 (P0734): 4th Gear Incorrect Ratio
DTC 46 (P0736): Reverse Gear Incorrect Ratio

CIRCUIT OPERATION
- The input shaft speed sensor generates a pulsed signal of 0 ⇔ 5 volts. The pulsed signal frequency increases with an increase in the input shaft speed.
- The PCM continuously monitors the input shaft speed signal.
- The output shaft speed sensor generates a pulsed signal of 0 ⇔ 5 volts. The pulsed signal frequency increases with an increase in the output shaft speed.
- The PCM continuously monitors the output shaft speed signal.

DESCRIPTIONS OF MONITOR METHODS <DTC 41 (P0731)>
- In 1st gear, if a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that step-out in 1st gear has occurred.

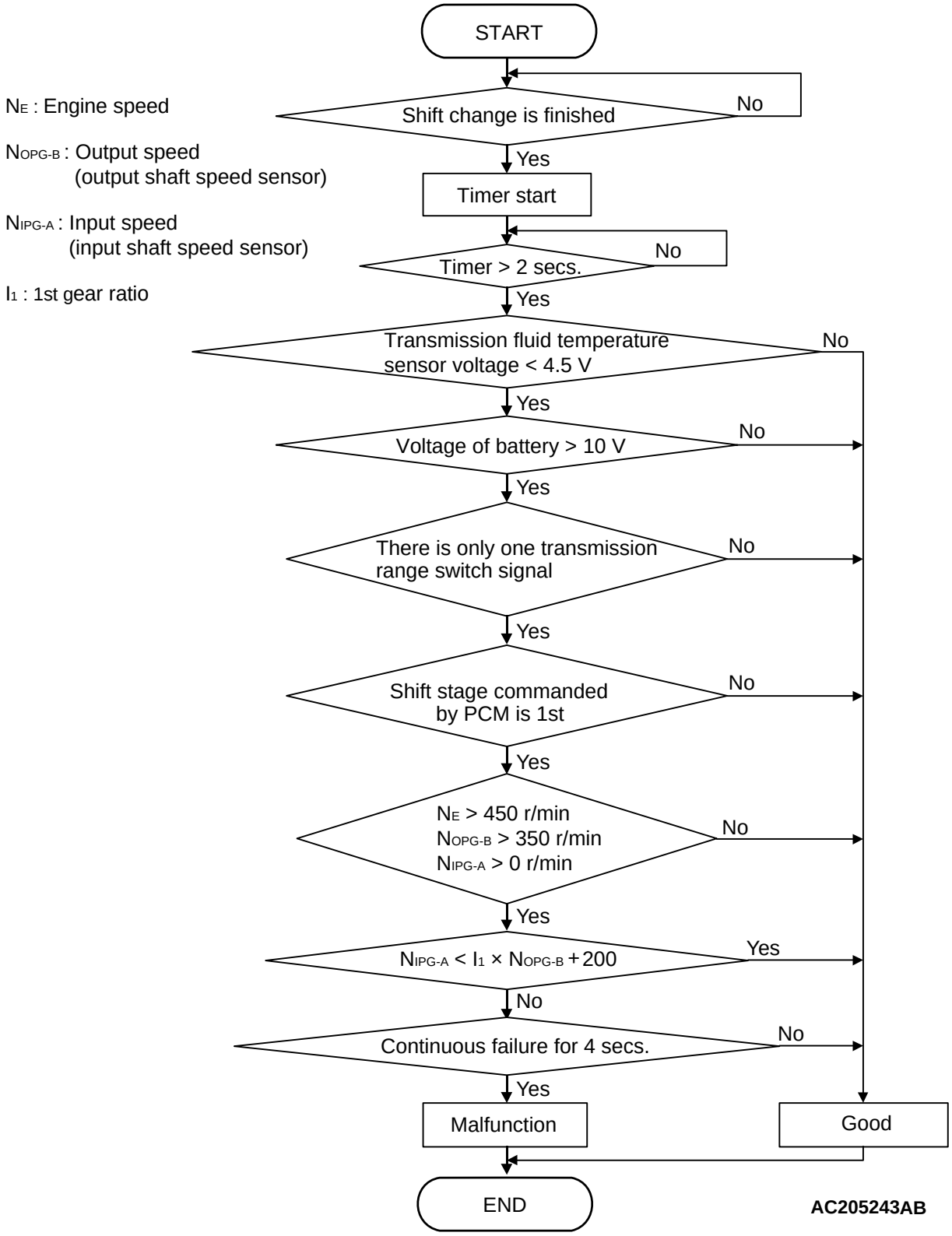
MONITOR EXECUTION <DTC 41 (P0731)>
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor) <DTC 41 (P0731)>

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 27, 28 (P0705): Transmission range switch malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)
- Input shaft speed sensor
- Output shaft speed sensor
- Transmission range switch
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence) <DTC 41 (P0731)>



DTC SET CONDITIONS <DTC 41 (P0731)>

Check Conditions

- Engine speed: 450 r/min or more.
- Output speed: 350 r/min or more.
- Shift stage: 1st gear.
- Input speed: more than 0 r/min.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Voltage of battery: 10 volts or more.

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- Transmission range switch rationality: only one signal.
- Time after shift changing finish: 2 seconds or more.

Judgement Criteria

- Output speed: [(input speed - 200 r/min) / 1st gear ratio] or less. (4 seconds)

DESCRIPTIONS OF MONITOR METHODS <DTC 42 (P0732)>

- In 2nd gear, if a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that step-out in 2nd gear has occurred.

MONITOR EXECUTION <DTC 42 (P0732)>

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor) <DTC 42 (P0732)>

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 27, 28 (P0705): Transmission range switch malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction
- If DTC 41 (P0731) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN <DTC 41 (P0731)>

Start the engine, and drive at 20 km/h (12 mph) or more for 10 seconds, with 1st gear fixed (1st gear in sport mode).

- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Transmission range switch
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

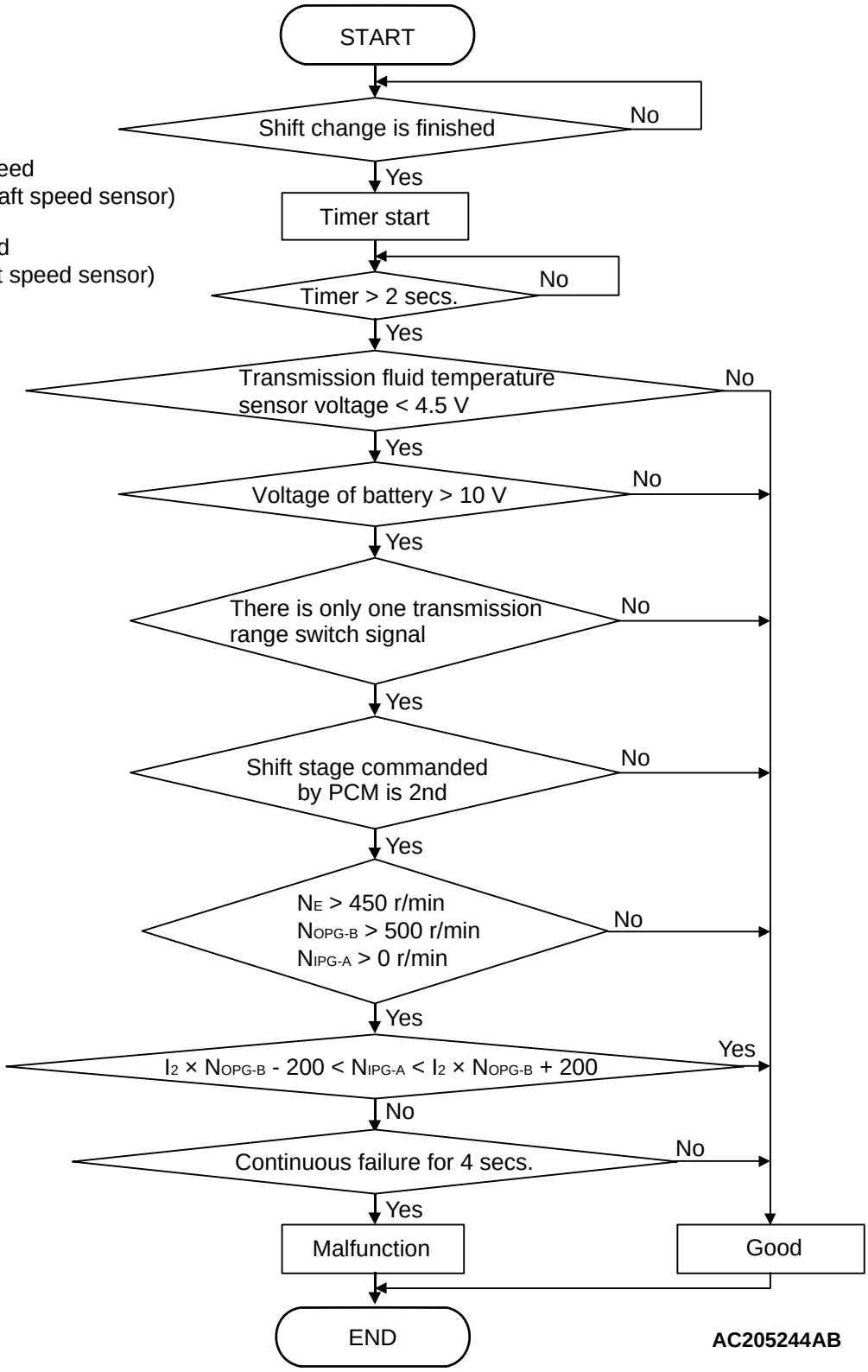
LOGIC FLOW CHARTS (Monitor Sequence) <DTC 42 (P0732)>

N_E : Engine speed

N_{OPG-B} : Output speed
(output shaft speed sensor)

N_{IPG-A} : Input speed
(input shaft speed sensor)

I_2 : 2nd gear ratio



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DTC SET CONDITIONS <DTC 42 (P0732)>

Check Conditions

- Engine speed: 450 r/min or more.
- Output speed: 500 r/min or more.
- Shift stage: 2nd gear.
- Input speed: more than 0 r/min.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Voltage of battery: 10 volts or more.
- Transmission range switch rationality: only one signal.
- Time after shift changing finish: 2 seconds or more.

DESCRIPTIONS OF MONITOR METHODS <DTC 43 (P0733)>

- In 3rd gear, if a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that step-out in 3rd gear has occurred.

MONITOR EXECUTION <DTC 43 (P0733)>

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor) <DTC 43 (P0733)>

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 27, 28 (P0705): Transmission range switch malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction

Judgement Criteria

- Output speed: [(input speed + 200 r/min) / 2nd gear ratio] or more. (4 seconds)
- Output speed: [(input speed - 200 r/min) / 2nd gear ratio] or less. (4 seconds)
- If DTC 42 (P0732) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN <DTC 42 (P0732)>

Start the engine, and drive at 30 km/h (19 mph) or more for 10 seconds, with 2nd gear fixed (2nd gear in sport mode).

- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Transmission range switch
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

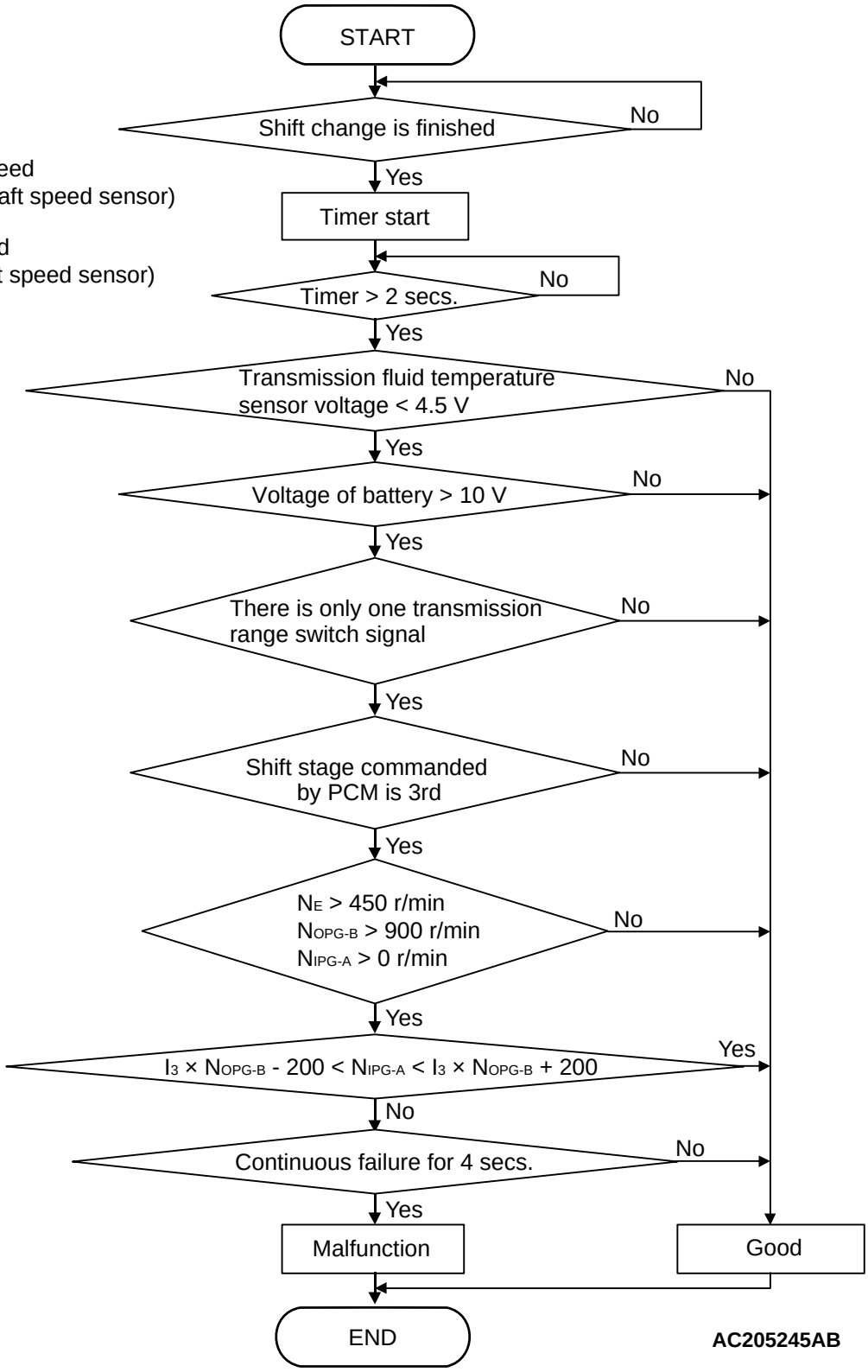
LOGIC FLOW CHARTS (Monitor Sequence) <DTC 43 (P0733)>

N_E : Engine speed

N_{OPG-B} : Output speed
(output shaft speed sensor)

N_{IPG-A} : Input speed
(input shaft speed sensor)

I_3 : 3rd gear ratio



TSB Revision

DTC SET CONDITIONS <DTC 43 (P0733)>

Check Conditions

- Engine speed: 450 r/min or more.
- Output speed: 900 r/min or more.
- Shift stage: 3rd gear.
- Input speed: more than 0 r/min.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Voltage of battery: 10 volts or more.
- Transmission range switch rationality: only one signal.
- Time after shift changing finish: 2 seconds or more.

DESCRIPTIONS OF MONITOR METHODS <DTC 44 (P0734)>

- In 4th gear, if a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that step-out in 4th gear has occurred.

MONITOR EXECUTION <DTC 44 (P0734)>

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor) <DTC 44 (P0734)>

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 27, 28 (P0705): Transmission range switch malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction

Judgement Criteria

- Output speed: [(input speed + 200 r/min) / 3rd gear ratio] or more. (4 seconds)
- Output speed: [(input speed - 200 r/min) / 3rd gear ratio] or less. (4 seconds)
- If DTC 43 (P0733) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN <DTC 43 (P0733)>

Start the engine, and drive at 40 km/h (25 mph) or more for 10 seconds, with 3rd gear fixed (3rd gear in sport mode).

- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Transmission range switch
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

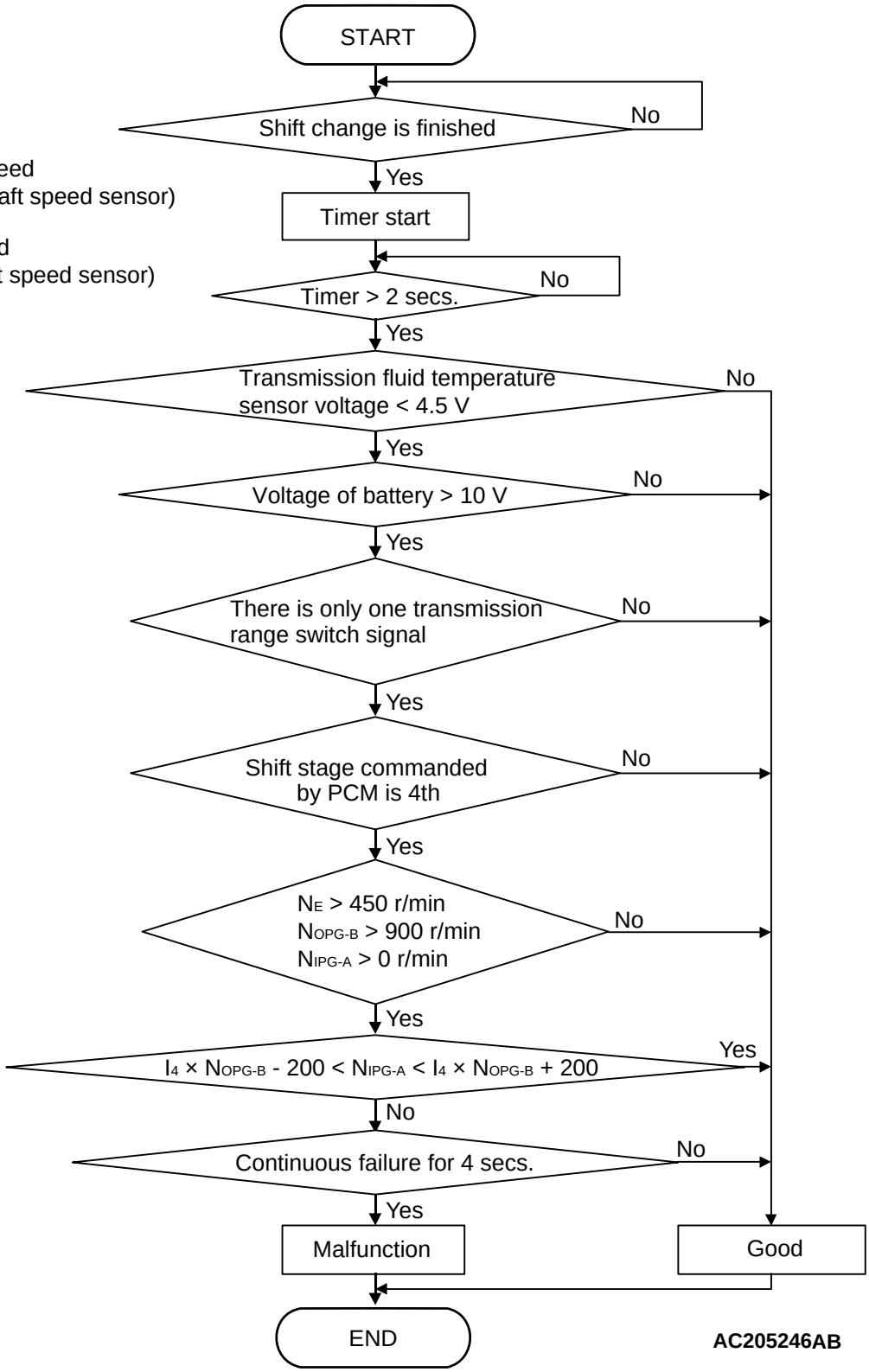
LOGIC FLOW CHARTS (Monitor Sequence) <DTC 44 (P0734)>

N_E : Engine speed

N_{OPG-B} : Output speed
(output shaft speed sensor)

N_{IPG-A} : Input speed
(input shaft speed sensor)

I_4 : 4th gear ratio



TSB Revision

DTC SET CONDITIONS <DTC 44 (P0734)>

Check Conditions

- Engine speed: 450 r/min or more.
- Output speed: 900 r/min or more.
- Shift stage: 4th gear.
- Input speed: more than 0 r/min.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Voltage of battery: 10 volts or more.
- Transmission range switch rationality: only one signal.
- Time after shift changing finish: 2 seconds or more.

DESCRIPTIONS OF MONITOR METHODS <DTC 46 (P0736)>

- In reverse gear, if a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that step-out in reverse gear has occurred.

MONITOR EXECUTION <DTC 46 (P0736)>

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor) <DTC 46 (P0736)>

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 27, 28 (P0705): Transmission range switch malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction

Judgement Criteria

- Output speed: [(input speed + 200 r/min) / 4th gear ratio] or more. (4 seconds)
- Output speed: [(input speed - 200 r/min) / 4th gear ratio] or less. (4 seconds)
- If DTC 44 (P0734) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN <DTC 44 (P0734)>

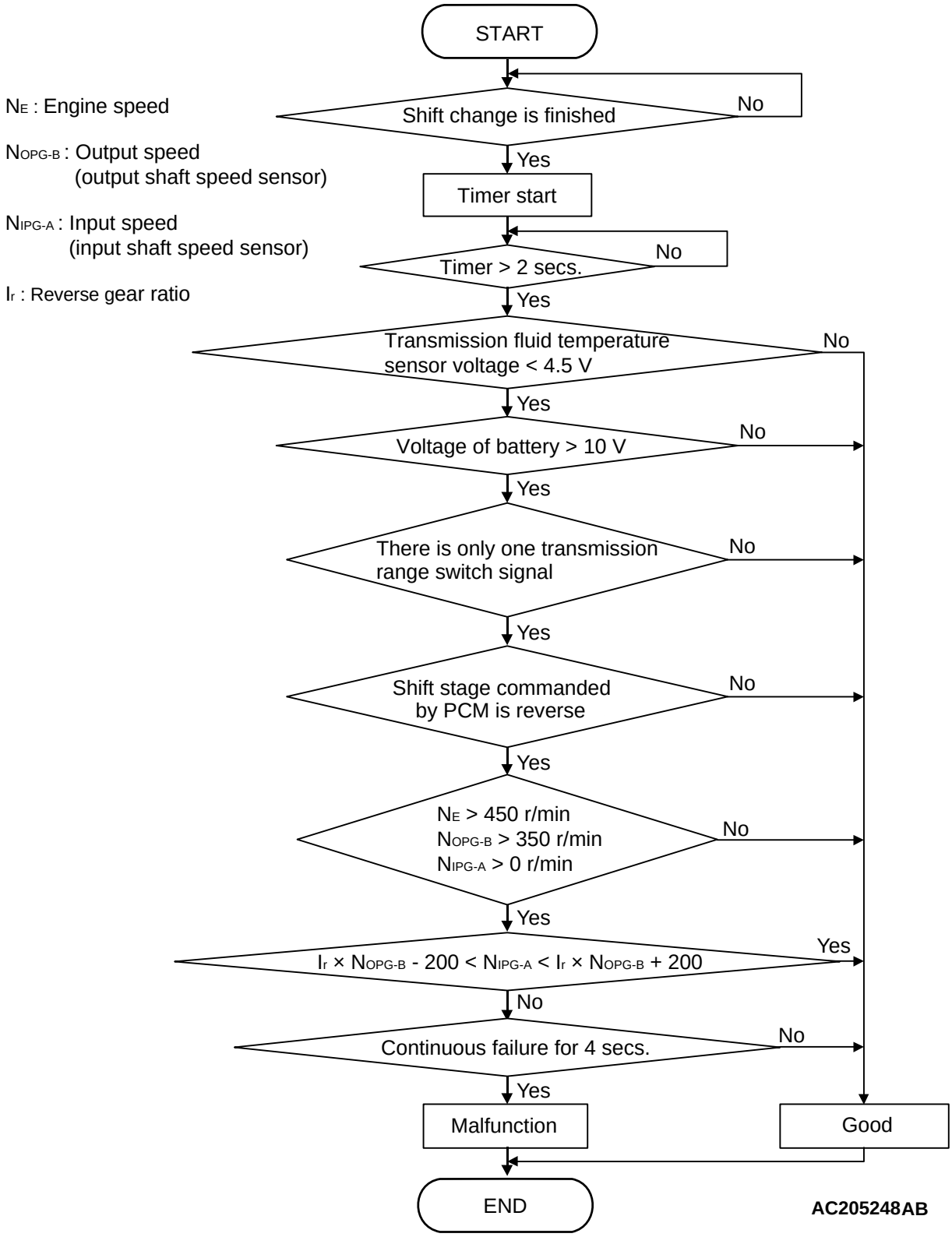
Start the engine, and drive at 40 km/h (25 mph) or more for 10 seconds, with 4th gear fixed (4th gear in sport mode).

- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Transmission range switch
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence) <DTC 46 (P0736)>



TSB Revision

DTC SET CONDITIONS <DTC 46 (P0736)>

Check Conditions

- Engine speed: 450 r/min or more.
- Output speed: 350 r/min or more.
- Shift stage: reverse gear.
- Input speed: more than 0 r/min.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Voltage of battery: 10 volts or more.
- Transmission range switch rationality: only one signal.
- Time after shift changing finish: 2 seconds or more.

Judgement Criteria

- Output speed: [(input speed + 200 r/min) / reverse gear ratio] or more. (4 seconds)
- Output speed: [(input speed - 200 r/min) / reverse gear ratio] or less. (4 seconds)
- If DTC 46 (P0736) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

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

- 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 (DTC 41 or DTC 46)

OBD-II DRIVE CYCLE PATTERN <DTC 46 (P0736)>

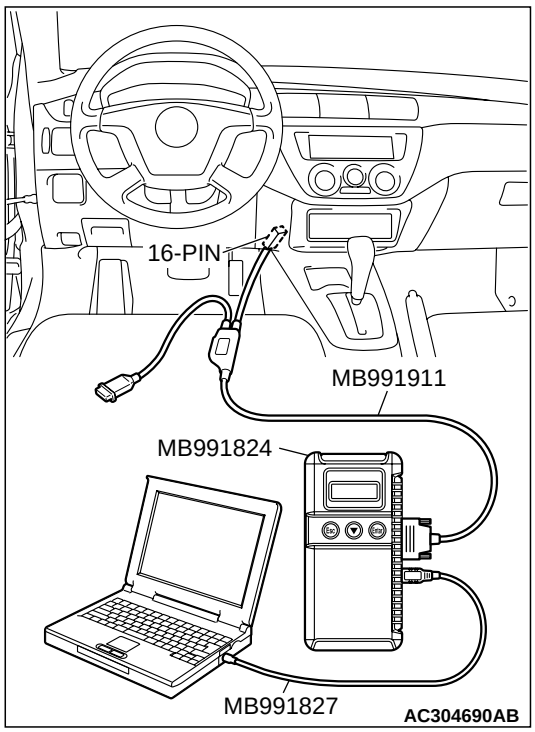
Start the engine, and drive in "R" range at 15 km/h (9 mph) or more for 10 seconds.

- Malfunction of the underdrive clutch system (DTC 41, DTC 42, or DTC 43)
- Malfunction of the second brake system (DTC 42 or DTC 44)
- Malfunction of the overdrive clutch system (DTC 43 or DTC 44)
- Malfunction of the reverse clutch system (DTC 46)
- Electrical noise generated

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, read the A/T diagnostic trouble code.

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC set?

YES <DTC 22 set> : Refer to P.23A-61, DTC 22: Input Shaft Speed Sensor System.
YES <DTC 23 set> : Refer to P.23A-80, DTC 23: Output Shaft Speed Sensor System.
YES <DTC 31 set> : Refer to P.23A-155, DTC 31: Low-Reverse Solenoid Valve System.
YES <DTC 32 set> : Refer to P.23A-168, DTC 32: Underdrive Solenoid Valve System.
YES <DTC 33 set> : Refer to P.23A-179, DTC 33: Second Solenoid Valve System.
YES <DTC 34 set> : Refer to P.23A-191, DTC 34: Overdrive Solenoid Valve System.
NO : Go to Step 2.

STEP 2. Check the hydraulic pressure.

Each hydraulic pressure of the elements below, which DTCs indicate, should be within the standard value. P.23A-23.

- DTC41: Underdrive clutch and low-reverse brake.
- DTC42: Underdrive clutch and second brake
- DTC43: Underdrive clutch and overdrive clutch
- DTC44: Overdrive clutch and second brake
- DTC46: Reverse clutch and low-reverse brake

Q: Does the hydraulic pressures meet the standard value range?

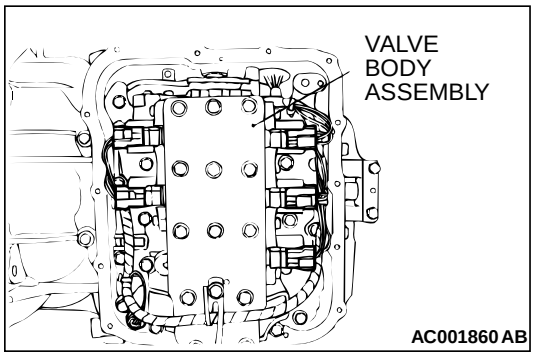
YES : Go to Step 5.
NO <out of the range in one place> : Go to Step 4.
NO <out of the range in all places> : Go to Step 3.

STEP 3. 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 : The procedure is complete.
NO : Go to Step 4.



STEP 4. 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 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 6.

STEP 5. Replace the PCM.

(1) Replace the PCM.

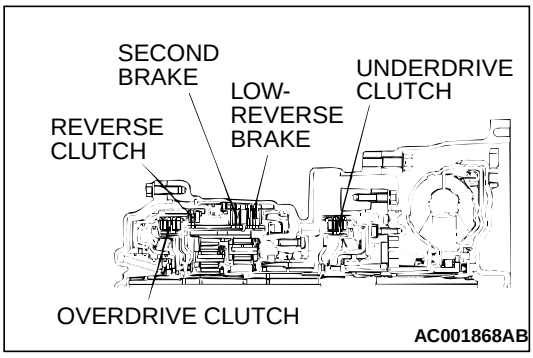
(2) Test drive the vehicle.

(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

YES : Go to Step 6.

NO : The procedure is complete.



STEP 6. Overhaul the A/T.

(1) Replace the following parts.

- If DTC 41, DTC 42, or DTC 43 are set individually or in a group, replace the underdrive clutch. Refer to GROUP 23C, Underdrive Clutch and Input Shaft P.23C-58.
- If DTC 43 or DTC 44 are set individually or in a group, replace the overdrive clutch. Refer to GROUP 23C, Reverse and Overdrive Clutch P.23C-61.
- If DTC 46 is set, replace the reverse clutch. Refer to GROUP 23C, Reverse and Overdrive Clutch P.23C-61.
- If DTC 41 or DTC 46 are set individually or in a group, replace the low-reverse brake. Refer to GROUP 23C, Transaxle P.23C-9.
- If DTC 42 or DTC 44 are set individually or in a group, replace the second brake. Refer to GROUP 23C, Transaxle P.23C-9.
- If DTC 41 is set, replace the one-way clutch. Refer to GROUP 23C, Planetary Gear P.23C-67.

(2) Test drive the vehicle.

(3) Check for A/T diagnostic trouble code.

Q: Are any A/T DTCs set again?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.

NO : The procedure is complete.

DTC 52 (P0741): Torque Converter Clutch System

DESCRIPTIONS OF MONITOR METHODS

- At start of lock-up operation, if lock-up clutch cannot be engaged even when duty ratio of torque converter clutch solenoid remains 100% for more than specified time, PCM judges that torque converter clutch is stuck OFF.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

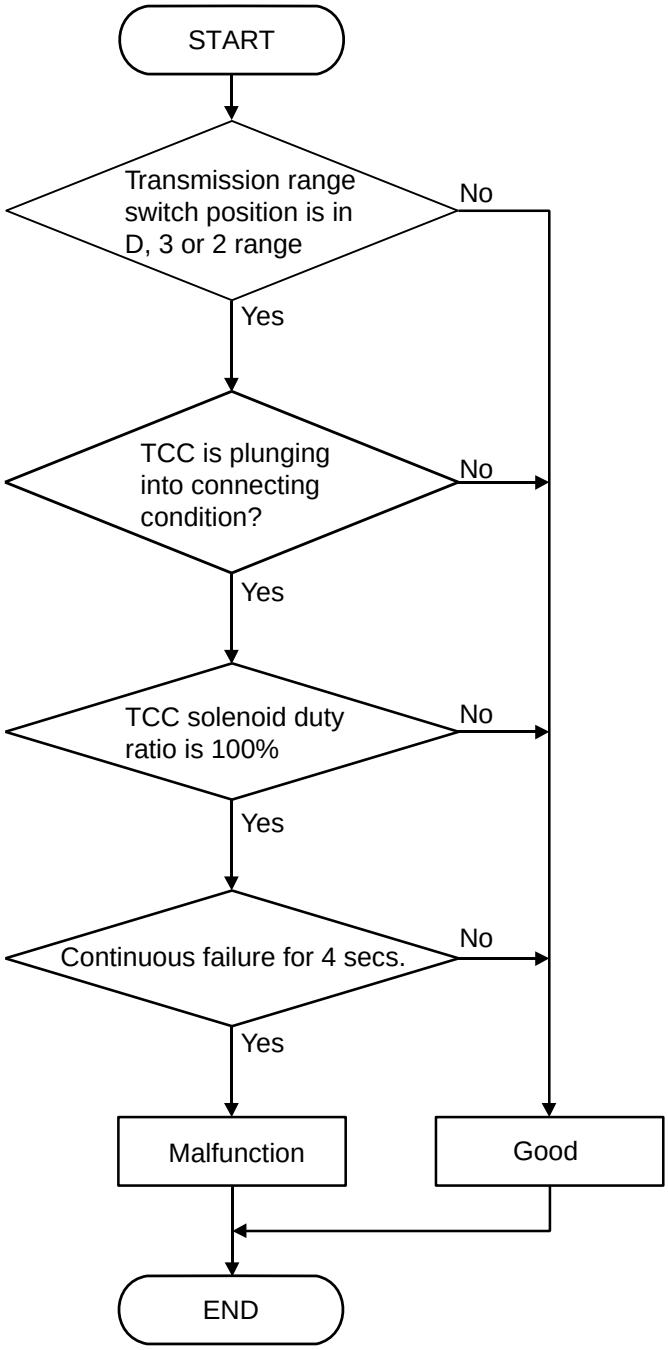
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 21 (P0335): Crankshaft position sensor malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction
- DTC 53 (P0742): Torque converter clutch system malfunction (Stuck ON)
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Crankshaft position sensor
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



AC205238

DTC SET CONDITIONS

Check Conditions

- Solenoid status: plunging into connecting condition.
- Transmission range switch position: D.

Judgement Criteria

- Time during 100% duty: 4 seconds or more.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and drive at 100 km/h (62 mph) for 10 seconds. Then stop the vehicle, and turn OFF the ignition switch. After that, restart the engine, and drive again at 100 km/h (62 mph) for 10 seconds.

TSB Revision

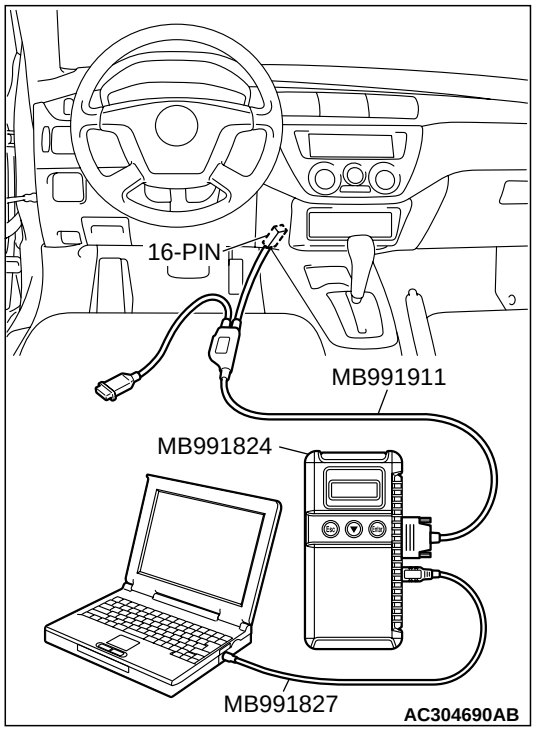
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the input shaft speed sensor
- Malfunction of the valve body
- Damaged harness or connector
- Malfunction of the PCM
- Malfunction of the torque converter

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, read the A/T diagnostic trouble code.

⚠ CAUTION

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

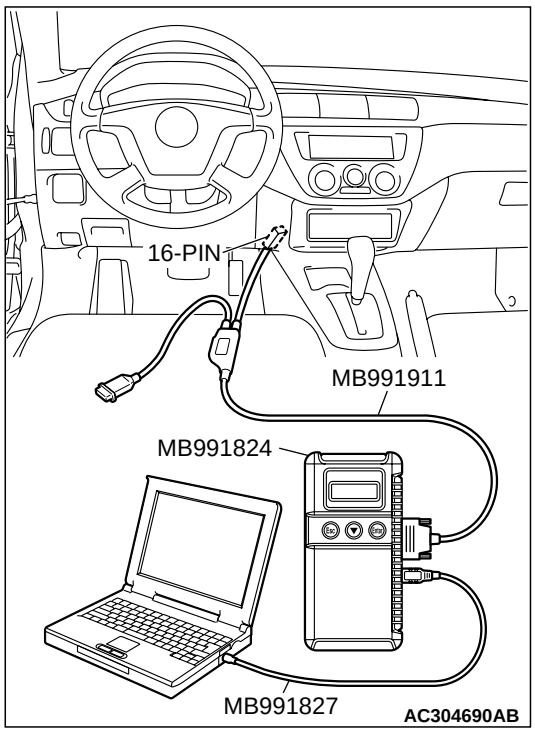
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 22 or 36 set?

YES <DTC 22 set> : Refer to P.23A-61, DTC 22: Input Shaft Speed Sensor System.

YES <DTC 36 set> : Refer to P.23A-203, DTC 36: Torque Converter Clutch Solenoid Valve System.

NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 36: Torque Converter Clutch Solenoid Valve Duty%.

⚠ CAUTION

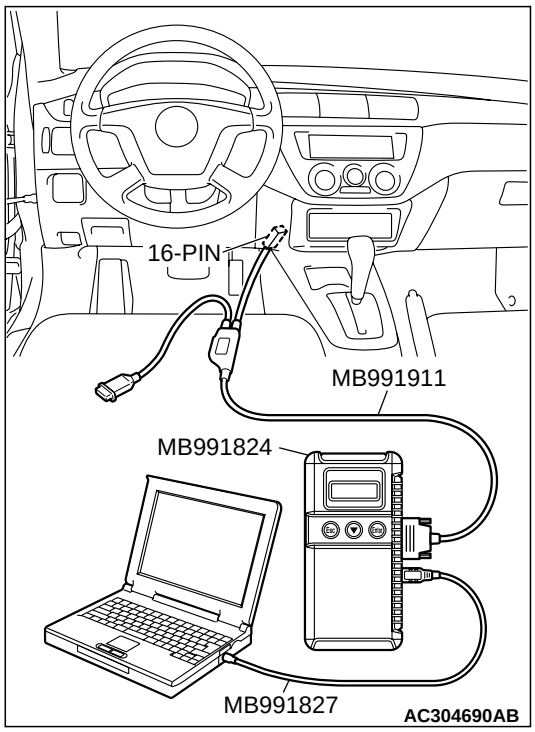
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine. (Warming up engine)
(3) Set scan tool MB991958 to the data reading mode.
- Item 36: Torque Converter Clutch Solenoid Valve Duty%.
  - When driving at constant speed of 60 km/h (37 mph), the display should be "70 – 99.6%" (Gear range: 3rd gear).
  - When the accelerator pedal is released [at less than 50 km/h (31 mph)], the display should be "70 – 99.6% → 0%" (decreases gradually as the vehicle speed decreases) (Gear range: 3rd gear).

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

Q: Is the solenoid valve operating properly?

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



STEP 3. Using scan tool MB991958, check data list item 52: Torque Converter Clutch Amount of Slippage.

⚠ CAUTION

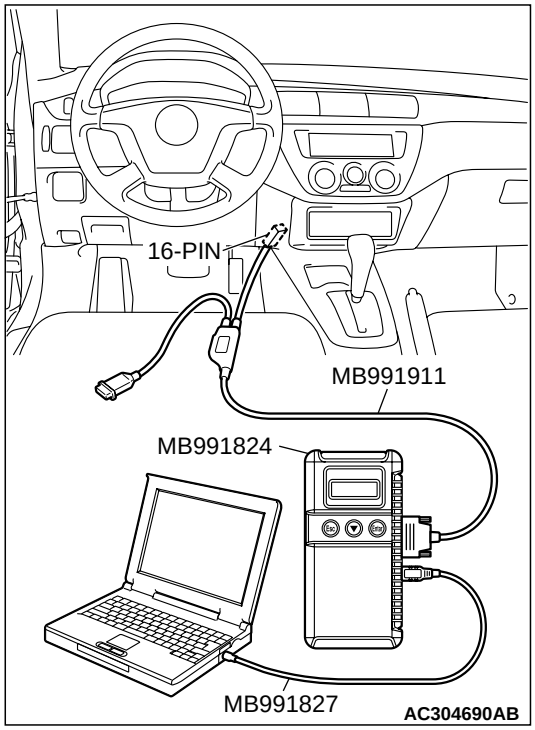
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine. (Warming up engine)
(3) Set scan tool MB991958 to the data reading mode.
- Item 52: Torque Converter Clutch Amount of Slippage.
  - Driving at a constant speed of 60 km/h (37 mph), the display should be "–10 to 10 r/min."
  - If the accelerator pedal is released, the display on the scan tool changes (50 km/h (31 mph) and less).

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

Q: Is the clutch operating properly?

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



STEP 4. Using scan tool MB991958, read the A/T diagnostic trouble code.

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 52 set?

YES : Replace the PCM.
NO : The procedure is complete.

STEP 5. Check the hydraulic pressure (for torque converter).

Measure the hydraulic pressure for torque converter. 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 7.
NO : Go to Step 6.

STEP 6. Adjust line pressure.

Adjust line pressure. Refer to P.23A-37, Line Pressure Adjustment. Then check the symptom.

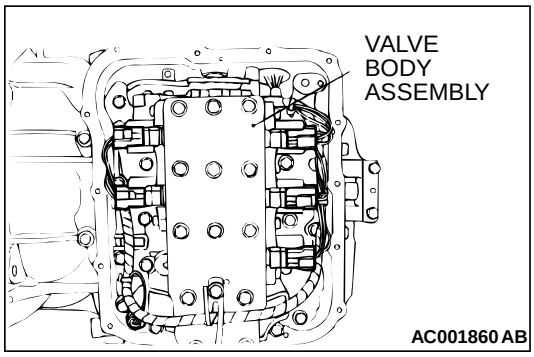
Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 8.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 8.



STEP 8. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23C, Transaxle P.23C-9.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 52 set?

YES : Replace the torque converter. Refer to GROUP 23C, Transaxle P.23C-9.
NO : The procedure is complete.

DTC 53 (P0742): Torque Converter Clutch is Stuck On

DESCRIPTIONS OF MONITOR METHODS

- With PCM signal for no lock-up engagement, if vehicle speed equals or exceeds specified value, accelerator is ON, and torque converter slip amount is below specified value, PCM judges that torque converter clutch is stuck ON.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

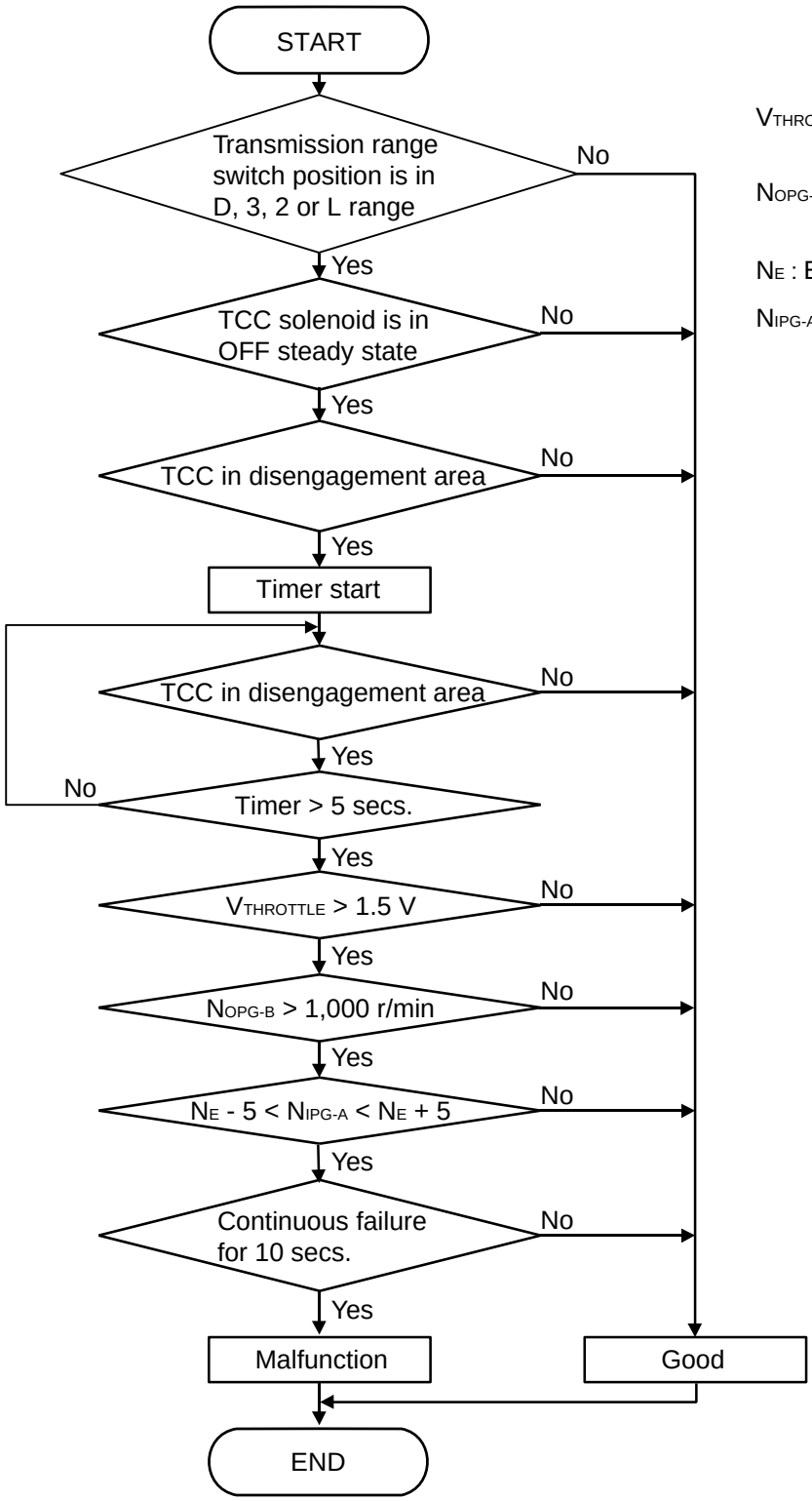
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 21 (P0335): Crankshaft position sensor malfunction
- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 23 (P0720): Output shaft speed sensor malfunction
- DTC 52 (P0741): Torque converter clutch system malfunction (Stuck OFF)
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- P0122: Throttle position sensor (main) malfunction (Low input)
- P0123: Throttle position sensor (main) malfunction (High input)
- P0222: Throttle position sensor (sub) malfunction (Low input)
- P0223: Throttle position sensor (sub) malfunction (High input)
- P2135: Throttle position sensor (main and sub) range/performance problem
- P0638: Throttle actuator control motor circuit range/performance problem
- P0642: Throttle position sensor power supply
- P1601: Communication malfunction (Between PCM and throttle actuator control module)
- P0606: PCM main processor malfunction
- P2108: Throttle actuator control module processor malfunction
- P2100: Throttle actuator control motor circuit (Open)
- P2101: Throttle actuator control motor magneto malfunction
- P2102: Throttle actuator control motor circuit (Shorted low)
- P2103: Throttle actuator control motor circuit (Shorted high)
- P2122: Accelerator pedal position sensor (main) circuit low input
- P2123: Accelerator pedal position sensor (main) circuit high input
- P2127: Accelerator pedal position sensor (sub) circuit low input
- P2128: Accelerator pedal position sensor (sub) circuit high input
- P2138: Accelerator pedal position sensor (main and sub) range/performance problem

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Output shaft speed sensor
- Crankshaft position sensor
- Torque converter clutch solenoid
- Throttle position sensor
- Accelerator pedal position sensor

LOGIC FLOW CHARTS (Monitor Sequence)



$V_{THROTTLE}$: Throttle position sensor output voltage

N_{OPG-B} : Output speed (output shaft speed sensor)

N_E : Engine speed

N_{IPG-A} : Input speed (input shaft speed sensor)

AC205239

DTC SET CONDITIONS

Check Conditions

- Throttle position sensor voltage: 1.5 volts or more.
- Output speed: 1,000 r/min or more.
- Solenoid status: OFF.
- Transmission range switch position: D.
- Time after lock up clutch release: 5 seconds or more.

Judgement Criteria

- Calculated slip (engine speed - input speed): 5 r/min or more. (10 seconds)
- Calculated slip (engine speed - input speed): -5 r/min or less. (10 seconds)

OBD-II DRIVE CYCLE PATTERN

Start the engine, and drive at 30 km/h (19 mph) for 30 seconds. Then stop the vehicle, and turn "LOCK" (OFF) the ignition switch. After that, restart the engine, and drive again at 30 km/h (19 mph) for 30 seconds.

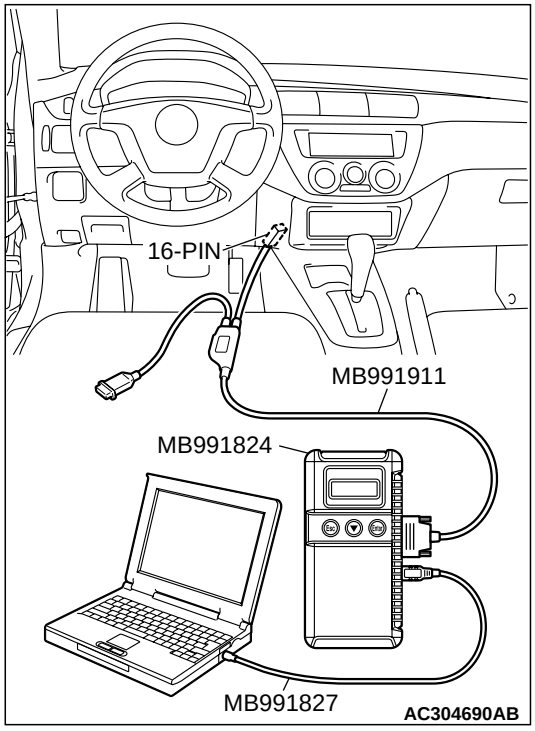
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the valve body
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, read the A/T diagnostic trouble code.

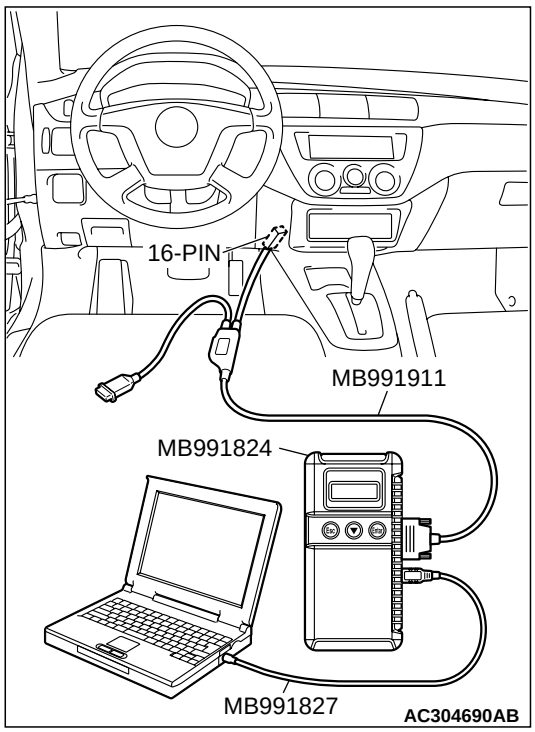
⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 36 set?

YES : Refer to P.23A-203, DTC 36: Torque Converter Clutch Solenoid Valve System.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 52: Amount of Torque Converter Clutch Slippage.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine. (Warming up engine)
(3) Set scan tool MB991958 to the data reading mode.
- Item 52: Torque Converter Clutch Amount of Slippage.
  - Driving at a constant speed of 60 km/h (37 mph), the display should be "–10 to 10 r/min."
  - If the accelerator pedal is released, the display on the scan tool changes (50 km/h (31 mph) and less).

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

Q: Is the torque converter clutch slippage within the specified range?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 3.

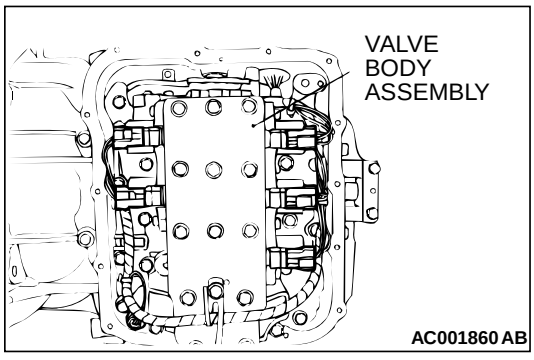
STEP 3. Replace the PCM.

(1) Replace the PCM.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 53 set?

YES : Go to Step 4.

NO : The procedure is complete.



STEP 4. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23C, Transaxle P.23C-9.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

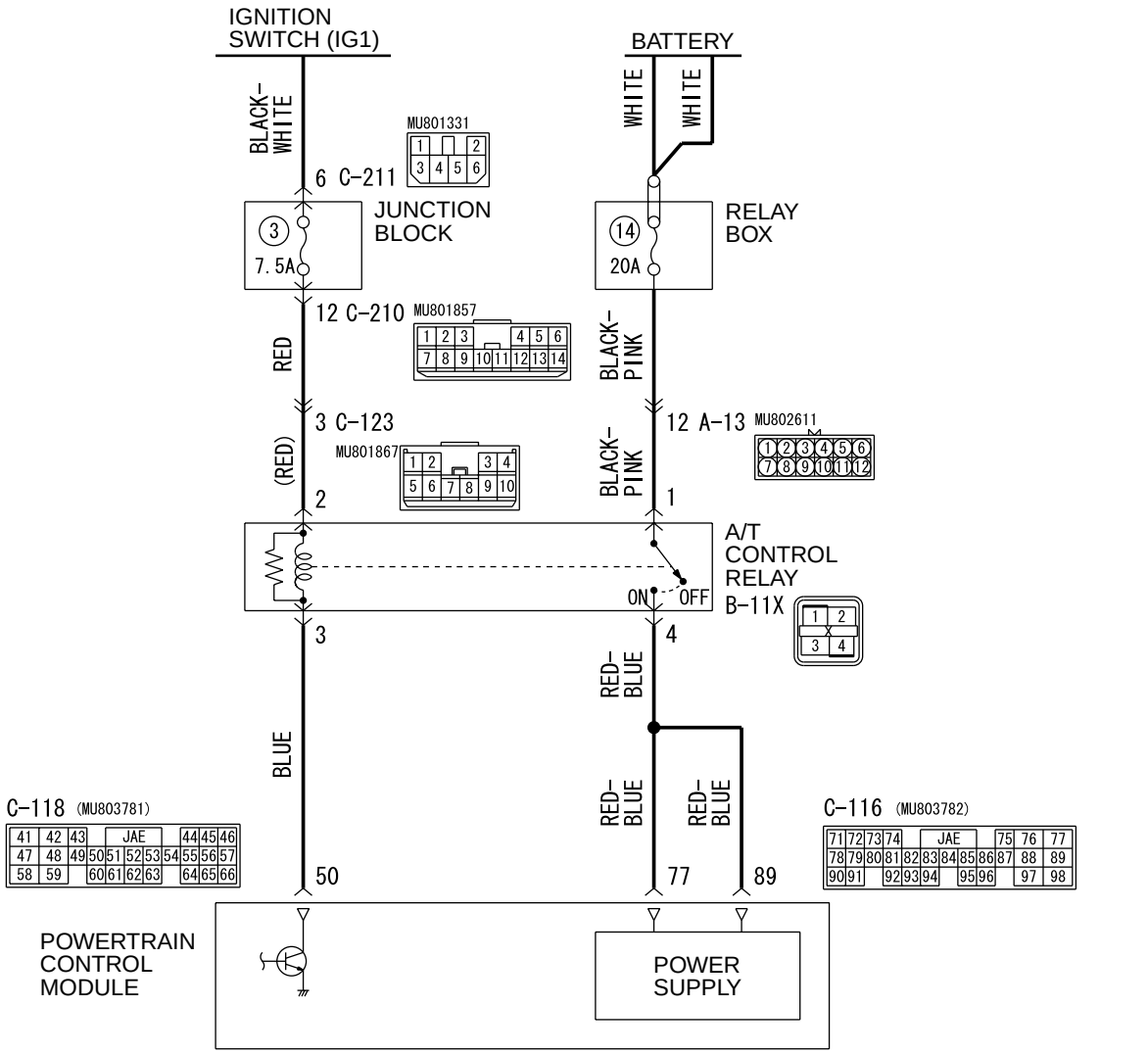
Q: Is DTC 53 set?

YES : Replace the Torque Converter. Refer to GROUP 23C, Transaxle P.23C-9.

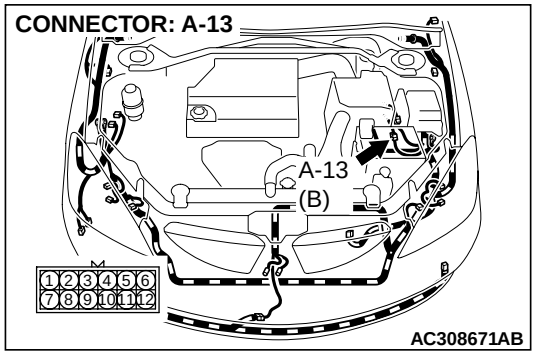
NO : The procedure is complete.

DTC 54 (P1751): A/T Control Relay System

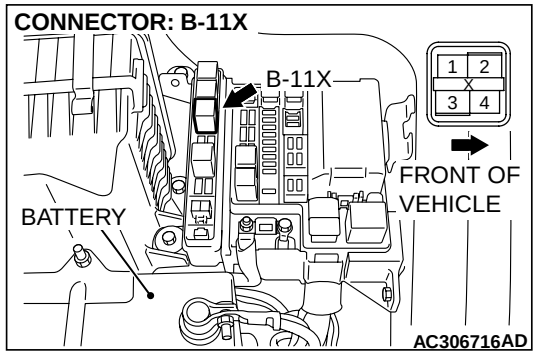
A/T Control Relay System Circuit



AC307931AC

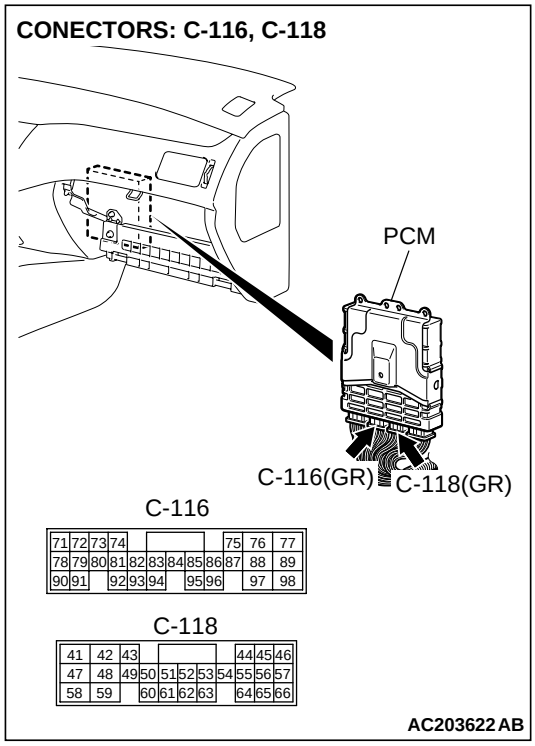


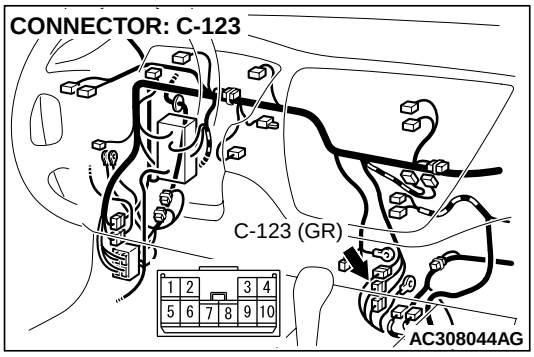
AC308671AB

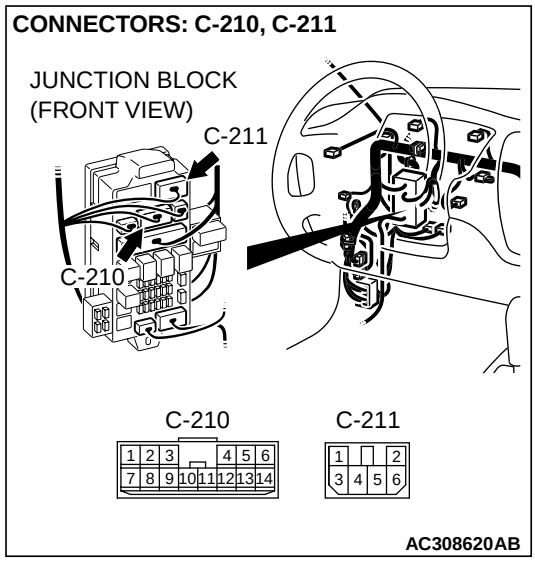


AC306716AD

TSB Revision







CIRCUIT OPERATION

- A/T control relay (terminal 1) receives the battery positive voltage through a dedicated 20 amp fuse.
- When the ignition switch is turned to the "ON" position, the PCM (terminal 50) receives battery voltage from the ignition switch. The PCM (terminal 50) applies voltage to energize the A/T control relay (terminal 3). With the A/T control relay energized, system voltage is applied to the PCM (terminals 77 and 89).

DESCRIPTIONS OF MONITOR METHODS

- If relay output voltage is below specified value, PCM judges that A/T control relay has a failure.

TSB Revision

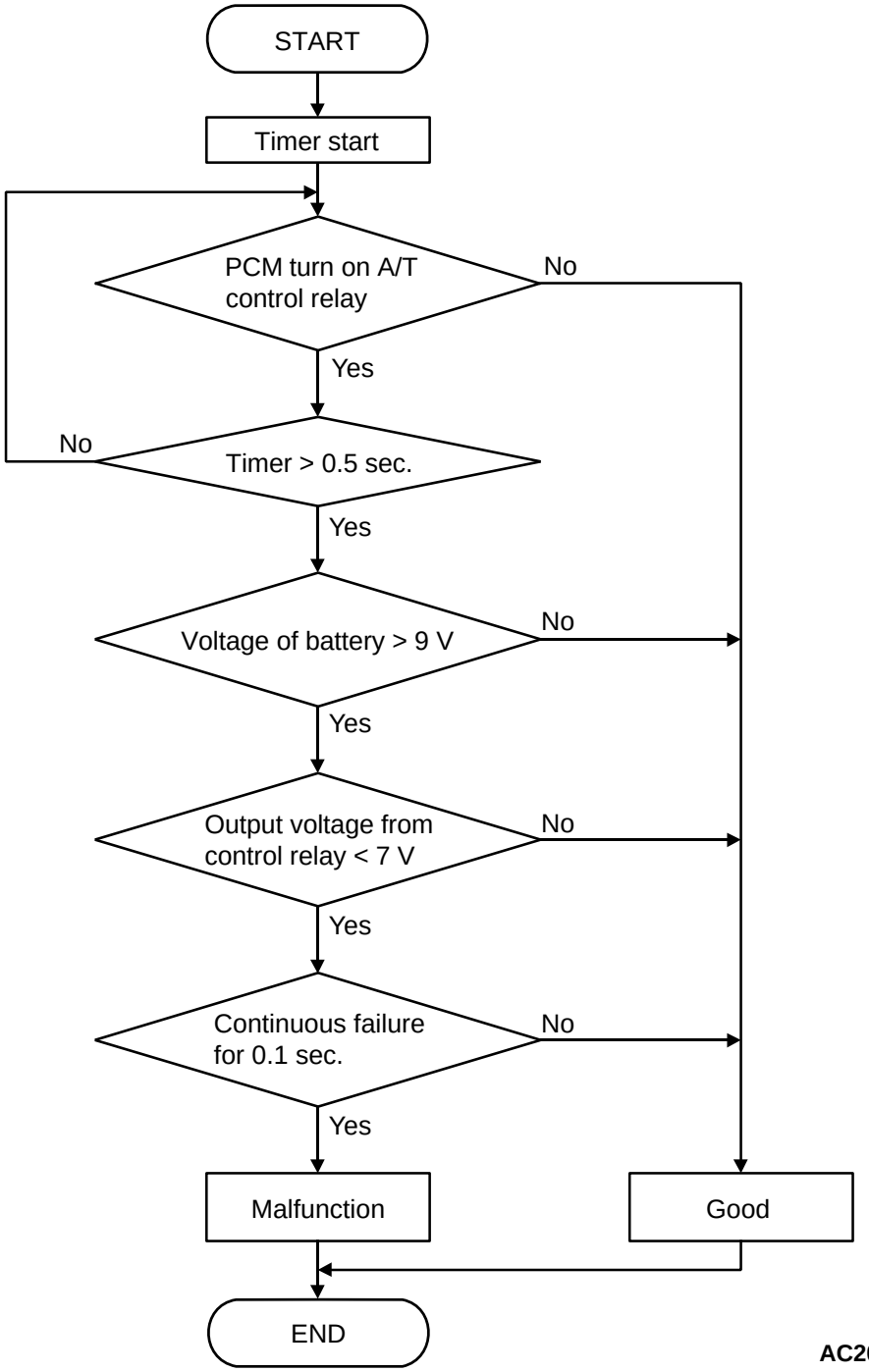
MONITOR EXECUTION
- Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- DTC 41 (P0731): 1st gear incorrect ratio
- DTC 42 (P0732): 2nd gear incorrect ratio
- DTC 43 (P0733): 3rd gear incorrect ratio
- DTC 44 (P0734): 4th gear incorrect ratio
- DTC 46 (P0736): Reverse gear incorrect ratio
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low-reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction

Sensor (The sensor below is determined to be normal)
- Torque converter clutch solenoid
- Low-reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid

LOGIC FLOW CHARTS (Monitor Sequence)



AC205241AB

DTC SET CONDITIONS

Check Conditions

- Voltage of battery: 9 volts or more.
- Time after PCM turns on A/T control relay: 0.5 second or more.

Judgement Criteria

- A/T control relay output voltage: 7 volts or less. (0.1 second)
- If DTC 54 (P1751) is set consecutively four times, the transaxle is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

TSB Revision

OBD-II DRIVE CYCLE PATTERN

Start the engine, and keep the vehicle stopped in "P" range for 5 seconds.

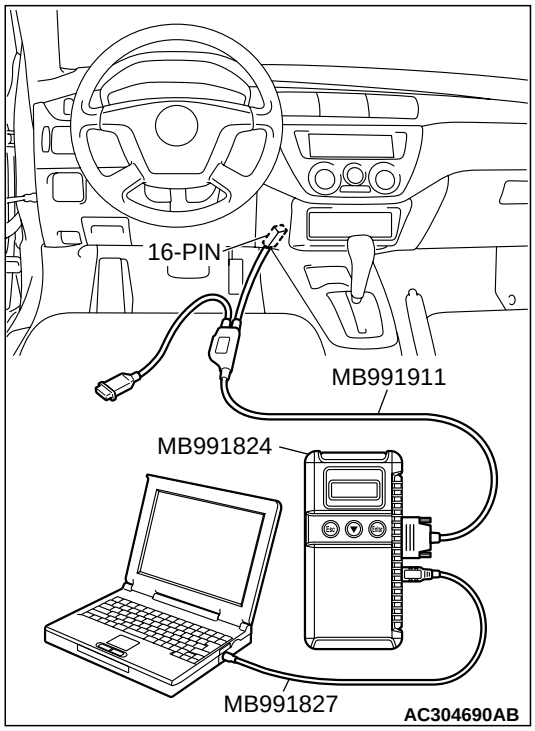
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the A/T control relay
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check data list item 54: A/T Control Relay Output Voltage.

⚠ CAUTION

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

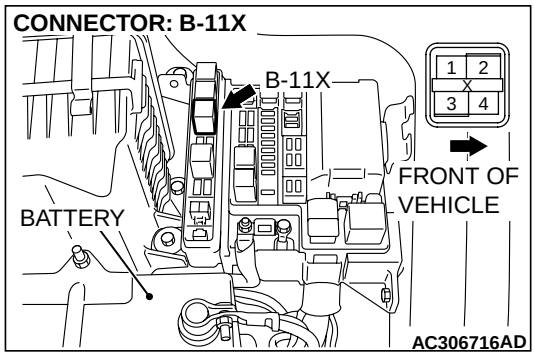
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 54: A/T Control Relay Output Voltage.
  - The voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal battery positive voltage?

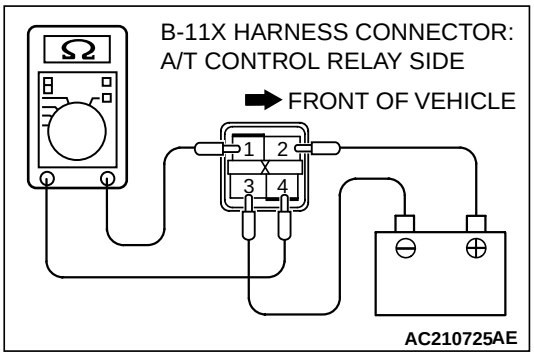
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.



STEP 2. Check the A/T control relay.

(1) Remove the A/T control relay from the engine component relay box connector B-11X.



(2) Using jumper wires, connect terminal 2 to the positive battery terminal, and terminal 3 to the negative battery terminal.

(3) Measure the resistance between terminals 1 and 4 of the A/T control relay.
- The resistance should be measured less than 2 ohms.
- Disconnect the jumper wires. The resistance between terminals 1 and 4 should measure over limits (open circuit).

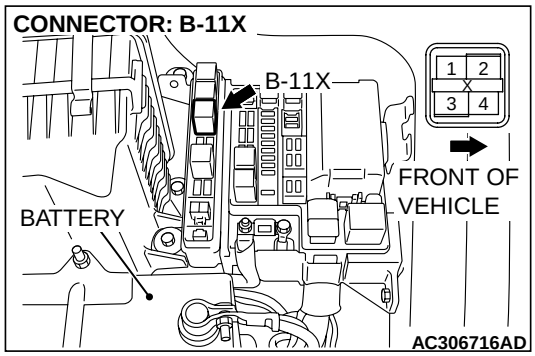
Q: Is the measured resistance less than 2 ohms when the relay is energized, and open circuit when the relay is de-energized?

YES : Go to Step 3.
NO : Replace the A/T control relay.

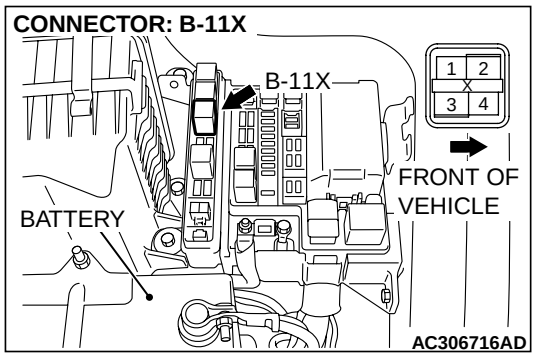
STEP 3. Check A/T control relay socket B-11X in the engine compartment relay box for loose, corroded or damaged terminals, or terminals pushed back in the socket.

Q: Is the relay connector in good condition?

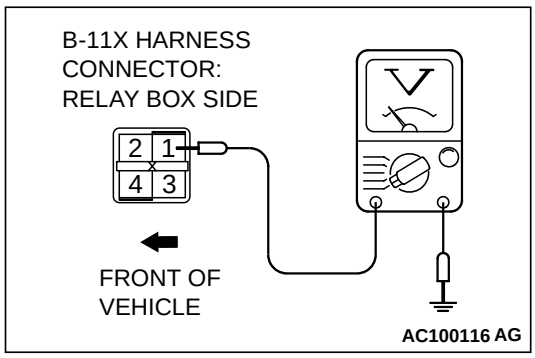
YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Measure the supply voltage at A/T control relay connector B-11X in the engine component relay box.



(1) Disconnect the A/T control relay.

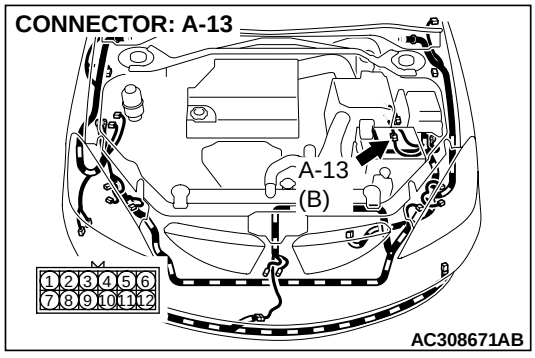


(2) Measure the voltage between terminal 1 and ground.
- The measured voltage should equal battery positive voltage.

Q: Is the measured voltage equal to battery positive voltage?

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

STEP 5. Check intermediate connector A-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

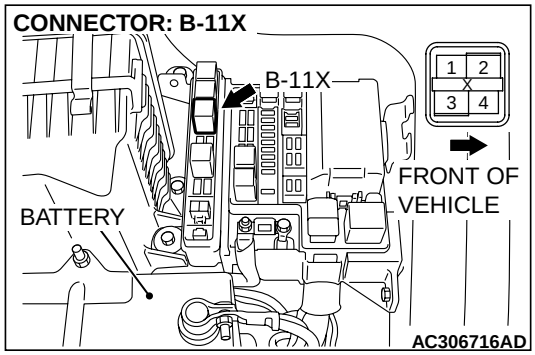
YES : Go to Step 6.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the harness for open circuit or short circuit to ground between A/T control relay connector B-11X terminal 1 in the engine component relay box and battery.

Q: Is the harness wire in good condition?

YES : Go to Step 15.

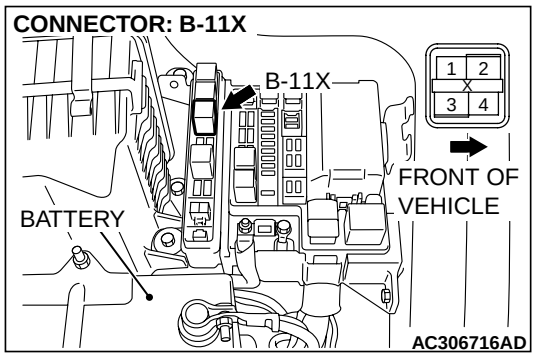
NO : Repair or replace the harness wire.

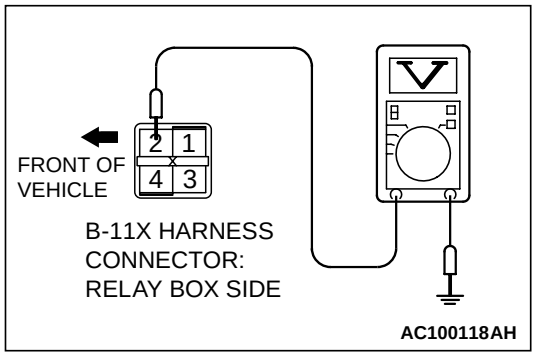


STEP 7. Measure the supply voltage at A/T control relay connector B-11X in the engine component relay box.

(1) Disconnect the A/T control relay.

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





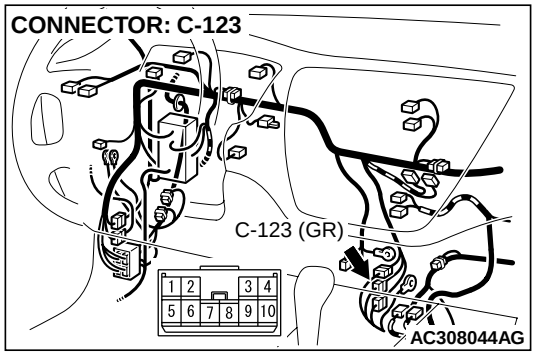
(3) Measure the voltage between terminal 2 and ground.
- The measured voltage should equal battery positive voltage.

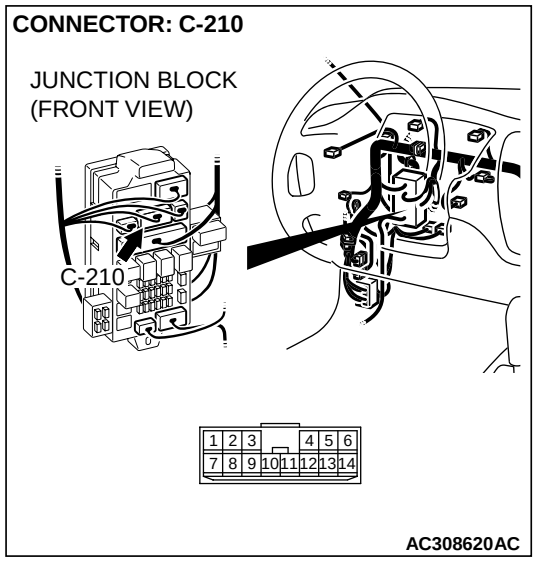
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage equal to battery positive voltage?

YES : Go to Step 10.

NO : Go to Step 8.





STEP 8. Check intermediate connector C-123 and junction block connector C-210 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors in good condition?

YES : Go to Step 9.

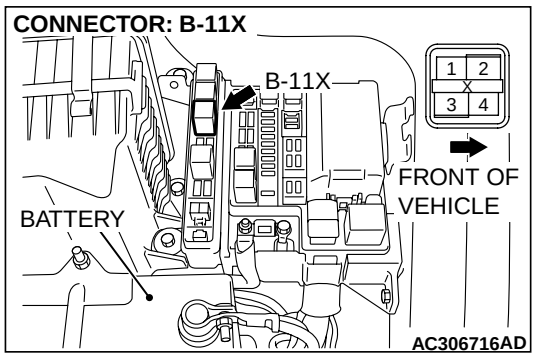
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

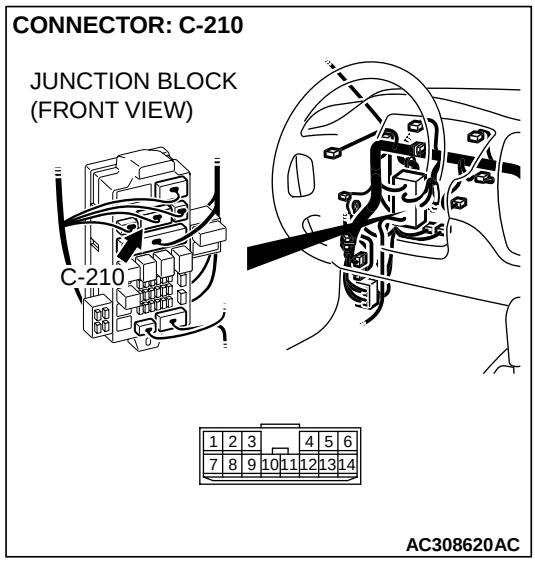
STEP 9. Check the harness for open circuit or short circuit to ground between A/T control relay connector B-11X terminal 2 in the engine component relay box and junction block connector C-210 terminal 12.

Q: Is the harness wire in good condition?

YES : Go to Step 15.

NO : Repair or replace the harness wire.

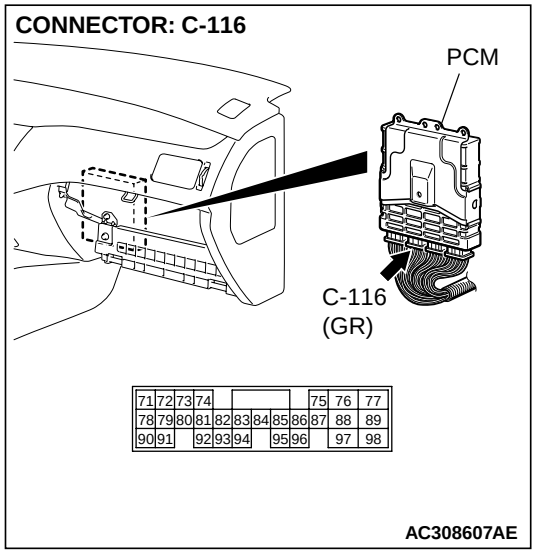


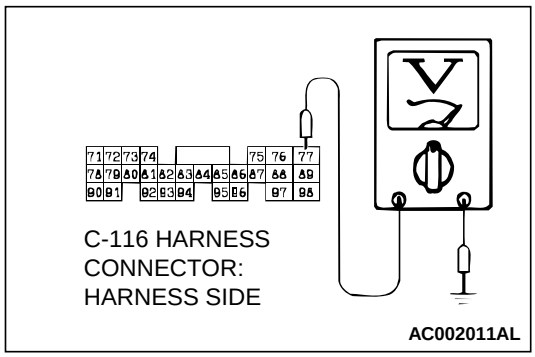


STEP 10. Measure the A/T control relay output voltage at PCM connector C-116 by backprobing.

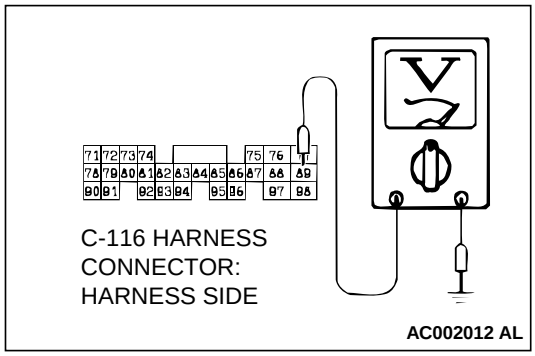
(1) Do not disconnect connector C-116.

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





(3) Measure the voltage between terminal 77 and ground.
- The measured voltage should equal battery positive voltage.



(4) Measure the voltage between terminal 89 and ground.
- The measured voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal to battery positive voltage between terminal 77 and ground, and between terminal 89 and ground?

YES : Go to Step 13.

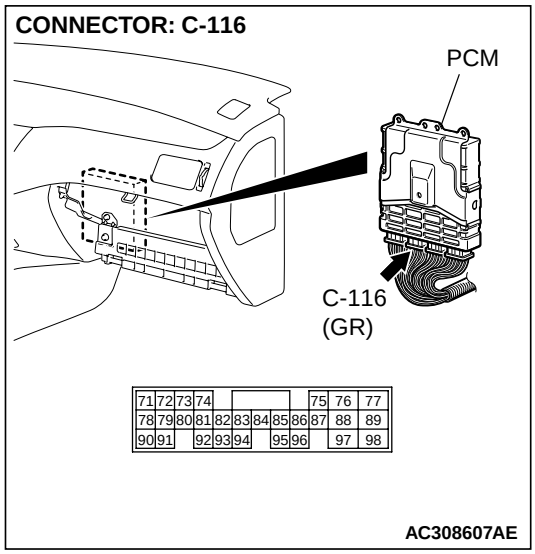
NO : Go to Step 11.

STEP 11. Check PCM connector C-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 12.

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

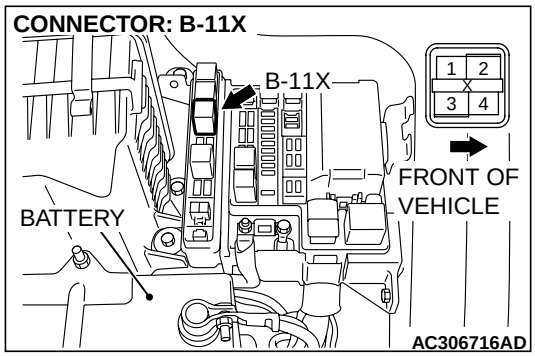


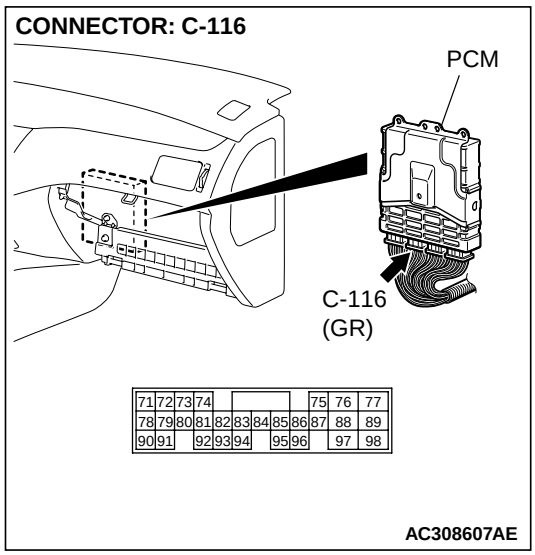
STEP 12. Check harness for open circuit or short circuit to ground between A/T control relay connector B-11X (terminal 4) in the engine component relay box and PCM connector C-116 (terminals 77 and 89).

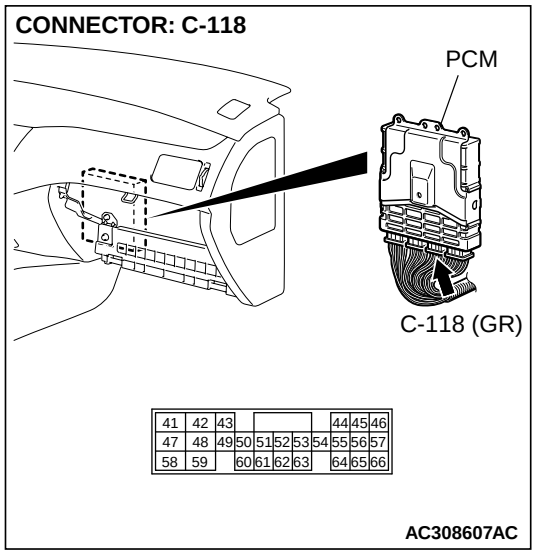
Q: Is the harness wire in good condition?

YES : Go to Step 15.

NO : Repair or replace the harness wire.





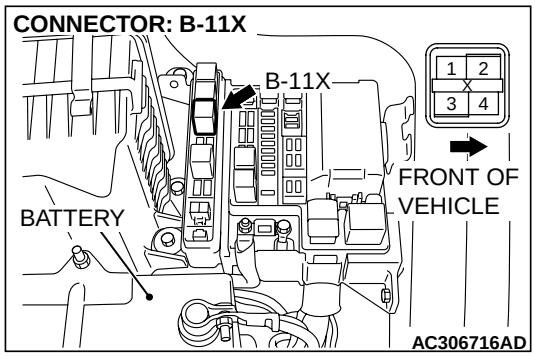


STEP 13. Check PCM connector C-118 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 14.

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

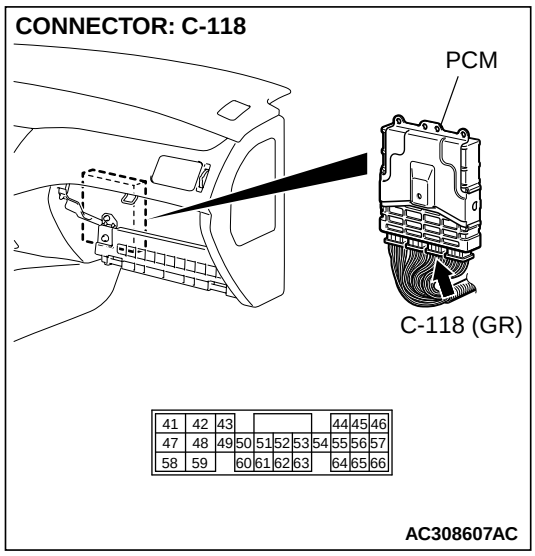


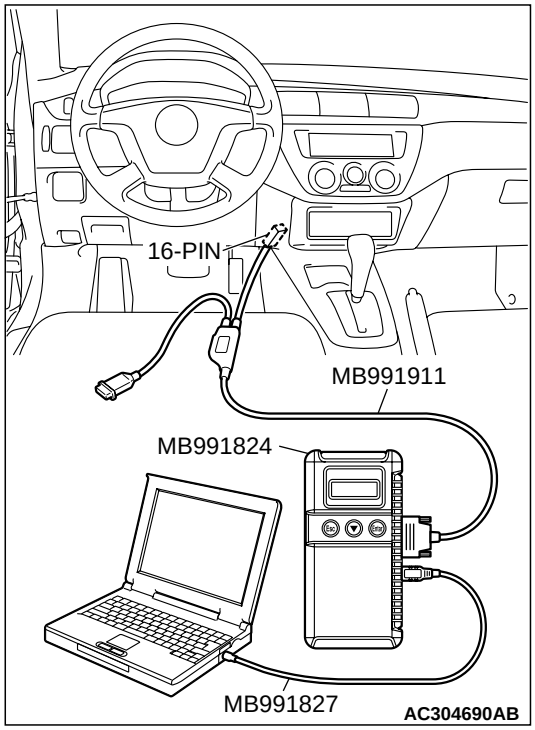
STEP 14. Check harness for open circuit or short circuit to ground between A/T control relay connector B-11X terminal 3 in the engine component relay box and PCM connector C-118 terminal 50.

Q: Is the harness wire in good condition?

YES : Go to Step 15.

NO : Repair or replace the harness wire.





STEP 15. Using scan tool MB991958, check data list item 54: A/T control relay output Voltage.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 54: A/T Control Relay Output Voltage.
  - The voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal battery positive voltage?

YES : It can be that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Engine does not Crank

COMMENT
If the engine does not crank when the selector lever is placed in the "P" or "N" position, the cause is probably a malfunction of the transmission range switch system, transaxle control cable assembly, engine system, torque converter or transaxle oil pump.

TROUBLESHOOTING HINTS (The most likely causes for this condition:)
- Malfunction of the transmission range switch
- Malfunction of the transaxle control cable assembly
- Malfunction of the engine system
- Malfunction of the torque converter
- Malfunction of the transaxle oil pump
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

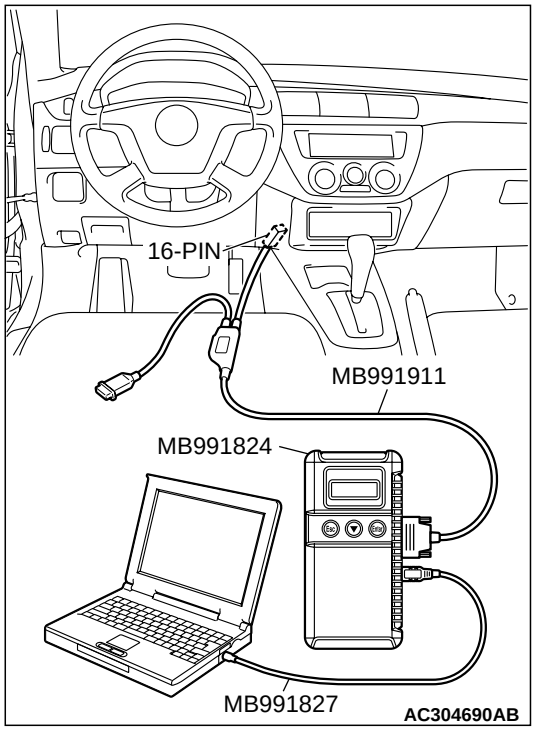
STEP 1. Using scan tool MB991958, read the A/T diagnostic trouble code.

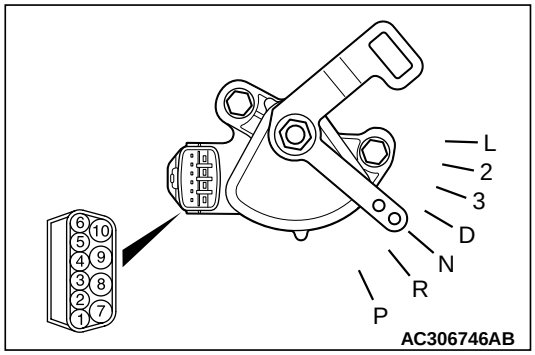
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is A/T DTCs "27" or "28" set?

YES <DTC 27 set> : Refer to P.23A-109, DTC 27: Transmission Range Switch System (Open Circuit).
YES <DTC 28 set> : Refer to P.23A-136, DTC 28: Transmission Range Switch System (Short Circuit).
NO : Go to Step 2.





STEP 2. Check the transaxle control cable assembly.

Move the selector lever to each position. The manual control lever position of the transmission range switch should match the transmission range.

Q: Is the manual control lever position correct?

YES : Go to Step 3.

NO : Repair the transaxle control cable. Refer to P.23A-345, Transmission Range Switch and Control Cable Adjustment. Retest the system to verify the repair.

STEP 3. Check the engine.

Refer to GROUP 13A, Diagnosis – Trouble Symptom Chart – Starting P.13A-32.

Q: Is the inspection result good?

YES : Go to Step 4.

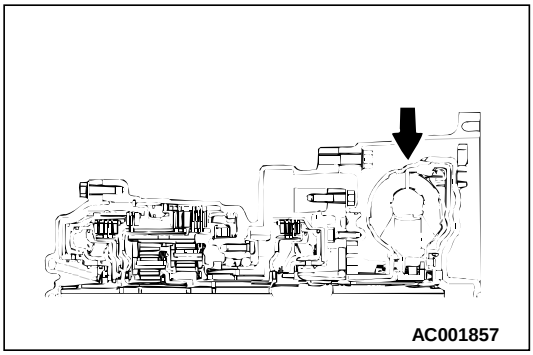
NO : Repair or replace the appropriate engine components.

STEP 4. Check the torque converter.

(1) Remove the starter.

(2) Turn the torque converter and check for a binding or sticking condition. Check the ring gear for damaged or missing teeth.

NOTE: Since the torque converter drives the oil pump, turning the torque converter also check for a binding oil pump. If either of these components are damaged the transaxle will need to be removed for inspection.



Q: Does the torque converter turn freely without any missing or damaged teeth?

YES : Go to Step 5.

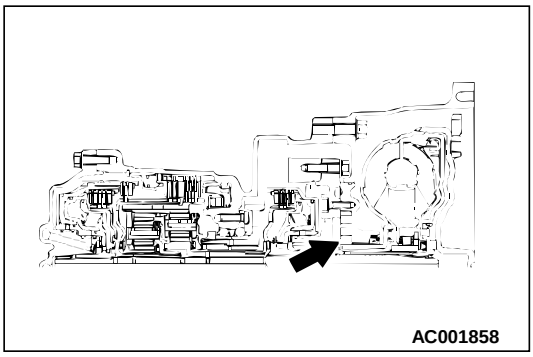
NO : Replace the torque converter. Refer to GROUP 23C, Transaxle P.23C-9.

STEP 5. Repair or replace the starter.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 6.



STEP 6. Replace the oil pump.

Replace the oil pump (Oil pump cannot be repaired). Refer to GROUP 23C, Transaxle P.23C-9. Confirm that the malfunction symptom is eliminated.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Does the engine crank when the selector lever is placed in the "P" or "N" position?

YES : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 2: Does not Move Forward

COMMENT

If the engine is idling and the selector lever is shifted from "N" to "D" range and the vehicle does not drive forward then the cause is due to line pressure defect, under drive clutch or valve body malfunction.

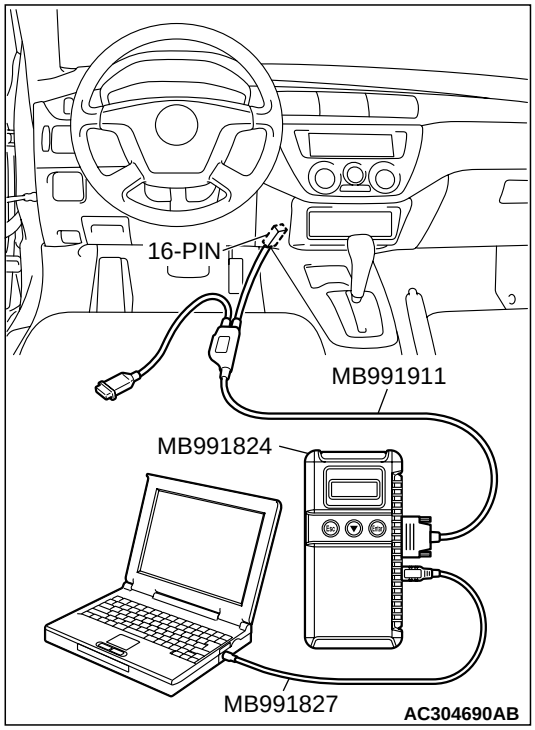
TROUBLESHOOTING HINTS (The most likely causes for this condition:)

- 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:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check actuator test item 02: Underdrive Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 02: Underdrive Solenoid Valve.
  - An audible clicking or buzzing should be heard when the underdrive solenoid valve is energized.

(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. Then confirm that the symptom is eliminated.

STEP 2. Check the hydraulic pressure.

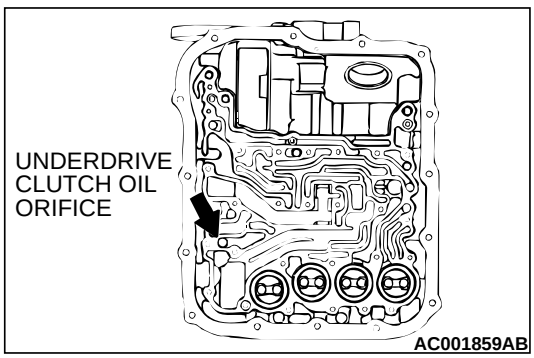
Shift the selector lever to the sport mode then measure the hydraulic pressure of each element in 1st speed to check and see if each respective hydraulic pressure is within the range of standard pressure. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

YES : Go to Step 3.
NO : Go to Step 4.

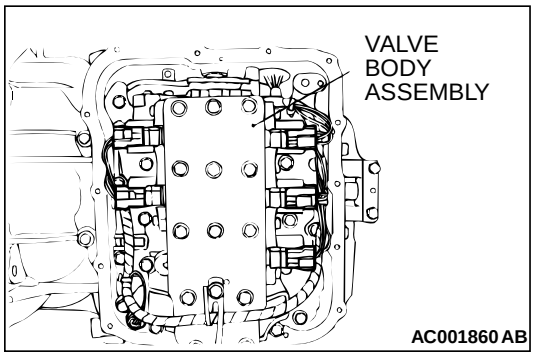
STEP 3. Check the underdrive clutch system.

(1) Remove the valve body cover and valve body. Refer to P.23A-351, Transaxle Assembly and GROUP 23C, Transaxle P.23C-9.
(2) Blow 108 kPa (15psi) 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.



STEP 4. Disassemble and clean the valve body.

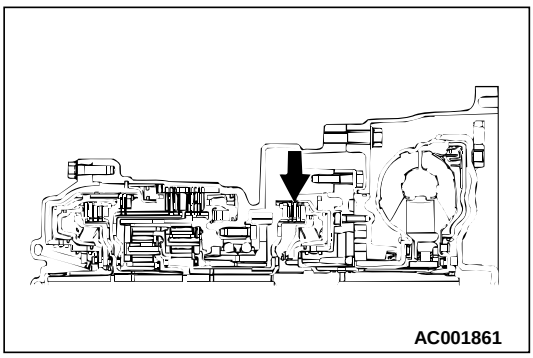
Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : 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 23C, Underdrive Clutch and Input Shaft P.23C-58. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at Step 1.

INSPECTION PROCEDURE 3: Does not Move Backward

COMMENT
If the vehicle does not move 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 condition:)
- 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:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 01: Low-Reverse Solenoid Valve.

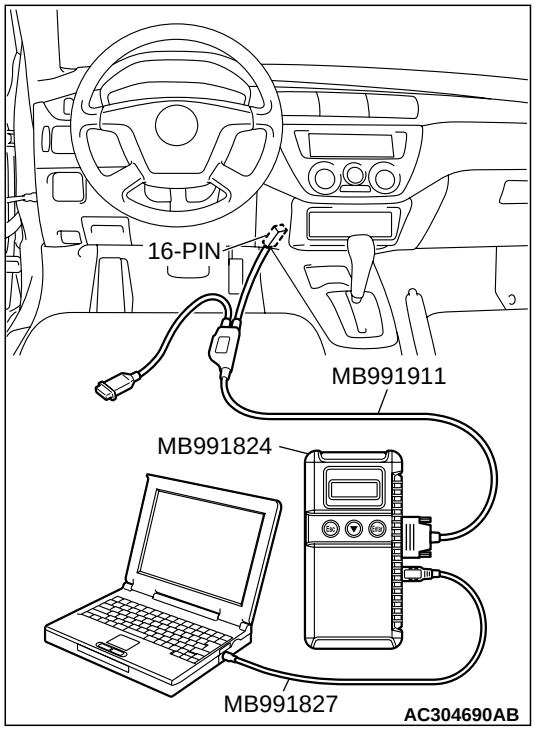
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 01: Low-Reverse Solenoid Valve.
  - An audible clicking or buzzing should be heard when the low-reverse solenoid valve is energized.

(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. Then confirm that the symptom is eliminated.



STEP 2. Check the hydraulic pressure (for reverse clutch).
Measure the hydraulic pressure for the 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?

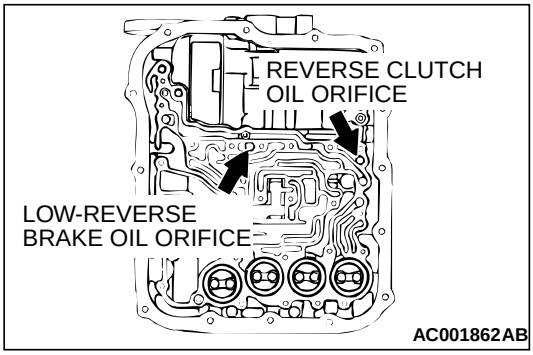
YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check the hydraulic pressure (for low-reverse brake).
Measure the hydraulic pressure for the 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.

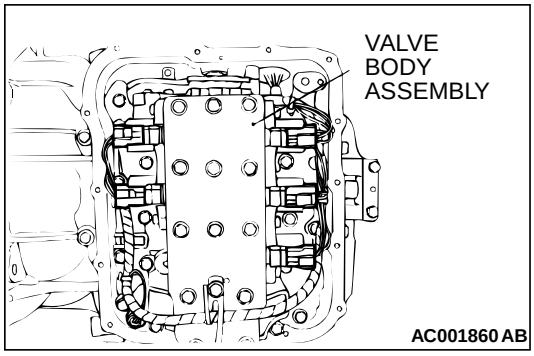
STEP 4. Check the reverse clutch system and low-reverse brake system.
(1) Remove the valve body cover and valve body. Refer to P.23A-351, Transaxle Assembly and GROUP 23C, Transaxle P.23C-9.
(2) Blow 108 kPa (15psi) compressed air into the reverse clutch oil orifice of the transaxle case. Then check if the reverse clutch piston moves and air pressures are maintained in that condition. Repeat for the low-reverse brake.



Q: Are the reverse clutch, low-reverse brake or both air pressures maintained?

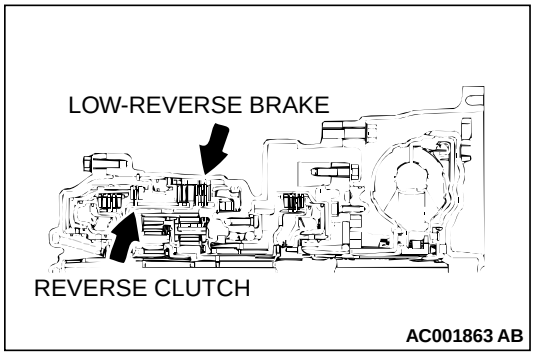
YES : Go to Step 5.
NO : Go to Step 6.

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 23C, Valve Body P.23C-75.
Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.



Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 7.



STEP 6. Check the reverse clutch, low-reverse brake or both. 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 23C, Transaxle P.23C-9, Reverse and Overdrive Clutch P.23C-61. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Start over at Step 1.

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 powertrain, oil pump or valve body.

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

- Abnormal line pressure
- Malfunction of the powertrain
- Malfunction of the oil pump
- Malfunction of the valve body
- Low transmission fluid level
- Malfunction of the PCM

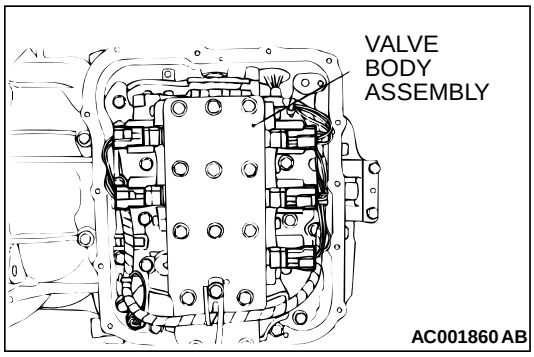
DIAGNOSIS

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 pressures are within the standard value and some are not, recheck the symptom.

Q: Are all pressures within the standard value?

YES : Check transmission fluid level and condition. If not OK, repair or replace as necessary, then retest the system. If OK, go to Step 3.
NO : Go to Step 2.



STEP 2. Disassemble and clean the valve body.

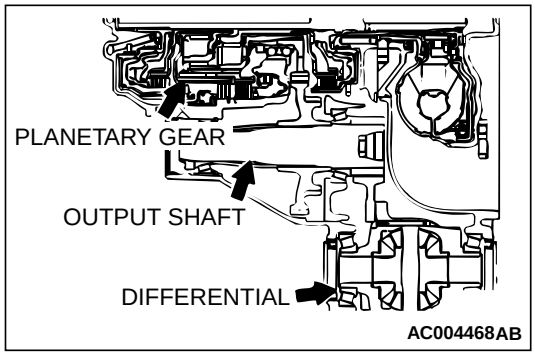
Check the O-ring installation bolts for looseness and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then retest the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 4.



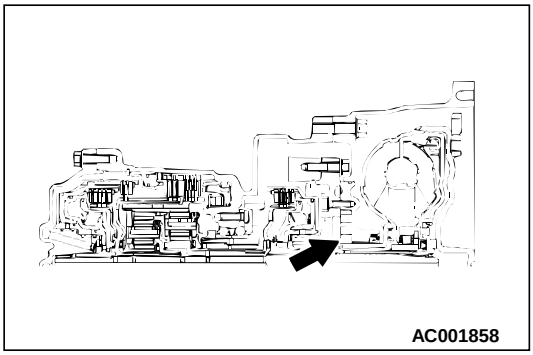
STEP 3. Check the transaxle powertrain components.

Disassemble the transaxle and check the planetary gear and output shaft, etc. Repair or replace the damaged parts. Refer to GROUP 23C, Transaxle P.23C-9, Planetary Gear P.23C-65, Output Shaft P.23C-69, Differential P.23C-72. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : 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 23C, Transaxle P.23C-9. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 5.

STEP 5. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure 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).

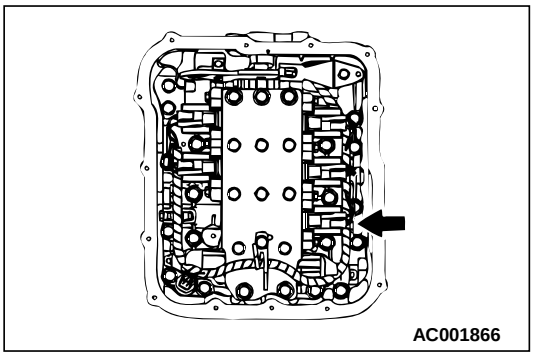
TROUBLESHOOTING HINTS (The most likely causes for this condition:)
- Malfunction of the engine system
- Malfunction of the torque converter clutch solenoid
- Malfunction of the valve body
- Malfunction of the torque converter (Malfunction of the torque converter clutch)
- Malfunction of the PCM

DIAGNOSIS

STEP 1. Check the engine system.
Refer to GROUP 13A, Diagnosis – Trouble Symptom Chart – When the engine is hot, it stalls at idle P.13A-32.

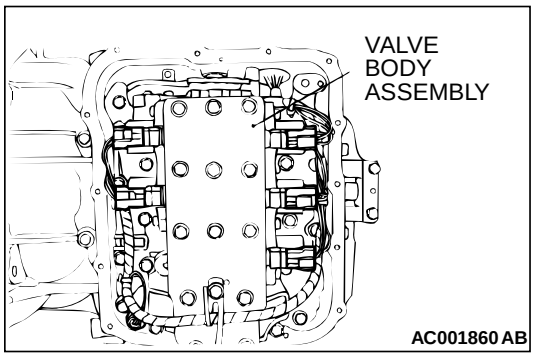
Q: Is the inspection result good?
YES : Go to Step 2.
NO : Repair or replace the engine components.

STEP 2. Replace the torque converter clutch solenoid valve.
Replace the torque converter clutch solenoid valve. Refer to GROUP 23C, Valve Body P.23C-75. Then check the symptom.


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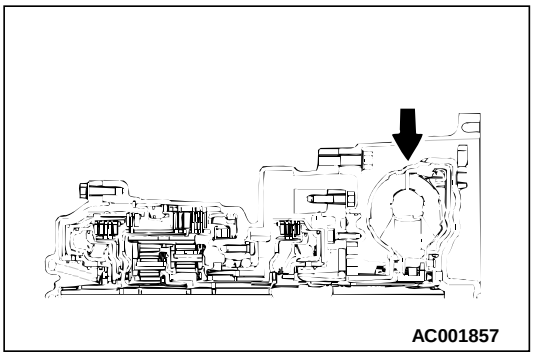
Q: Is the symptom eliminated?
YES : The procedure is complete.
NO : Go to Step 3.

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 23C, Valve Body P.23C-75.
Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.



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Q: Is the repair possible and the symptom eliminated?
YES : The procedure is complete.
NO : Go to Step 4.



STEP 4. Replace the torque converter assembly.

(1) Remove the transaxle.
(2) Replace the torque converter assembly. Refer to GROUP 23C, Transaxle P.23C-9. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 5.

STEP 5. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 6: Shift Shock when Shifting from "N" to "D" and Long Delay

COMMENT

If abnormal shock 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 TP sensor.

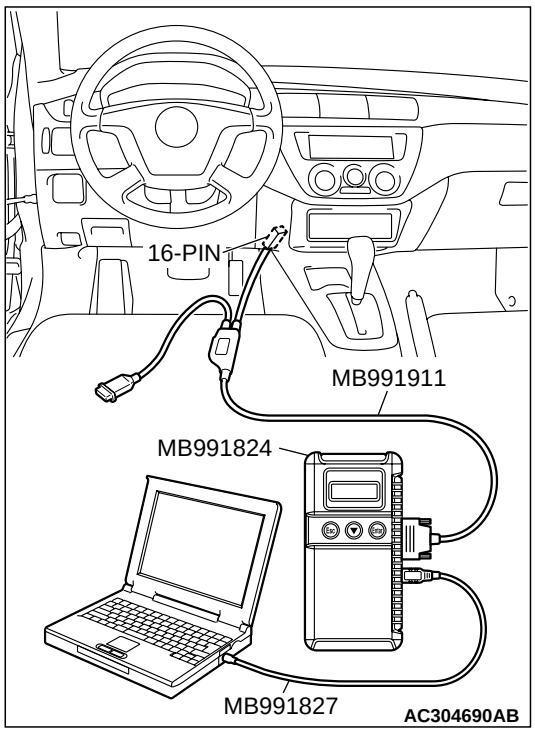
TROUBLESHOOTING HINTS (The most likely causes for this condition:)

- Abnormal underdrive clutch pressure
- Malfunction of the underdrive solenoid valve
- Malfunction of the underdrive clutch
- Malfunction of the valve body
- Malfunction of the TP sensor
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check actuator test item 02: Underdrive Solenoid Valve.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 02: Underdrive Solenoid Valve.
  - An audible clicking or buzzing should be heard when the underdrive solenoid valve is energized.

(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. Then confirm that the symptom is eliminated.

STEP 2. Check when shift shock occurs.

Q: When does the shift shock occur?

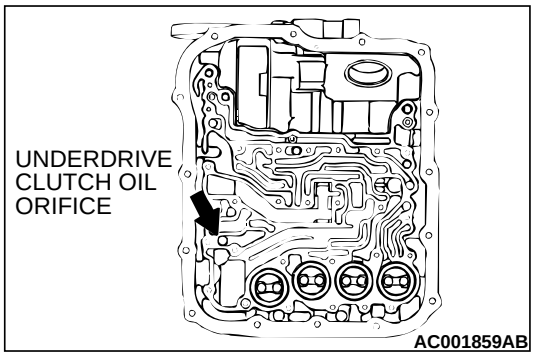
When engaging from "N" to "D" : Go to Step 3.
When the vehicle starts moving : Go to Step 6.

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.



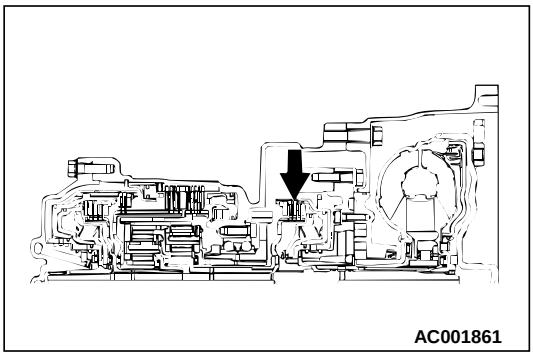
STEP 4. Check the underdrive clutch system.

(1) Remove the valve body cover and valve body. Refer to P.23A-351, Transaxle Assembly and GROUP 23C, Transaxle P.23C-9.

(2) Blow 108 kPa (15 psi) 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 8.
NO : Go to Step 5.



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 23C P.23C-58, Underdrive Clutch and Input Shaft. Then check the symptom.

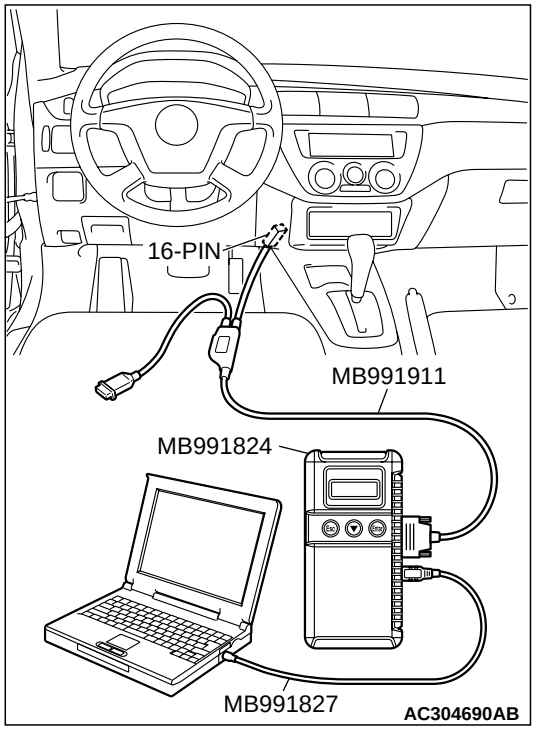
Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 9.

STEP 6. Check shift shock.

Q: Does shift shock occur?

YES : Go to Step 7.
NO : Go to Step 8.



STEP 7. Using scan tool MB991958, check data list item 11: TP Sensor.

⚠ CAUTION

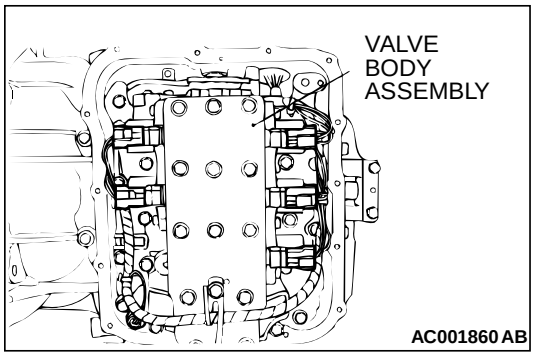
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 11: TP Sensor.
  - With the throttle valve in idle position, voltage should measure between 335 and 935 mV.
  - With the throttle valve in full-open position, voltage should measure between 4,390 and 5,290 mV.

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

Q: Is the measured voltage between 335 and 935 mV at idle, and between 4,390 and 5,290 mV at the full-open position?

YES : Go to Step 8.
NO : Check the TP sensor. Refer to GROUP13A, Diagnostic Trouble Code Procedures P.13A-156, P.13A-169, P.13A-179, DTCs P0121, P0122, P0123: TP 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 23C, Valve Body P.23C-75.
Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure 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 : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 7: Shift Shock when Shifting from "N" to "R" and Long Delay

COMMENT
If abnormal shock or delay of two seconds or more occurs 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 TP sensor.

TROUBLESHOOTING HINTS (The most likely causes for this condition:)
- 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 TP sensor
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 01: Low-Reverse Solenoid Valve.

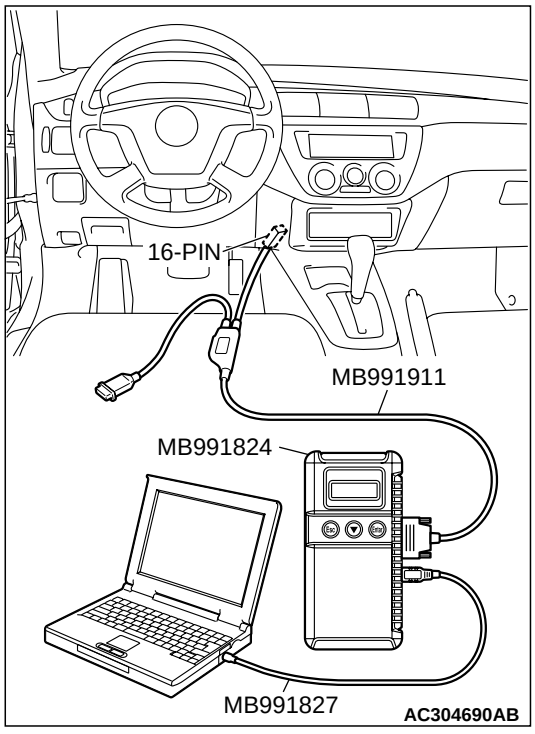
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 01: Low-Reverse Solenoid Valve.
  - An audible clicking or buzzing should be heard when the low-reverse solenoid valve is energized.

(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. Then confirm that the symptom is eliminated.



STEP 2. Check when shift shock occurs.

Q: When does the shift shock 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).

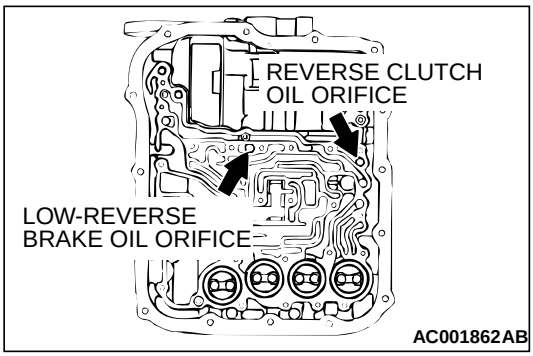
Measure the hydraulic pressure for low-reverse brake when the selector lever is at the "R" range. Check if the hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

Q: Is the hydraulic pressure within the standard value?

YES : Go to Step 5.
NO : Go to Step 9.

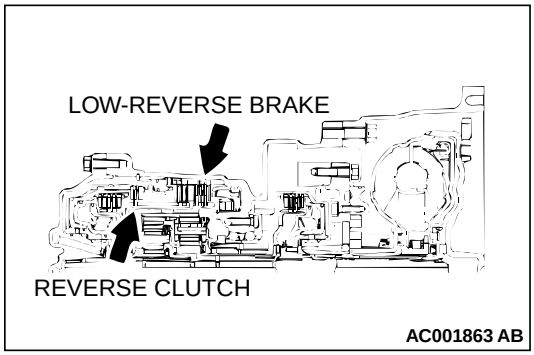
STEP 5. Check the reverse clutch system and low-reverse brake system.

(1) Remove the valve body cover and valve body. Refer to P.23A-351, Transaxle Assembly and GROUP 23C, Transaxle P.23C-9.
(2) Blow 108 kPa (15 psi) 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 23C, Transaxle P.23C-9, Reverse and Overdrive Clutch P.23C-61. Then Retest the system.

Q: Is the symptom eliminated?

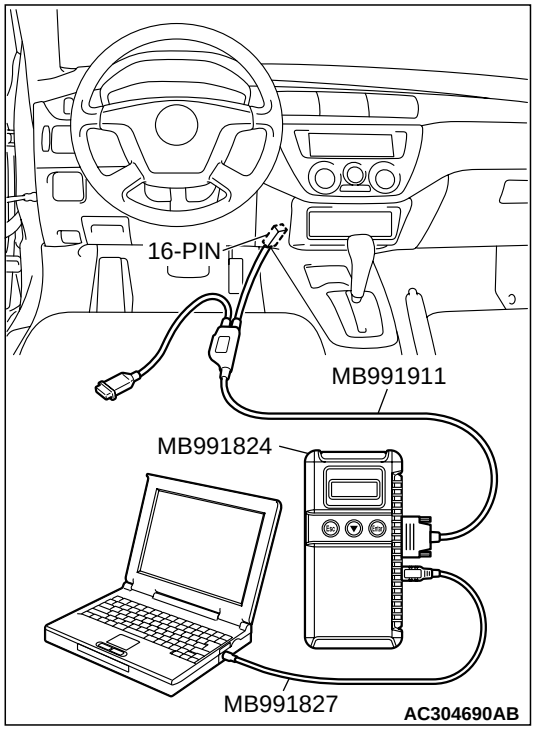
YES : The procedure is complete.
NO : Go to Step 10.

STEP 7. Check shift shock.

Q: Does shift shock occur sometimes?

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

STEP 8. Using scan tool MB991958, check data list item 11: TP Sensor.



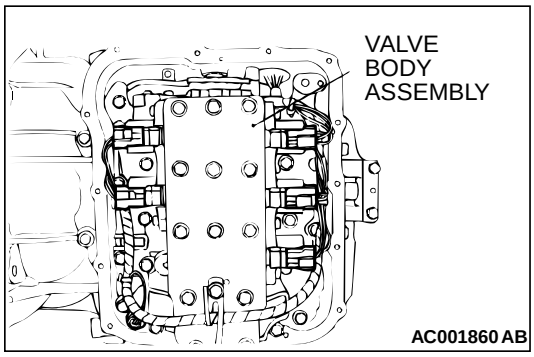
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 11: TP Sensor.
  - With the throttle valve in idle position, voltage should be measured between 335 and 935 mV.
  - With the throttle valve in full-open position, voltage should be measured between 4,390 and 5,290 mV.

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

Q: Is the measured voltage between 335 and 935 mV at idle, and between 4,390 and 5,290 mV at the full-open position?

YES : Go to Step 9.
NO : Check the TP sensor. Refer to GROUP13A, Diagnostic Trouble Code Procedures P.13A-156, P.13A-169, P.13A-179, DTCs P0121, P0122, P0123: TP 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 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 10.

STEP 10. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at Step 1.

INSPECTION PROCEDURE 8: Shift Shock when Shifting from "N" to "D," "N" to "R" and Long Delay

COMMENT
If abnormal shock or delay of two seconds or more occurs when the selector lever is moved from "N" to "D" range or 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 condition:)
- Abnormal line pressure
- Malfunction of the oil pump
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

STEP 1. Check the hydraulic pressure.
(1) 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.
(2) If some elements pressures 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.

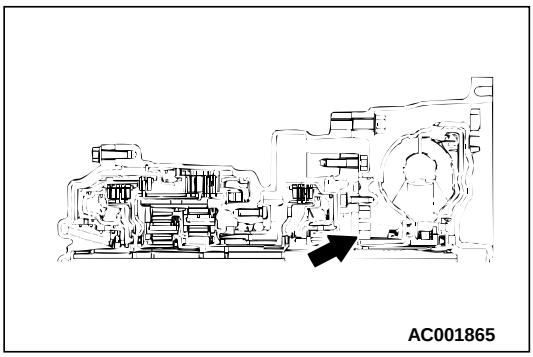
Q: Is the symptom eliminated?
YES : The procedure is complete.
NO : Go to Step 3.

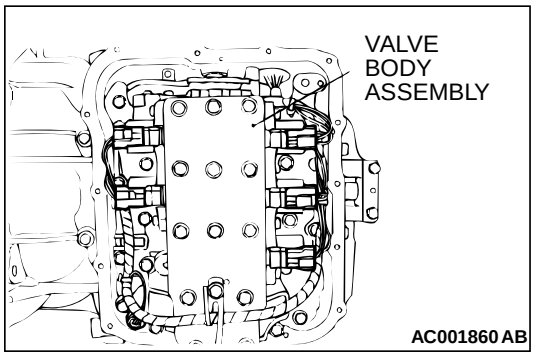
STEP 3. Check when shift shock occurs.

Q: When does the shift shock 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 23C, Transaxle P.23C-9. Then check the symptom.

Q: Is the symptom eliminated?
YES : The procedure is complete.
NO : Go to Step 6.





STEP 5. Disassemble and clean the valve body.

Check the installation bolts for looseness and the O-ring, valves and valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23C, Valve Body P.23C-75.
Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 9: Shift Shock and Slipping

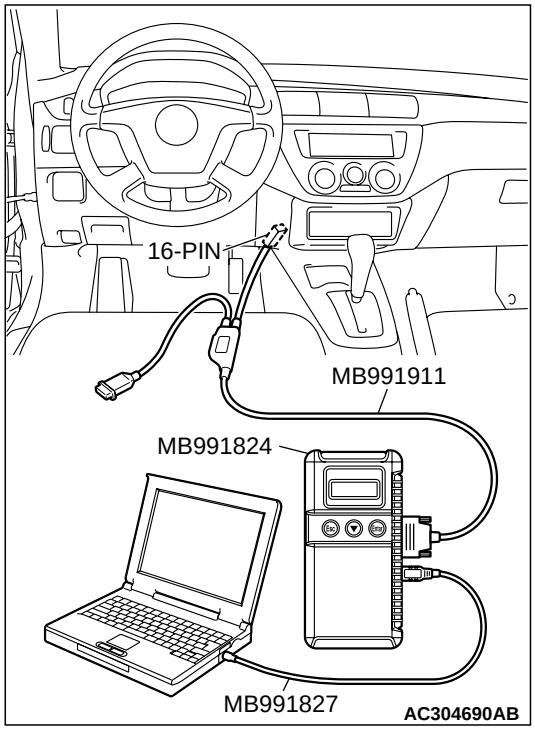
COMMENT
If shift shock when driving is due to upshifting or downshifting and the transaxle speed become higher than the engine speed, the cause is probably abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.

TROUBLESHOOTING HINTS (The most likely causes for this conditon:)
- Abnormal line pressure
- Malfunction of each solenoid valve
- Malfunction of the oil pump
- Malfunction of the valve body
- Malfunction of each brake or each clutch
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test.



⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the 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 audible clicking or buzzing should be heard when the solenoid valves are energized.
(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. Then confirm that the symptom is eliminated.

STEP 2. Check the hydraulic pressure.

(1) Measure the hydraulic pressure of each element. Check if each hydraulic pressure is within the standard value. Refer to P.23A-23, Hydraulic Pressure Test.

(2) If some elements pressure 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 6.

NO : Go to Step 3.

STEP 3. 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?

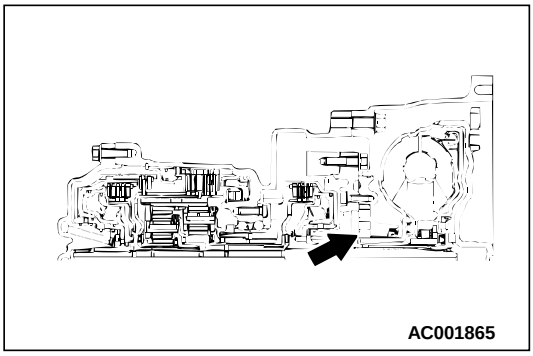
YES : The procedure is complete.

NO : Go to Step 4.

STEP 4. Replace the oil pump.

(1) Remove the transaxle.

(2) Replace the oil pump. (Oil pump can not be repaired). Refer to GROUP 23C, Transaxle P.23C-9. Then check the symptom.


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Q: Is the symptom eliminated?

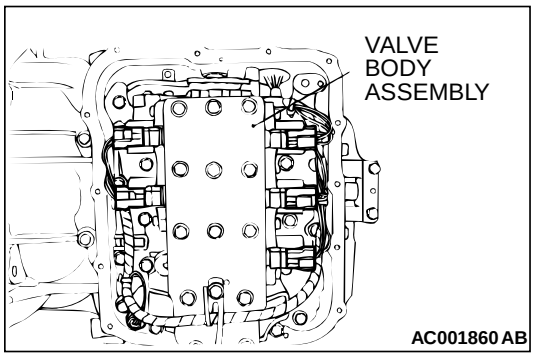
YES : The procedure is complete.

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 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

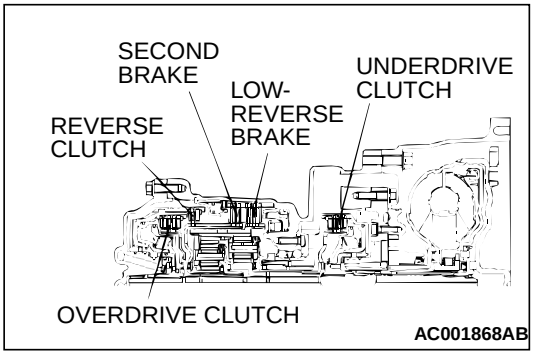


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Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 7.



STEP 6. 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 23C, Transaxle P.23C-9, Underdrive Clutch and Input Shaft P.23C-58, Reverse and Overdrive Clutch P.23C-61. Then Retest the system.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 10: Early or Late Shifting in All Gears

COMMENT
If all shift points are early or late while driving, the cause is probably a malfunction of the output shaft speed sensor, TP sensor or a solenoid valve.

TROUBLESHOOTING HINTS (The most likely causes for this condition:)
- Malfunction of the output shaft speed sensor
- Malfunction of the TP sensor
- Malfunction of each solenoid valve
- Abnormal line pressure
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check data list item 23: Output Shaft Speed Sensor.

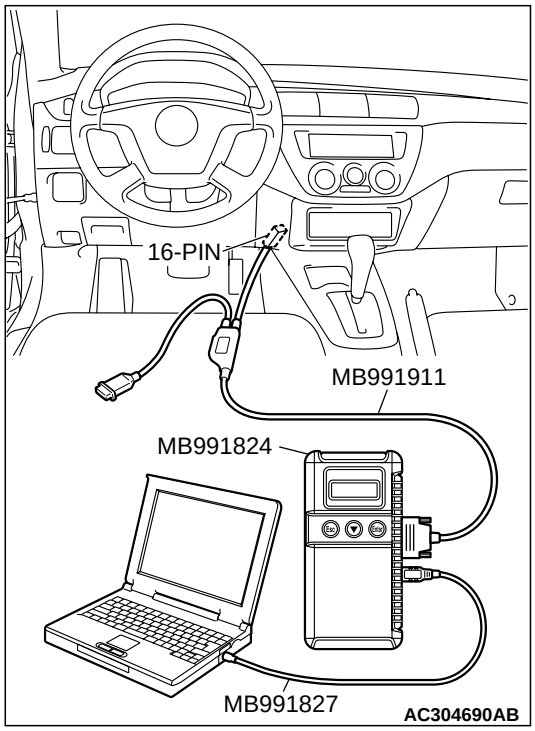
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

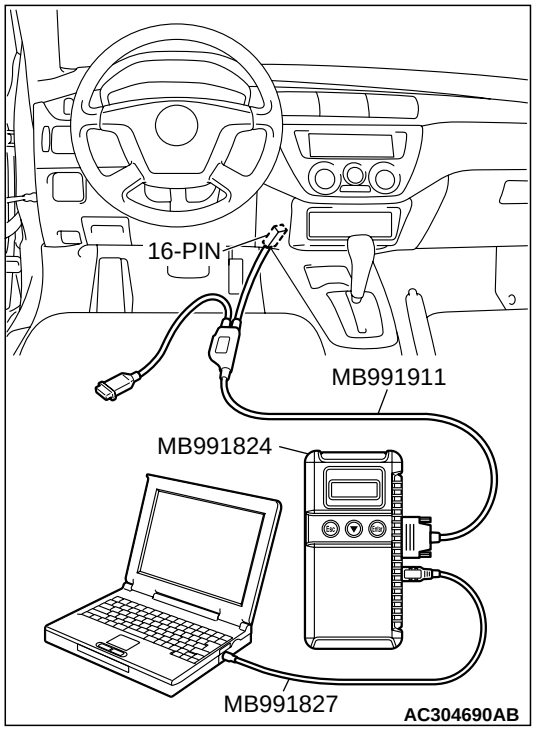
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
- Item 23: Output Shaft Speed Sensor.
  - When driving at constant speed of 50km/h (31mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).

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

Q: Is the sensor operating properly?

YES : Go to Step 2.
NO : Refer to P.23A-80, DTC 23: Output shaft speed sensor system.





STEP 2. Using scan tool MB991958, check data list item 11: TP Sensor.

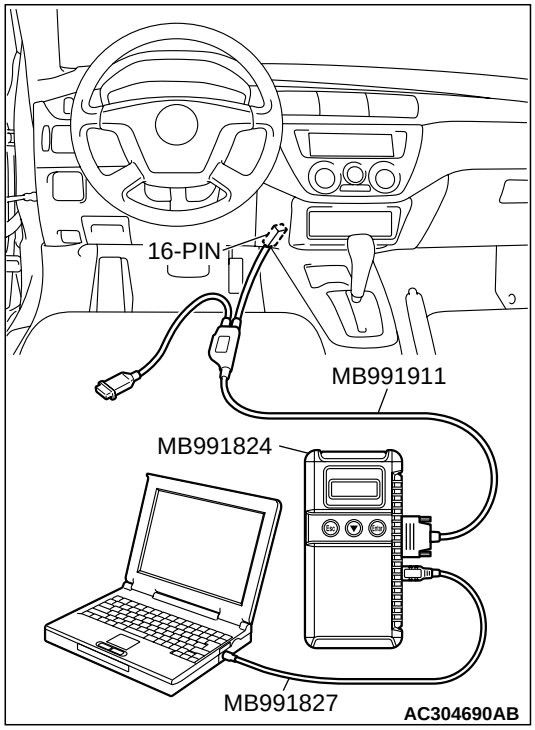
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 11: TP Sensor.
  - With the throttle valve in idle position, voltage should be measured between 335 and 935 mV.
  - With the throttle valve in full-open position, voltage should be measured between 4,390 and 5,290 mV.

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

Q: Is the measured voltage between 335 and 935 mV at idle, and between 4,390 and 5,290 mV at the full-open position?

YES : Go to Step 3.

NO : Check the TP sensor. Refer to GROUP13A, Diagnostic Trouble Code Procedures P.13A-156, P.13A-169, P.13A-179, DTCs P0121, P0122, P0123: TP Sensor System. Then check the symptom.



STEP 3. Using scan tool MB991958, check data list.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the 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 the "LOCK" (OFF) position.

Q: Are the solenoid valves operating properly?

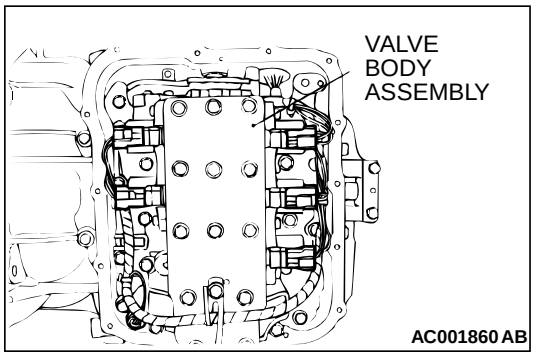
YES : Go to Step 4.
NO : Go to Step 6.

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 : The procedure is complete.
NO : Go to Step 5.



STEP 5. Disassemble and clean the valve body.

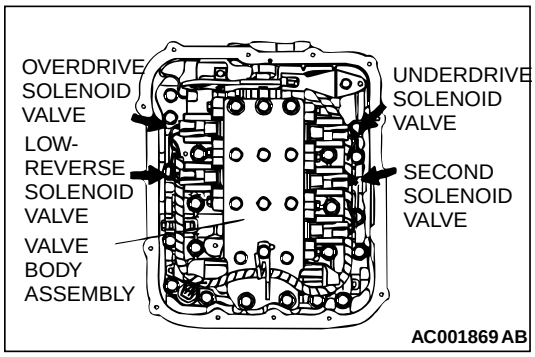
Check the O-ring installation bolts for looseness and the valve body for damage. Repair or replace the faulty parts. Refer to GROUP 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 7.



STEP 6. Replace each solenoid valve.

Replace the faulty solenoid valve with a new one.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 7.

STEP 7. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at Step 1.

INSPECTION PROCEDURE 11: Early or Late Shifting in Some Gears

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.

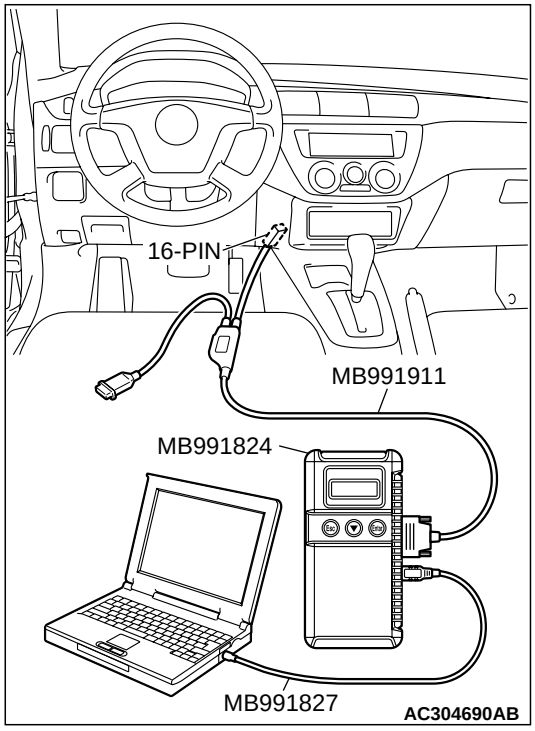
TROUBLESHOOTING HINTS (The most likely causes for this condition:)
- Malfunction of the valve body
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 14: INVECS-II Cancel Command.

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



(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the actuator test mode.
- Item14: INVECS-II Cancel Command.
  - Drive the vehicle and confirm 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 the "LOCK" (OFF) position.

Q: Does the gear shifting correspond to the standard shift line of the shift pattern diagram?

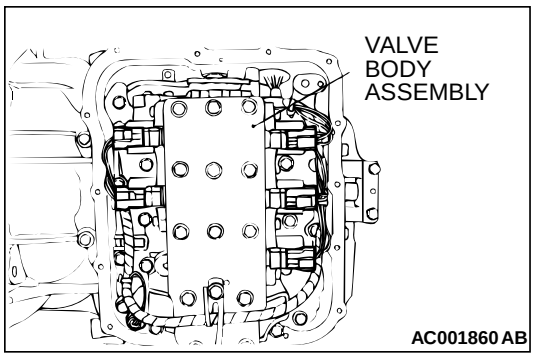
YES : The symptom is due to characteristics of the INVECS-II system, but is not abnormal.
NO : Go to Step 2.

STEP 2. Check the shift points.

Q: Are the shift points early or late only when transmission fluid is -29°C (84°F) or less (early), or 125°C (257°F) or more (late)?

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 23C, Valve Body P.23C-75.
Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 4.

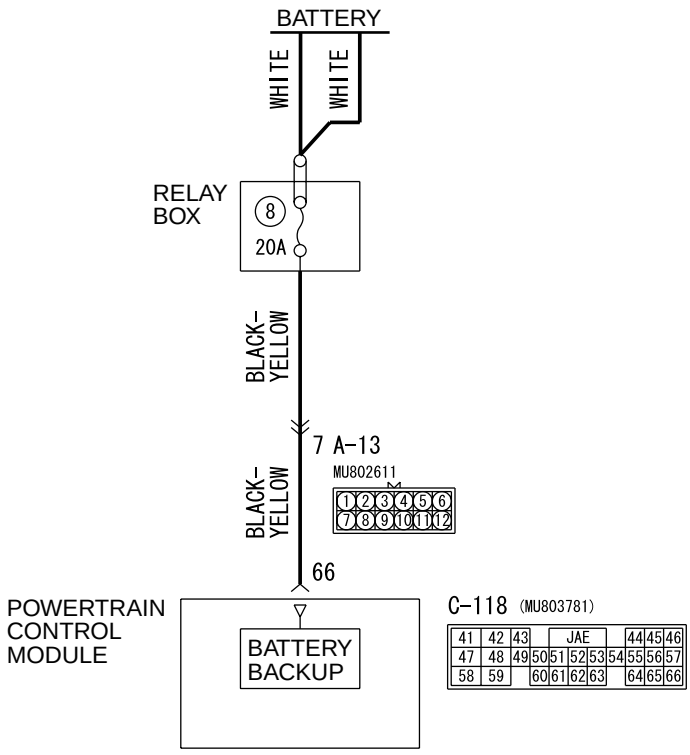
STEP 4. Replace the PCM.

Q: Is the symptom eliminated?

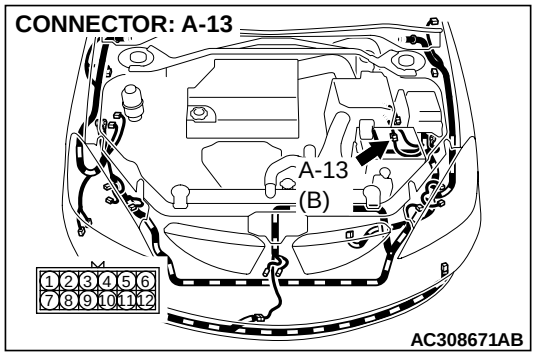
YES : The procedure is complete.
NO : Start over at Step 1.

INSPECTION PROCEDURE 12: No Diagnostic Trouble Codes (Does not Shift)

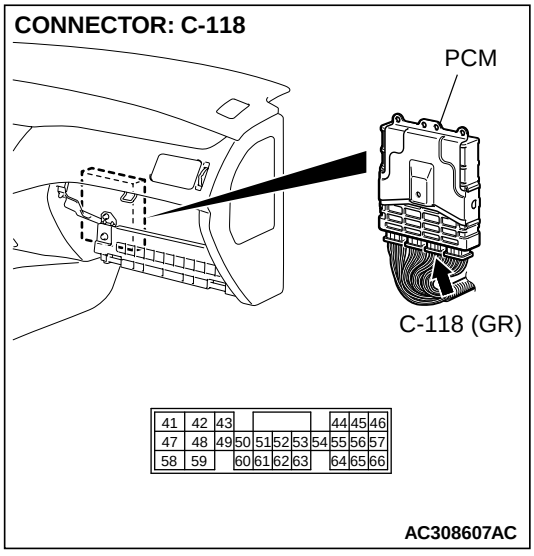
Backup Power Supply System Circuit



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AC308671AB



AC308607AC

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 transmission range switch, or PCM may exist.

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

- Malfunction of the transmission range switch
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

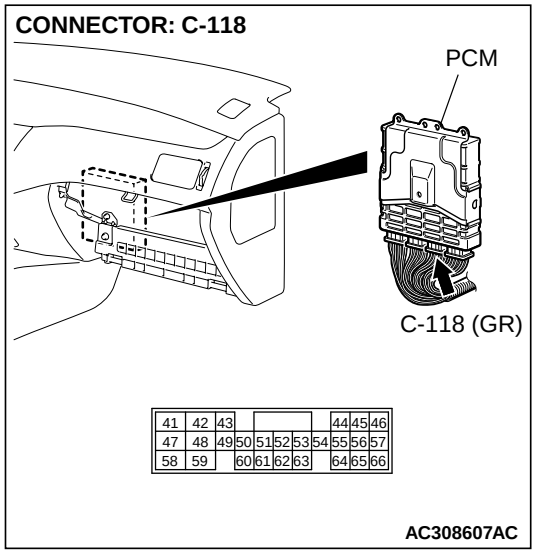
STEP 1. Check the vehicle acceleration.

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. Measure the backup power supply voltage at PCM connector C-118 by backprobing.

(1) Do not disconnect connector C-118.

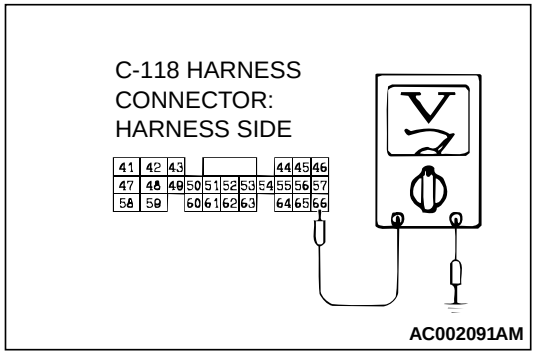


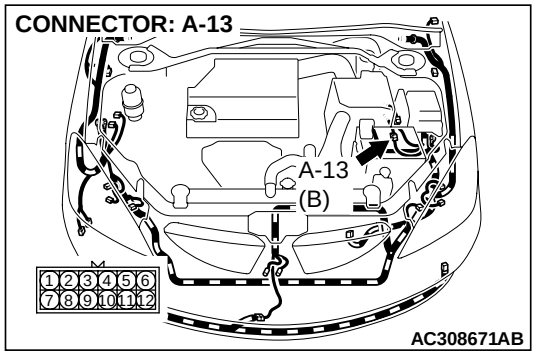
(2) Measure the voltage between terminal 66 and ground.
- The voltage should be measured battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

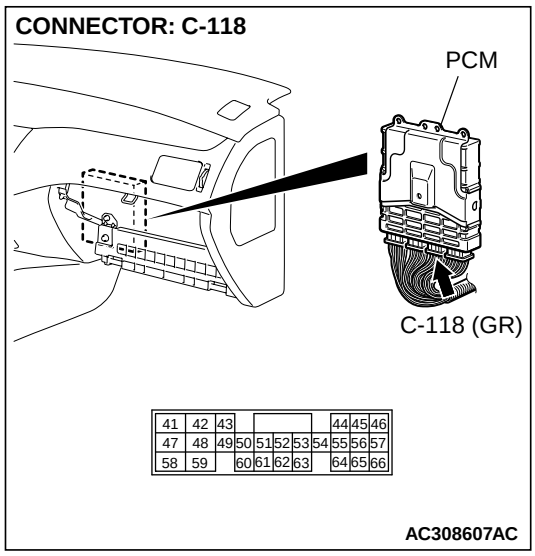
YES : Go to Step 5.
NO : Go to Step 3.





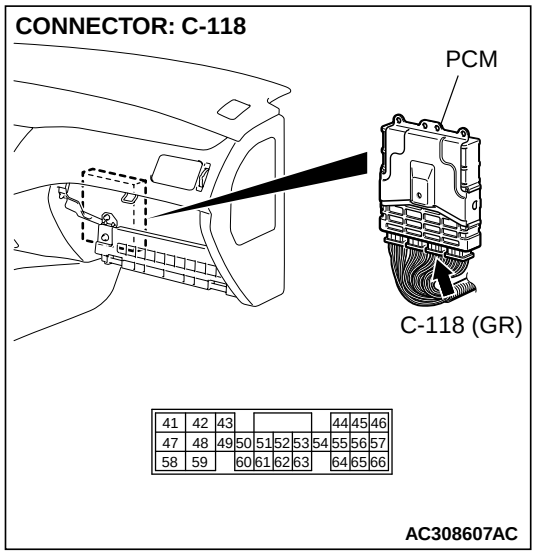
STEP 3. Check intermediate connector A-13 and PCM connector C-118 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Is the connector in good condition?

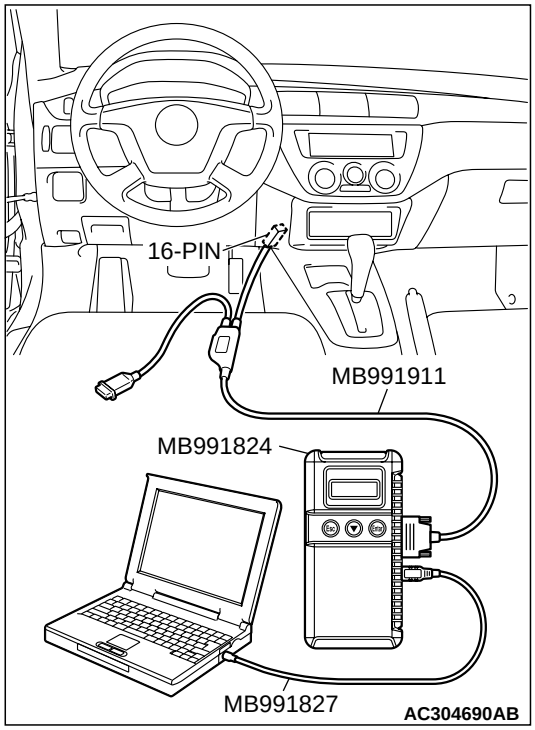
YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then retest the system.



STEP 4. Check the harness for open circuit between PCM connector C-118 terminal 66 and battery.
Q: Is the harness wire in good condition?

YES : Go to Step 5.
NO : Repair or replace the harness wire.





STEP 5. Using scan tool MB991958, check data list item 61: Transmission Range Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode.
- Item 61: Transmission Range Switch.
  - Move the selector lever to "P," "R," "N," "D," "3," "2" and "L" positions and confirm that the selected transmission range match the positions shown on scan tool MB991958.

(4) Turn the ignition switch to the "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-109, P.23A-136, DTCs 27, 28: Transmission Range 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 condition:)
- Malfunction of the engine system
- Malfunction of the clutch system and brake system
- Malfunction of the PCM

DIAGNOSIS

STEP 1. Check the engine system.
Refer to GROUP 13A, Diagnosis – Symptom Chart – Poor acceleration P.13A-777.

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 retest the system.

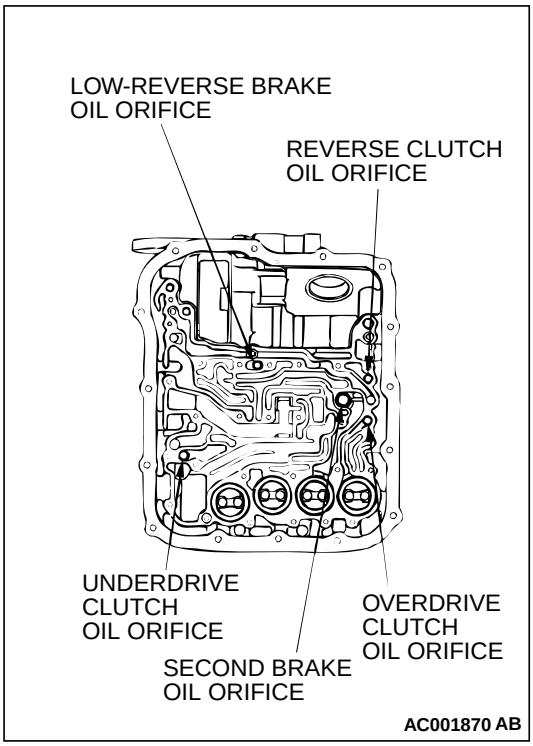
Q: Is the symptom eliminated?

YES : The procedure 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 retest the system.

Q: Is the symptom eliminated?

YES : The procedure is complete.
NO : Go to Step 4.



STEP 4. Check each brake system and each clutch system.

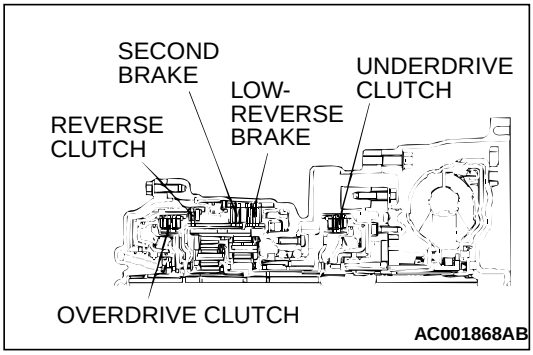
(1) Remove the valve body cover and valve body. Refer to GROUP 23C, Transaxle P.23C-9.

(2) Blow 108 kPa (15 psi) compressed air into the each brake oil orifice and clutch oil orifice of the transaxle case, and check if each brake and each clutch piston move and air pressure is maintained.

Q: Is the air pressure maintained?

YES : The procedure is complete.

NO : Go to Step 5.



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 23C, Transaxle P.23C-9, Underdrive Clutch and Input Shaft P.23C-58, Reverse and Overdrive Clutch P.23C-61. Then retest the system.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at Step 1.

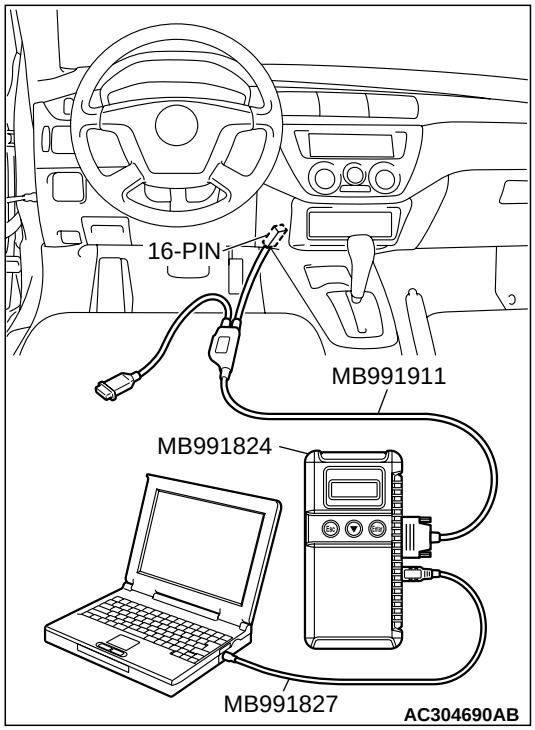
INSPECTION PROCEDURE 14: Vibration

COMMENT
If vibration occurs when driving at constant speed or when accelerating in 4th gear, abnormal torque converter clutch pressure 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 condition:)
- 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:
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 06: Torque Converter Clutch Solenoid Valve.
  - An audible clicking or buzzing should be heard when the torque converter clutch solenoid valve is energized.

(4) Turn the ignition switch to the "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 23C, Valve Body P.23C-75. 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, Diagnosis – Symptom Chart – Driving P.13A-32. 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?

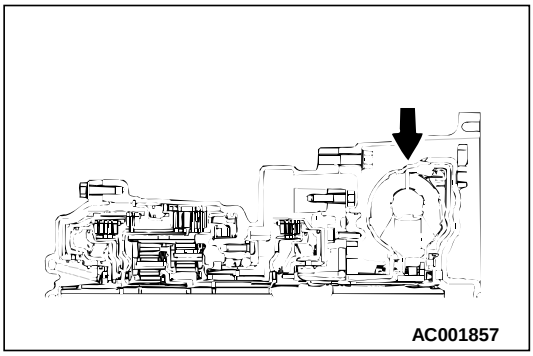
YES : Go to Step 4.

NO : Go to Step 5.

STEP 4. Replace the torque converter assembly.

(1) Remove the transaxle.

(2) Replace the torque converter assembly. Refer to GROUP 23C, Transaxle P.23C-9. Then check the symptom.


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Q: Is the symptom eliminated?

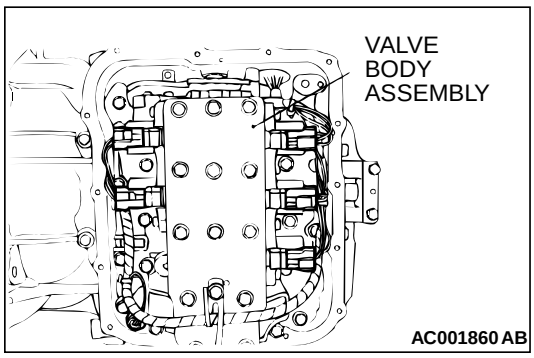
YES : The procedure is complete.

NO : Go to Step 6.

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 23C, Valve Body P.23C-75.

Replace the valve body assembly if the damages are thought to be irreparable. Then check the symptom.



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Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Go to Step 6.

STEP 6. Replace the PCM.

Q: Is the symptom eliminated?

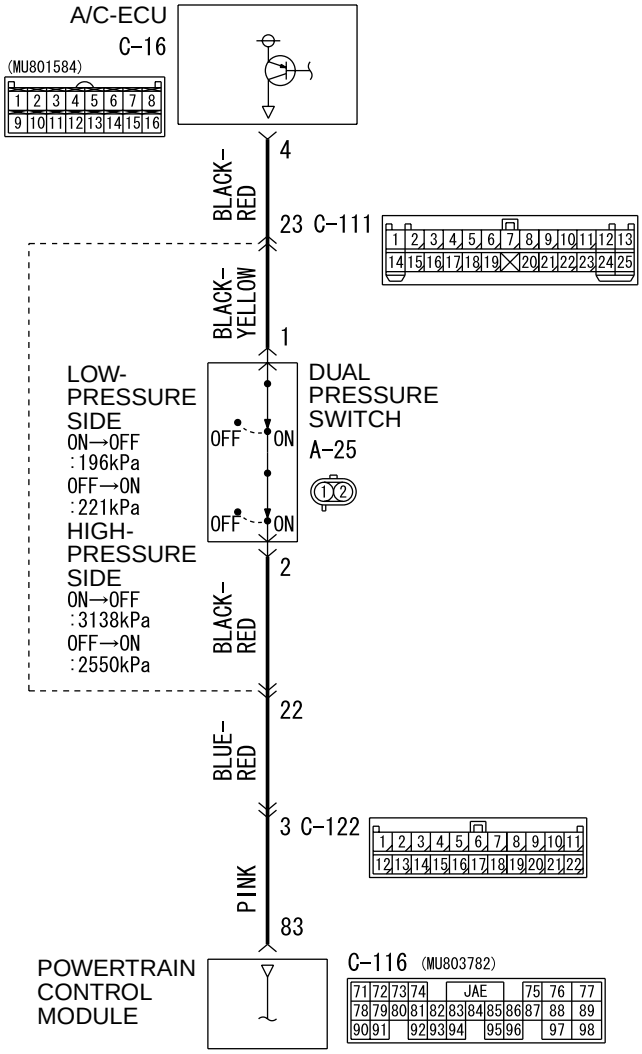
YES : The procedure is complete.

NO : Start over at Step 1.

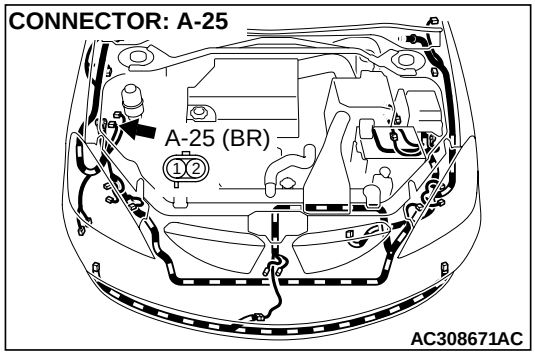
TSB Revision

INSPECTION PROCEDURE 15: Vehicle Shifts Differently with A/C Engaged

Dual Pressure Switch System Circuit

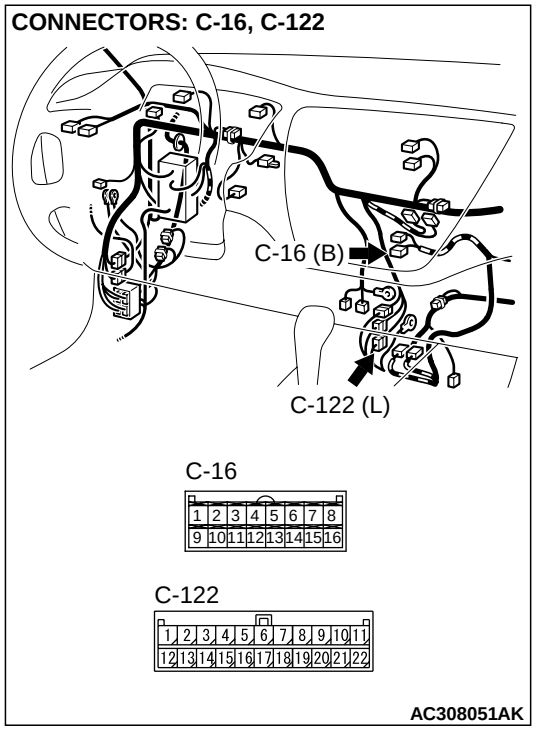


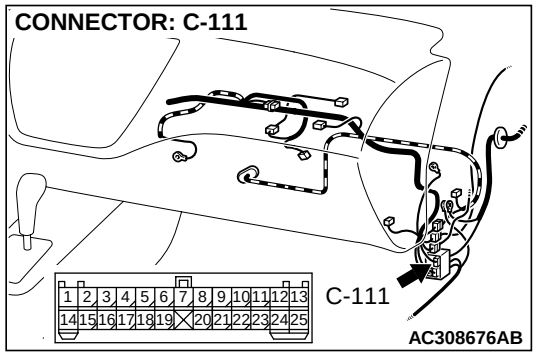
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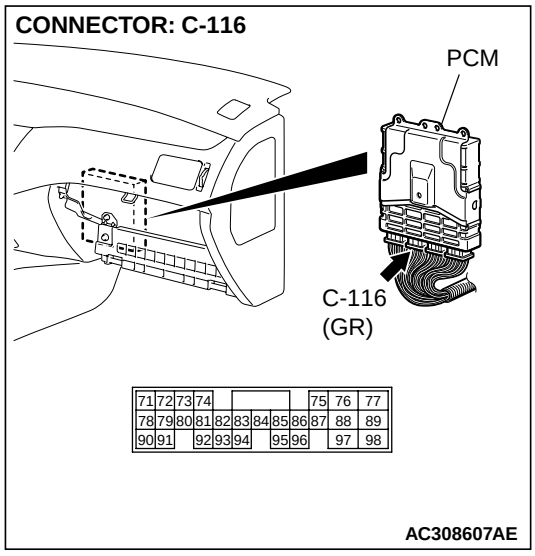


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TSB Revision







CIRCUIT OPERATION

- The understanding is that the A/C compressor is operating when the A/C switch is ON and the A/C-ECU (terminal 4) is applying power (voltage) on PCM (terminal 83).
- When the A/C compressor is engaged, the PCM increases line pressure and briefly delays shift points to compensate for the additional engine load.

COMMENT

The cause is probably a faulty A/C-ECU circuit or a defective PCM.

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

- Malfunction of the dual pressure switch
- Damaged harness or connector
- Malfunction of A/C system
- Malfunction of the A/C-ECU
- Malfunction of the PCM

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DIAGNOSIS

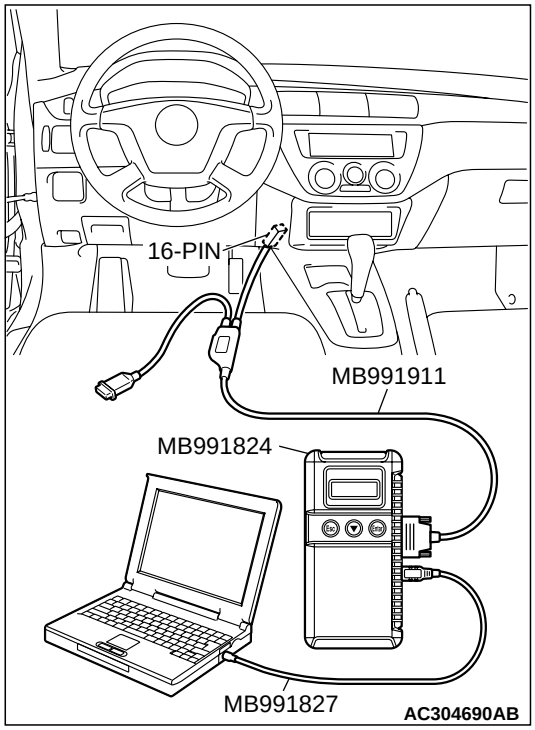
Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check data list item 65: Dual Pressure Switch.

⚠ CAUTION

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



(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to data reading mode.
- Item 65: Dual Pressure Switch.
  - When the A/C is in operation, scan tool MB991958 display should be "ON."
  - When the A/C is not in operation, scan tool MB991958 display should be "OFF."

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

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

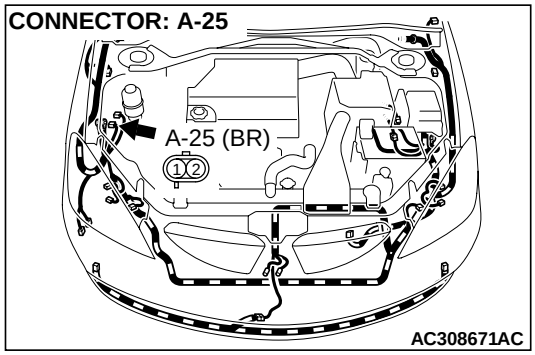
STEP 2. Check the dual pressure switch.

Refer to GROUP 55, On-vehicle Service P.55-99.

Q: Does the dual pressure switch pass the checks?

YES : Go to Step 3.

NO : Replace the dual pressure switch. Refer to GROUP 55, Refrigerant Line P.55-125.

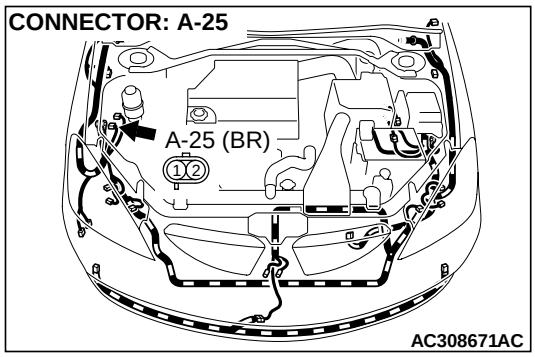


STEP 3. Check dual pressure switch connector A-25 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 4.

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

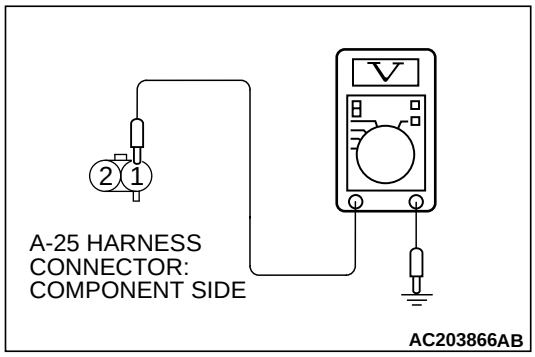


STEP 4. Measure the power supply voltage at dual pressure switch connector A-25.

(1) Disconnect connector A-25 and measure at the harness side.

(2) Start the engine and run at idle.

(3) Operate the A/C.



(4) Measure the voltage between terminal 1 and ground.
- Voltage should measure battery positive voltage.

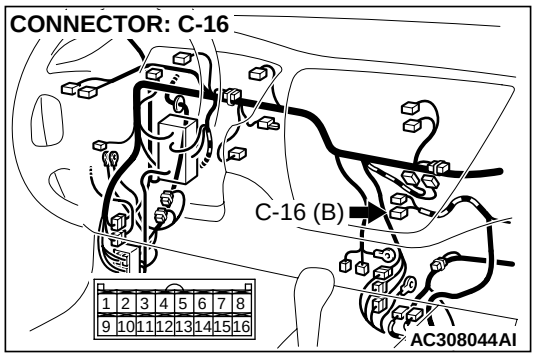
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

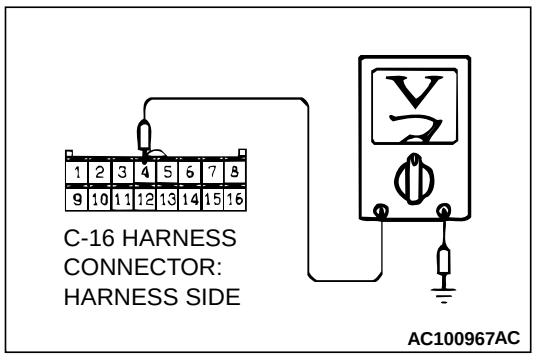
YES : Go to Step 11.

NO : Go to Step 5.

STEP 5. Measure the power supply voltage at A/C-ECU connector C-16 by backprobing.



(1) Do not disconnect connector C-16.
(2) Start the engine and run at idle.
(3) Operate the A/C.



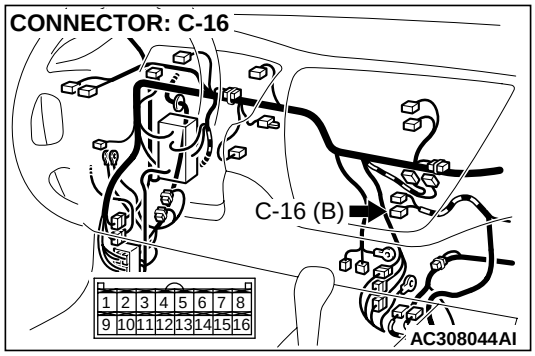
(4) Measure the voltage between terminal 4 and ground by backprobing.
- Voltage should measure battery positive voltage.

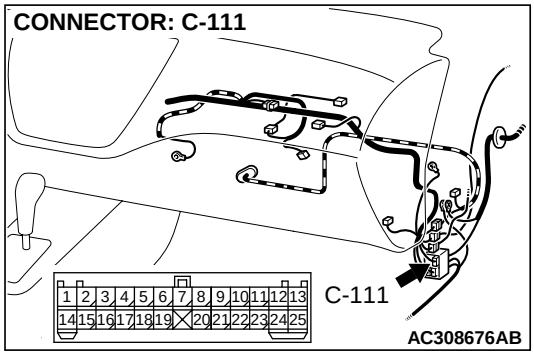
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 9.
NO : Go to Step 6.

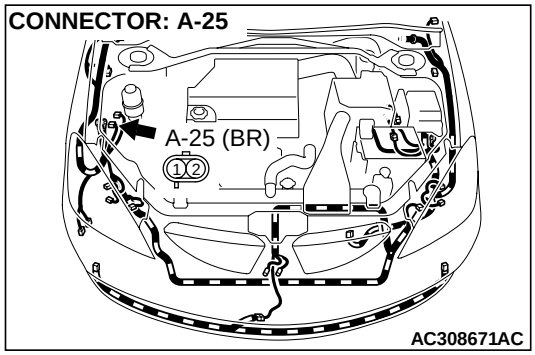
STEP 6. Check A/C-ECU connector C-16 and intermediate connector C-111 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

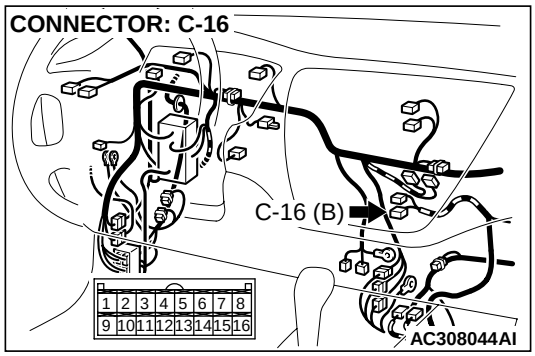




Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



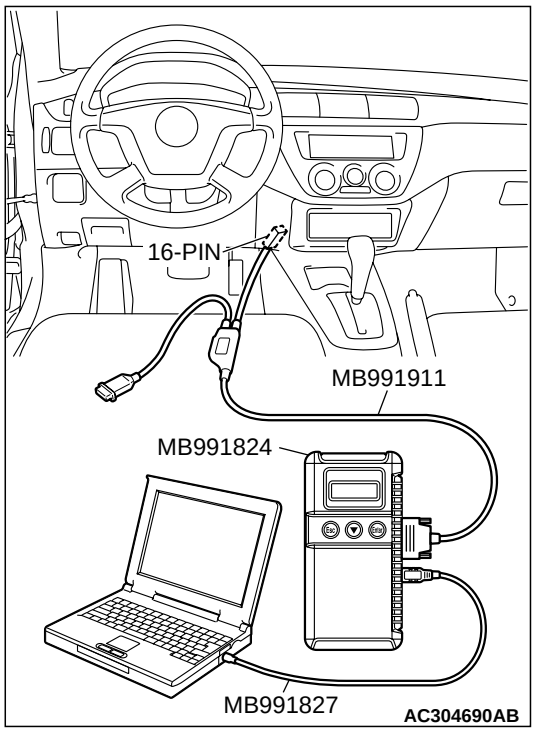


STEP 7. Check the harness for short circuit to ground between dual pressure switch connector A-25 terminal 1 and A/C-ECU connector C-16 terminal 4.

Q: Is the harness wire in good condition?

YES : Go to Step 8.

NO : Repair or replace the harness wire.



STEP 8. Using scan tool MB991958, check data list item 65: Dual Pressure Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.

(2) Start the engine and run at idle.

(3) Set scan tool MB991958 to data reading mode.

- Item 65: Dual Pressure Switch.
  - When the A/C is in operation, scan tool MB991958 display should be "ON."
  - When the A/C is not in operation, scan tool MB991958 display should be "OFF."

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

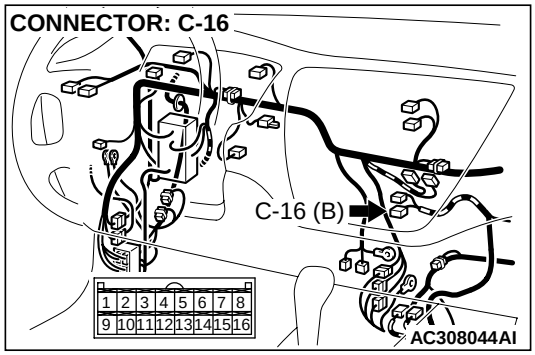
Q: Is the switch operating properly?

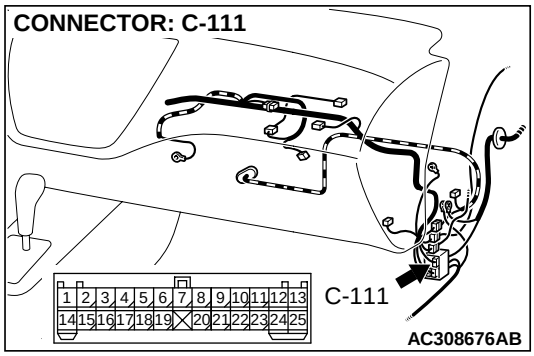
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Check the air conditioning system. Refer to GROUP 55, Troubleshooting Strategy P.55-5.

STEP 9. Check A/C-ECU connector C-16 and intermediate connector C-111 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

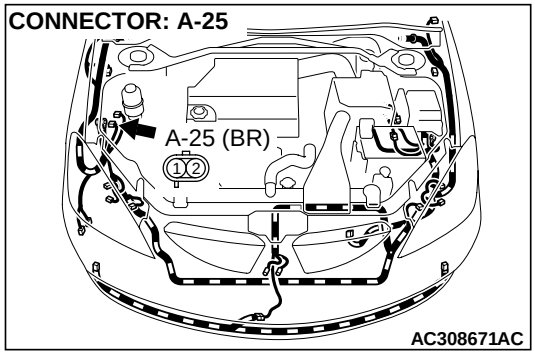
YES : Go to Step 10.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

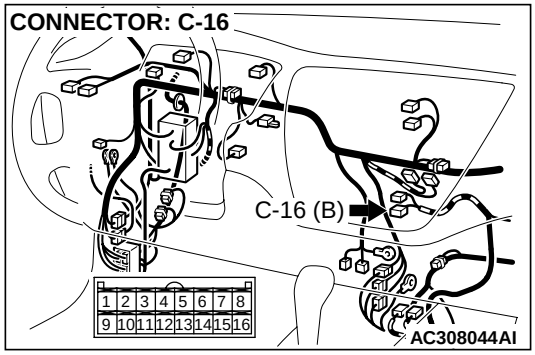


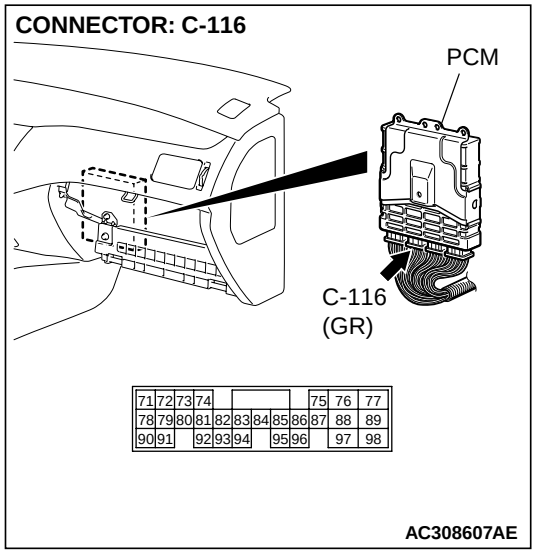


STEP 10. Check the harness for open circuit between dual pressure switch connector A-25 terminal 1 and A/C-ECU connector C-16 terminal 4.
Q: Is the harness wire in good condition?

YES : Go to Step 14.
NO : Repair or replace the harness wire.

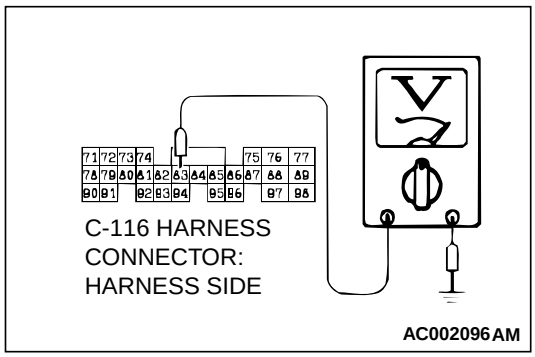






STEP 11. Measure the switch output voltage at PCM connector C-116 by backprobing.

(1) Do not disconnect connector C-116.
(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 measure battery positive voltage.

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

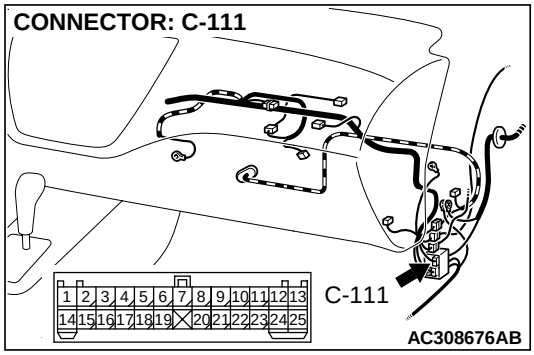
Q: Is the measured voltage battery positive voltage?

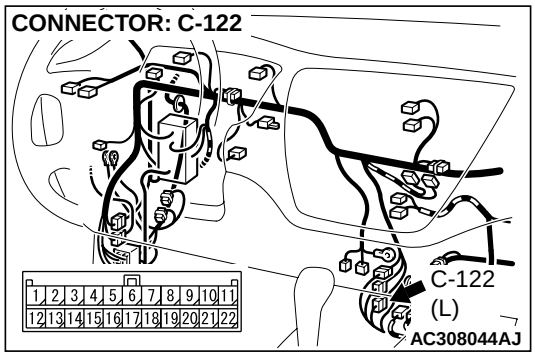
YES : Go to Step 15.
NO : Go to Step 12.

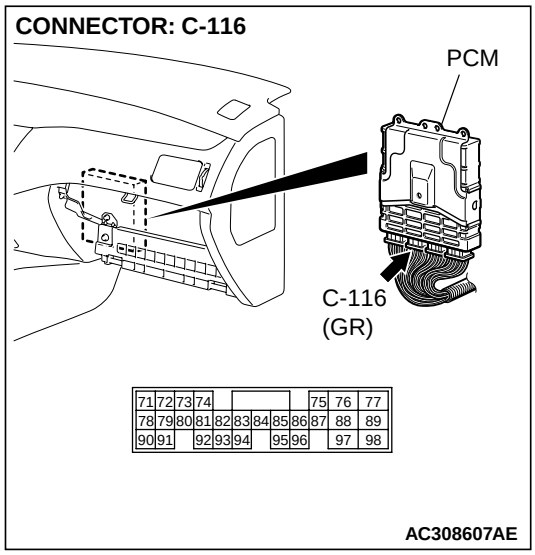
STEP 12. Check intermediate connectors C-111, C-122 and PCM connector C-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 13.

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





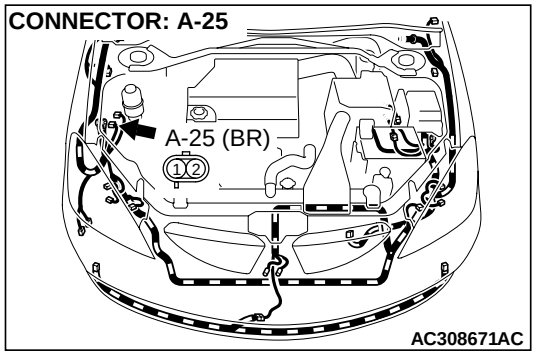


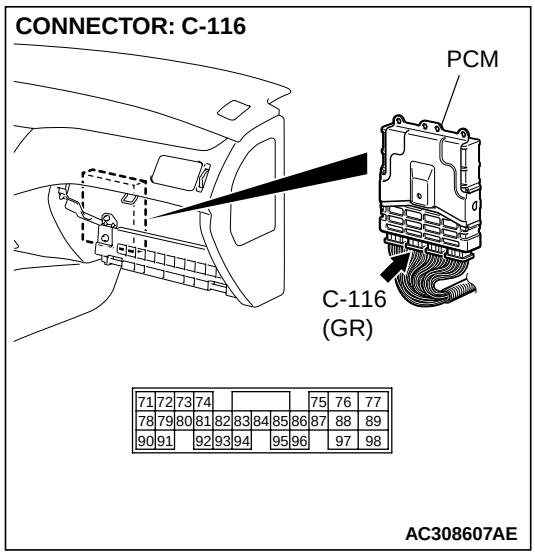
STEP 13. Check harness for open circuit or short circuit to ground between dual pressure switch connector A-25 terminal 2 and PCM connector C-116 terminal 83.

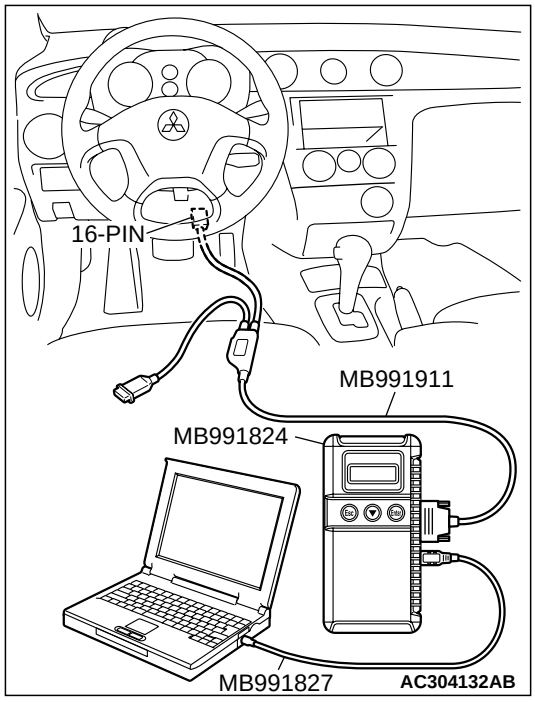
Q: Is the harness wire in good condition?

YES : Go to Step 14.

NO : Repair or replace the harness wire.







STEP 14. Using scan tool MB991958, check data list item 65: Dual Pressure Switch.

⚠ CAUTION

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

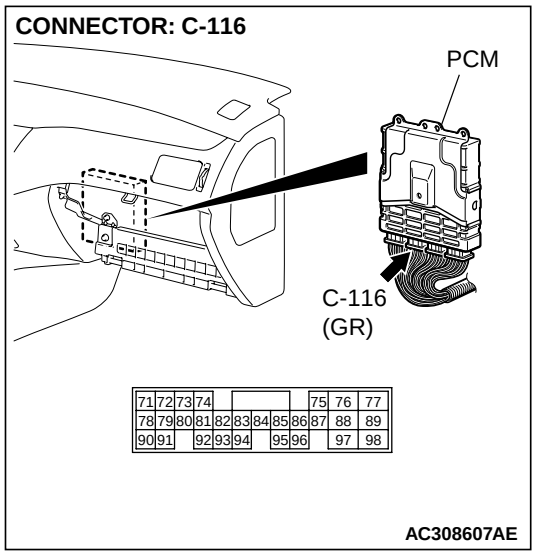
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991502 or MB991958 to data reading mode.
- Item 65: Dual Pressure Switch.
  - When the A/C is in operation, the scan tool MB991958 display should be "ON."
  - When the A/C is not in operation, the scan tool MB991958 display should be "OFF."

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

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.



STEP 15. Check PCM connector C-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

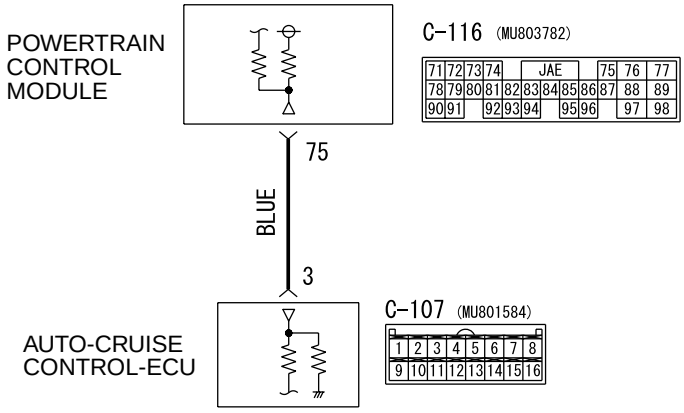
Q: Are the connector and terminals in good condition?

YES : Go to Step 14.

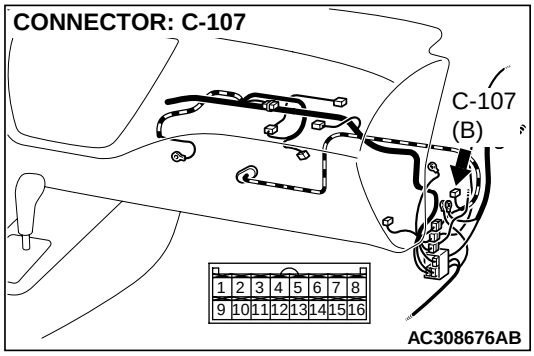
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

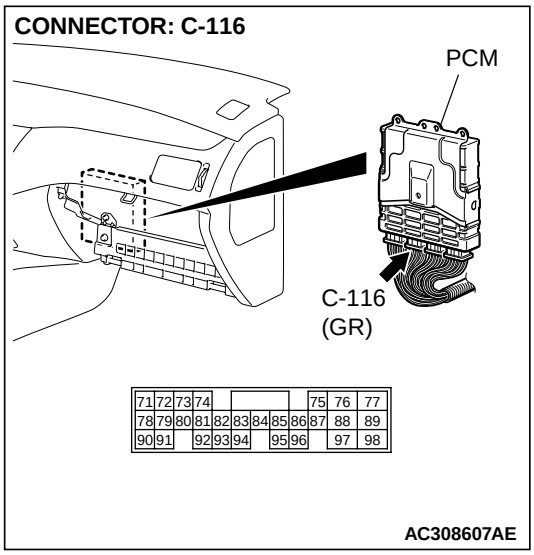
INSPECTION PROCEDURE 16: Transaxle won't Downshift under Load with Auto-cruise Engaged.

Auto-cruise Signal Line System Circuit



AC308692AB





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 an overdrive cancel signal. When a malfunction of the auto-cruise control circuit occurs, the transaxle may downshift harshly with the auto-cruise control engaged.

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 case:)

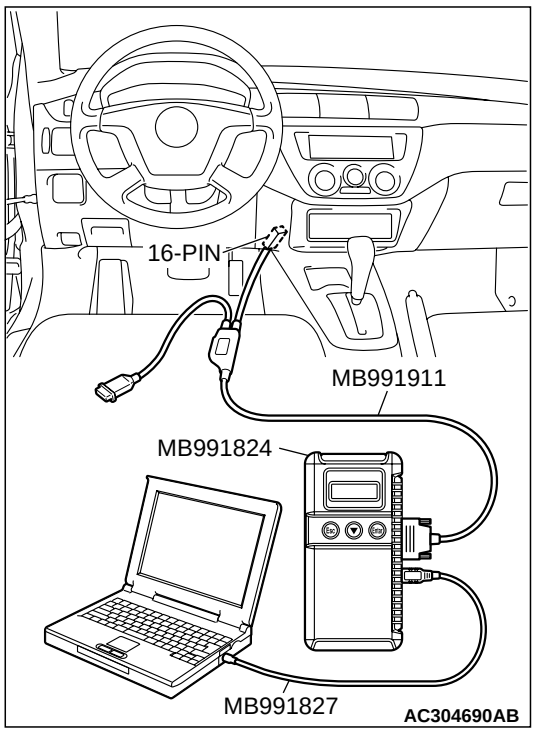
- Damaged harness, connector
- Malfunction of the PCM
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check data list item 66: Overdrive Off Signal (Auto-cruise control-ECU Signal).



⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and prepare to test drive the vehicle. (Operate the auto-cruise)
(3) Set scan tool MB991958 to data reading mode.
- Item 66: Overdrive Off Signal (Auto-cruise control-ECU 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 the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction can be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

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.17-13.

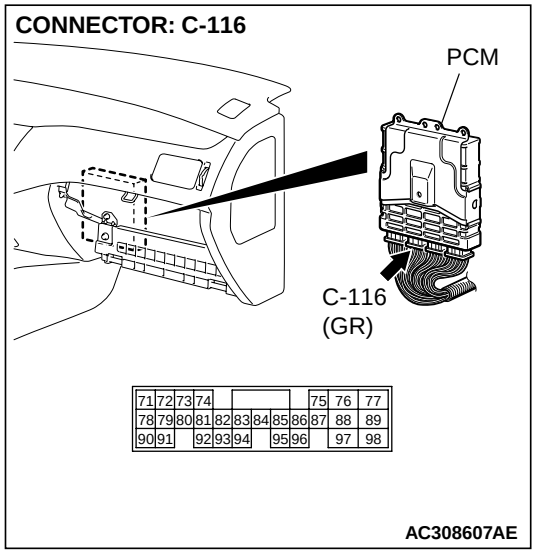
Q: Is the auto-cruise system operating properly?

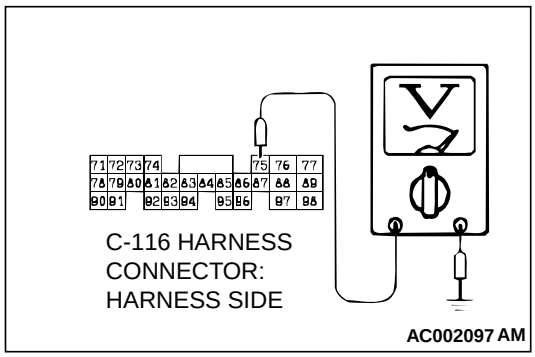
YES : Go to Step 3.

NO : Repair it, then check the symptom.

STEP 3. Measure the signal voltage at PCM connector C-116 by backprobing.

(1) Do not disconnect connector C-116.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the voltage between terminal 75 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

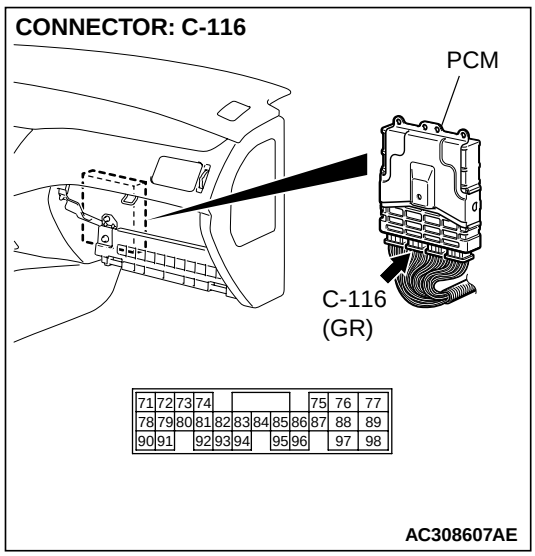
Q: Is the measured voltage battery positive voltage?

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

STEP 4. Check PCM connector C-116 for looser, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

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

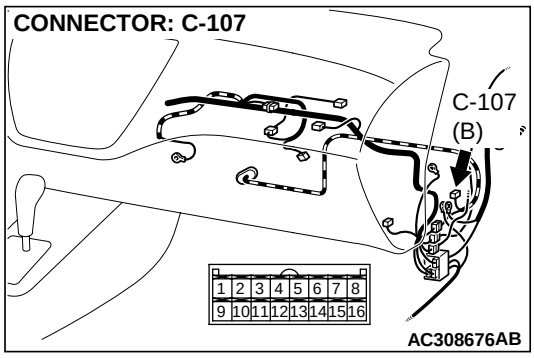


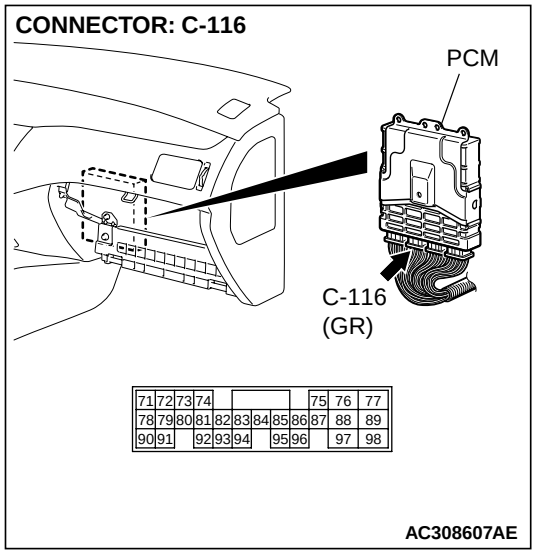
STEP 5. Check the harness for open circuit, short circuit to ground or damage between auto-cruise control-ECU connector C-107 terminal 3 and PCM connector C-116 terminal 75.

Q: Is the harness wire in good condition?

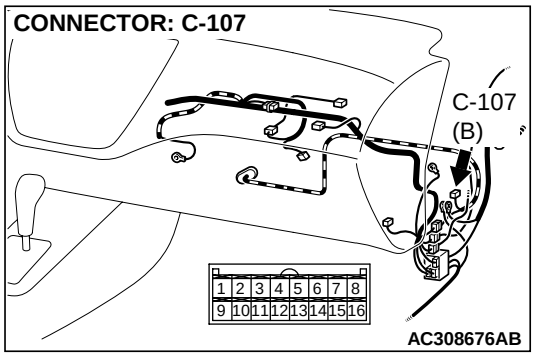
YES : Go to Step 6.

NO : Repair or replace the harness wire.

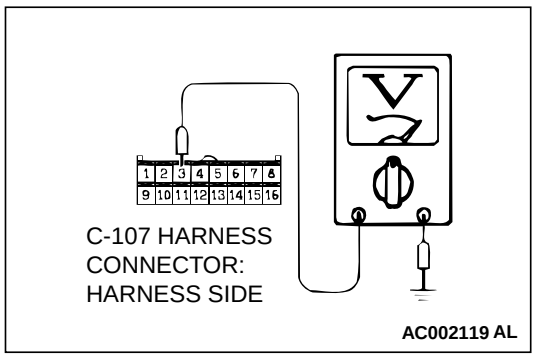




STEP 6. Measure the signal voltage at auto-cruise control-ECU connector C-107 by backprobing.



(1) Do not disconnect connector C-107.
(2) Turn the ignition switch to the "ON" position.



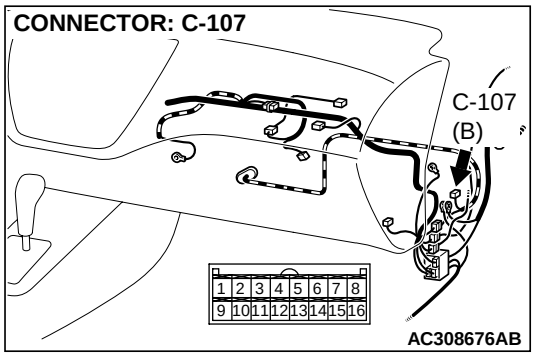
(3) Measure the voltage between terminal 3 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 7.
NO : Go to Step 8.

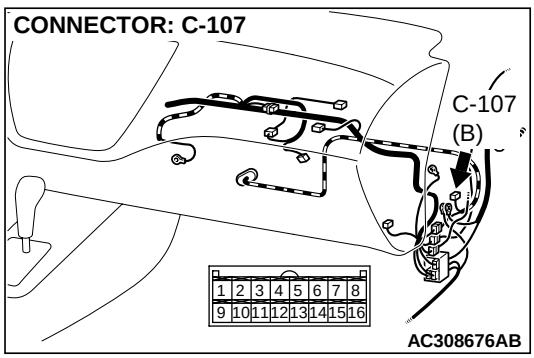
STEP 7. Check auto-cruise control-ECU connector C-107 at for looser, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

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

STEP 8. Check auto-cruise control-ECU connector C-107 for looser, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

YES : Go to Step 9.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

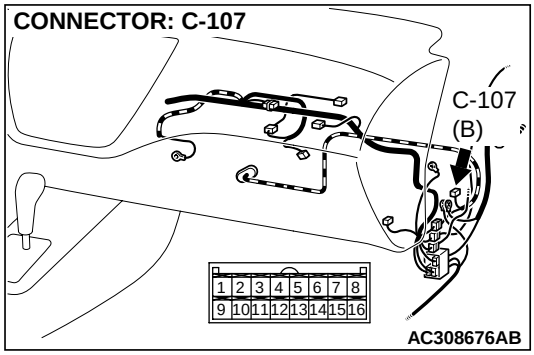
TSB Revision

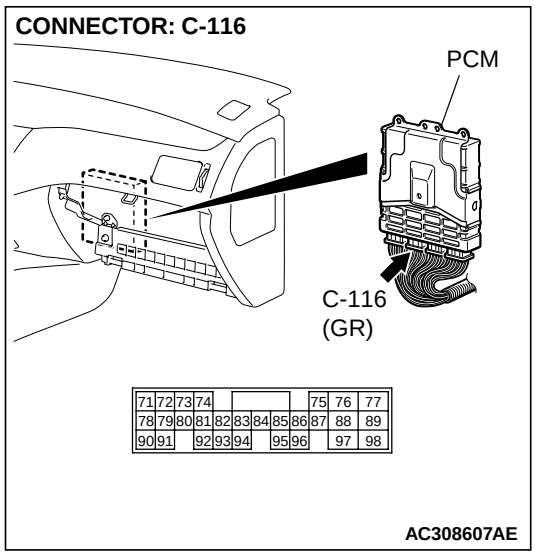
STEP 9. Check harness for short circuit to ground between auto-cruise control-ECU connector C-107 terminal 3 and PCM connector C-116 terminal 75.

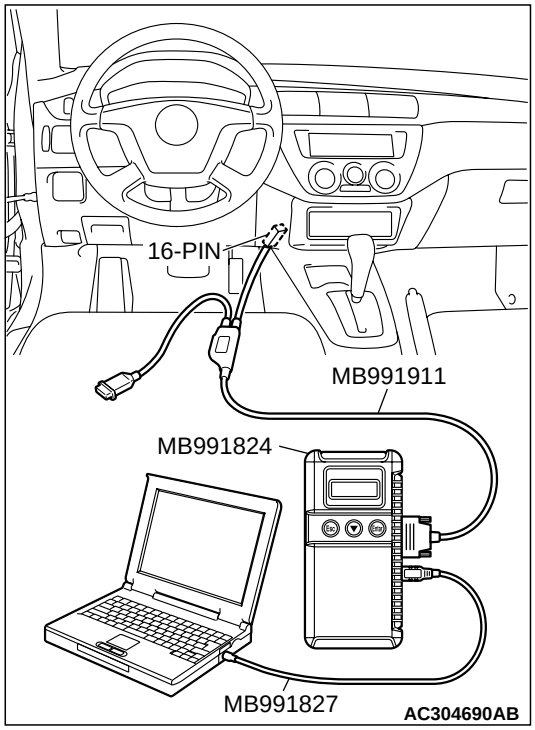
Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair or replace the harness wire.







STEP 10. Using scan tool MB991958, check data list item 66: Overdrive Off Signal (Auto-cruise control-ECU Signal).

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and prepare to test drive the vehicle. (Operate the auto-cruise)
(3) Set scan tool MB991958 to data reading mode.
- Item 66: Overdrive Off Signal (Auto-cruise control-ECU 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 the "LOCK" (OFF) position.

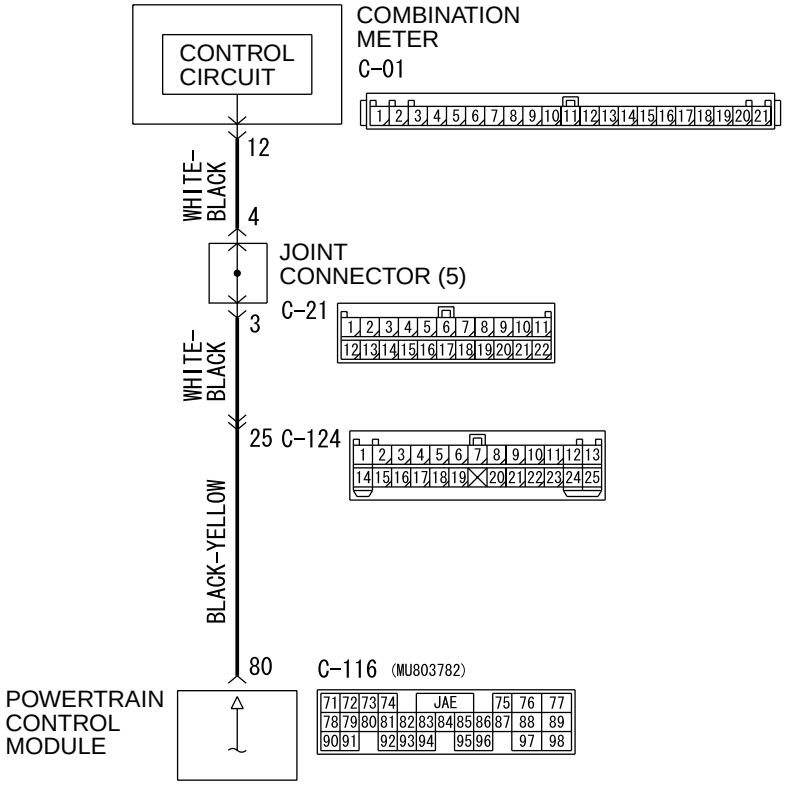
Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction can be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

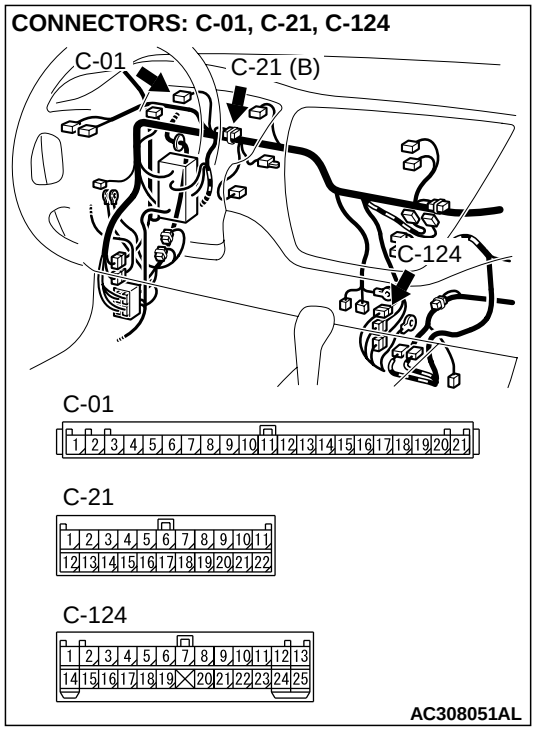
INSPECTION PROCEDURE 17: Vehicle Speed Signal System

Vehicle Speed Signal System Circuit



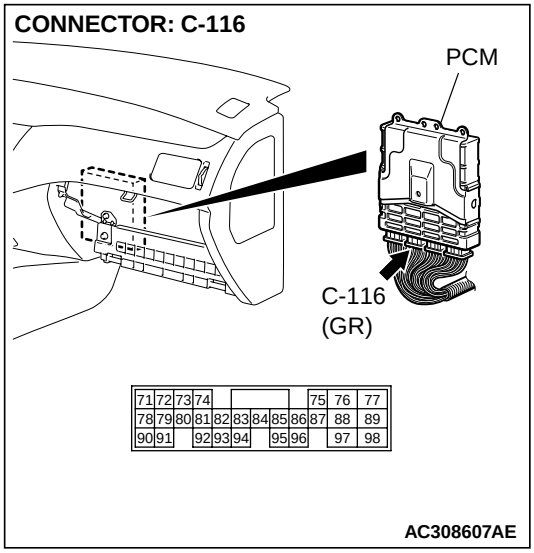
AC307934AC

CONNECTORS: C-01, C-21, C-124



AC308051AL

CONNECTOR: C-116



AC308607AE

TSB Revision

CIRCUIT OPERATION

- While the vehicle is being driven, the PCM sends pulse signals (ranging from 0 to 12 volts) to the combination meter according to output signals from the output shaft speed sensor. The combination meter displays vehicle speed according to the pulse signals.
- If the vehicle speed signal becomes inoperative, the transaxle will not shift normally.

COMMENTS

Failure may occur on vehicle speed signal circuit, speedometer and PCM.

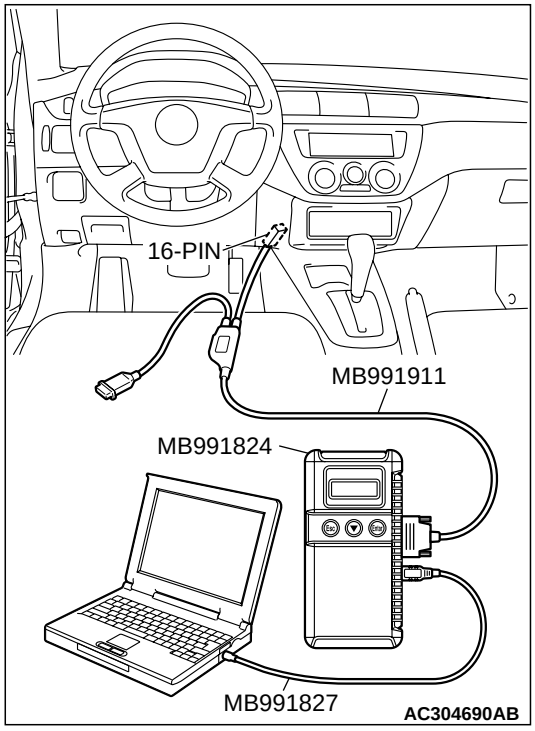
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the output shaft speed sensor
- Malfunction of the speedometer
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, read the A/T diagnostic trouble code.

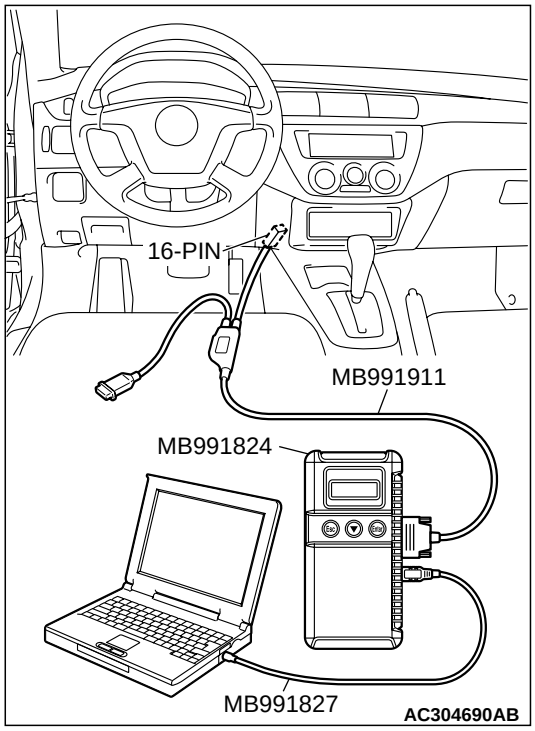
⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 23 set?

YES : Refer to P.23A-80, DTC 23: Output Shaft Speed Sensor System.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 29: Vehicle Speed Signal.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to data reading mode.
- Item 29: Vehicle Speed Signal.
  - Check that the speedometer and scan tool MB991958 display speed match when driving at a vehicle speed of 40 km/h (25 mph).

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

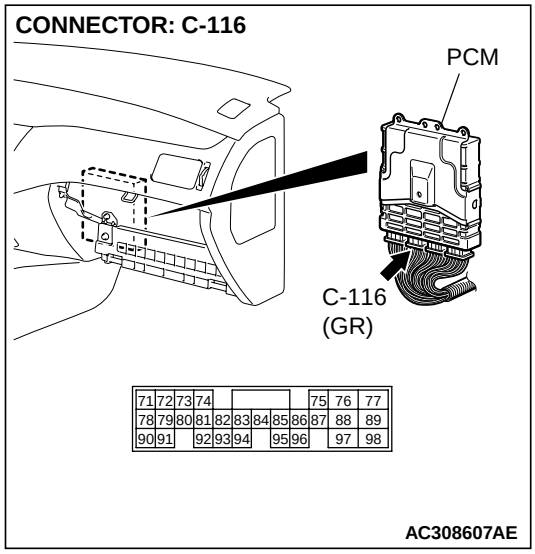
Q: Is the sensor operating properly?

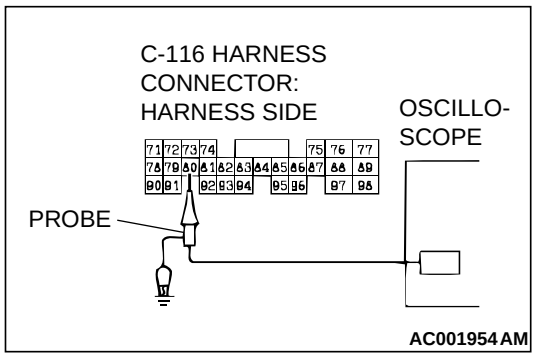
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 3.

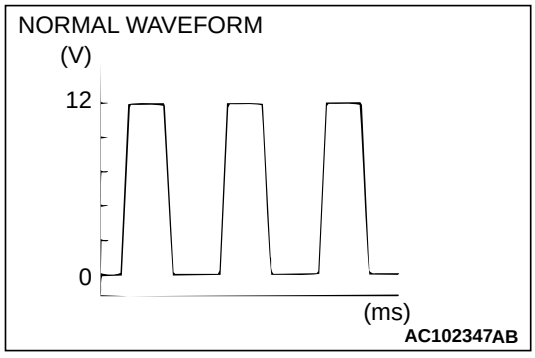
STEP 3. Using an oscilloscope, check the vehicle speed signal waveform at PCM connector C-116 by backprobing.

(1) Do not disconnect connector C-116.





(2) Connect an oscilloscope probe to PCM connector C-116 terminal 80 by backprobing.
(3) Start the engine and drive the vehicle.

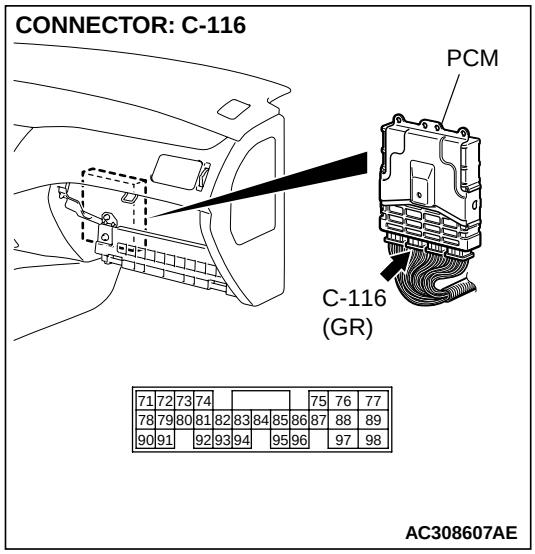


(4) Check the vehicle speed signal waveform.
- The vehicle speed signal waveform should show a pattern similar to the illustration. The maximum value should be 11 volts and more and the minimum value 0.6 volt and less. The output waveform should not contain electrical noise

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

Q: Is the waveform normal?

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



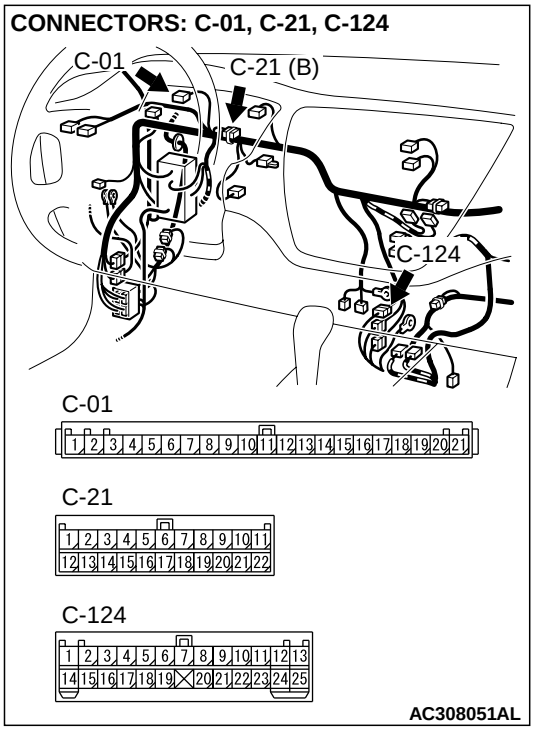
STEP 4. Check PCM connector C-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

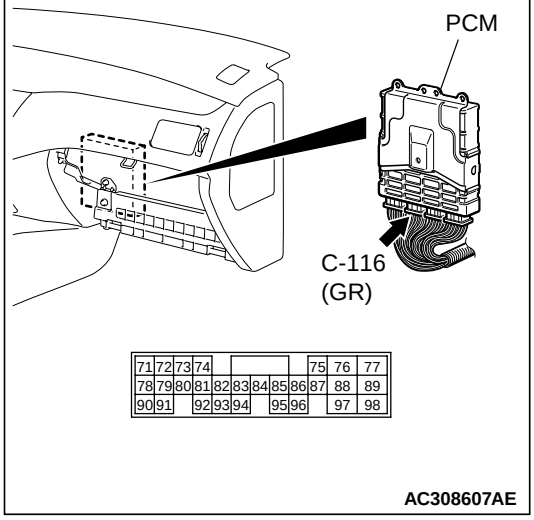
YES : Go to Step 8.

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

CONNECTORS: C-01, C-21, C-124



CONNECTOR: C-116



STEP 5. Check combination meter connector C-01, joint connector C-21, intermediate connector C-124 and PCM connector C-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

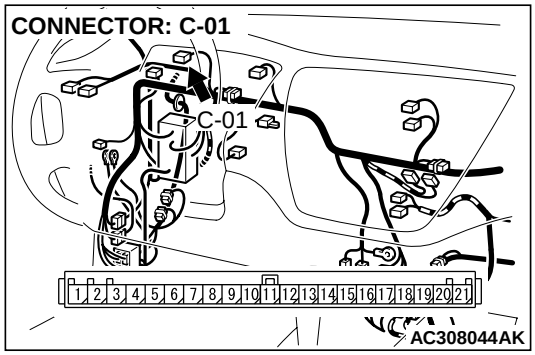
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

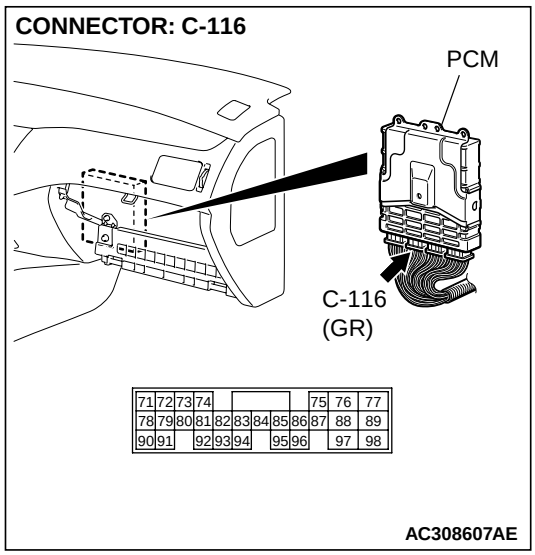
STEP 6. Check the harness for open circuit, short circuit to ground or damage between combination meter connector C-01 terminal 12 and PCM connector C-116 terminal 80.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair or replace the harness wire.





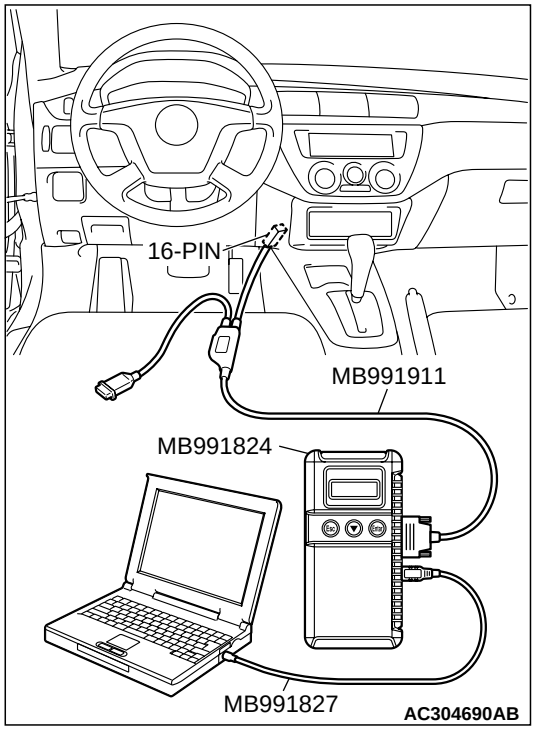
STEP 7. Check the speedometer.

Refer to GROUP 54A, Combination Meters Assembly and Vehicle Speed Sensor – Trouble Symptom Chart – Speedometer Does Not Work P.54A-11.

Q: Is the speedometer operating properly?

YES : Go to Step 8.

NO : Replace the combination meter.



STEP 8. Using scan tool MB991958, check data list item 29: Vehicle Speed Signal.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to data reading mode.
- Item 29: Vehicle Speed Signal.
  - Check that the speedometer and scan tool MB991958 display speed match when driving at a vehicle speed of 40 km/h (25 mph).

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

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

DATA LIST REFERENCE TABLE

M1231008100359

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
2ND SOL DUTY	33	Second solenoid valve duty %	Transmission range: L	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	100%
			Transmission range: 2	Driving at constant speed of 30 km/h (19 mph) in 2nd gear	0%
			Transmission range: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear	100%
			Transmission range: D	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 voltage
CKP SENSOR	21	Crankshaft position sensor	• Engine: Idling (after the worming up) • Transmission range: P	Accelerator pedal: Release	600 – 900 r/min
				Accelerator pedal: Depressed	Gradually rises from the above value
DUAL PRESS SW	65	Dual pressure switch	• Engine: Idling • Transmission range: P, N	A/C switch: ON (while the A/C compressor is in operation)	ON
				A/C switch: OFF	OFF
ENGINE LOAD	57	Engine load (volumetric efficiency)	• Engine: Idling • Transmission range: P, N	Accelerator pedal: Release → depressed	Data changes
ISS SENSOR	22	Input shaft speed sensor	Gear range: 3rd gear	Driving at constant speed of 50 km/h (31 mph)	1,400 – 1,700 r/min
L/R SOL DUTY	31	Low-reverse solenoid valve duty %	Transmission range: L	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	0%
			Transmission range: 2	Driving at constant speed of 30 km/h (19 mph) in 2nd gear	100%
			Transmission range: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear	100%
			Transmission range: D	Driving at constant speed of 50 km/h (31 mph) in 4th gear	100%

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
O/D SOL DUTY	34	Overdrive solenoid valve duty %	Transmission range: L	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	100%
			Transmission range: 2	Driving at constant speed of 30 km/h (19 mph) in 2nd gear	100%
			Transmission range: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear	0%
			Transmission range: D	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
OSS SENSOR	23	Output shaft speed sensor	Gear range: 3rd gear	Driving at constant speed of 50 km/h (31 mph)	1,400 – 1,700 r/min
SHIFT POS	63	Shift position	Transmission range: L	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	1st
			Transmission range: 2	Driving at constant speed of 30 km/h (19 mph) in 2nd gear	2nd
			Transmission range: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear	3rd
			Transmission range: D	Driving at constant speed of 50 km/h (31 mph) in 4th gear	4th
			Transmission range: R	Driving at constant speed of 5 km/h (3.1 mph) in reverse gear	REV
			Transmission range: P, N		NP
STOPLIGHT SW	26	Stoplight switch	Ignition switch: ON	Brake pedal: Depressed	ON
				Brake pedal: Released	OFF
TCC SLIPPAGE	52	Torque converter clutch amount of slippage	• Warmed up • Transmission range: 3 • Driving at speed of 60 km/h (37 mph) in 3rd gear	Driving at constant speed of 60 km/h (37 mph)	–10 to 10 r/min
				Release accelerator pedal (at less than 50 km/h (31 mph)	The value should fluctuate when the accelerator is released.

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION
TCC SOL DUTY	36	Torque converter clutch solenoid valve duty %	• Warmed up • Transmission range: 3 • Driving at speed of 60 km/h (38 mph) in 3rd gear	Driving at constant speed of 60 km/h (37 mph)	70 – 99.6%
				Release accelerator pedal (at less than 50 km/h (31 mph))	70 – 99.6% → 0% Decreases gradually as the vehicle speed decreases
TFT SENSOR	15	Transmission fluid temperature sensor	Warmed up	Drive for 15 minutes or more so that the transmission fluid temperature becomes 70 – 80°C (158 – 176°F)	Gradually rises to 70 – 80°C (158 – 176°F)
TP SENSOR	11	TP sensor	• Ignition switch: ON • Engine: Stopped • Transmission range: P	Accelerator pedal: Release	335 – 935 mV
				Accelerator pedal: Depressed	Gradually rises from the above value
				Accelerator pedal: Fully depressed	4,390 – 5,290 mV
TR SWITCH	61	Transmission range switch	Ignition switch: ON	Transmission range: P	P
				Transmission range: R	R
				Transmission range: N	N
				Transmission range: D	D
				Transmission range: 3	3
				Transmission range: 2	2
				Transmission range: L	L
U/D SOL DUTY	32	Underdrive solenoid valve duty %	Transmission range: L	Driving at constant speed of 10 km/h (6.2 mph) in 1st gear	0%
			Transmission range: 2	Driving at constant speed of 30 km/h (19 mph) in 2nd gear	0%
			Transmission range: 3	Driving at constant speed of 50 km/h (31 mph) in 3rd gear	0%
			Transmission range: D	Driving at constant speed of 50 km/h (31 mph) in 4th gear	100%
VSS	29	Vehicle speed signal	Idling in 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

M1231008200323

MUT-III 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 MB991958 (MUT-III sub assembly) at 50% duty for five seconds. No other solenoid valve should be energized.	• Ignition switch: ON • Transmission range: P • Engine: stopped • Throttle opening voltage: Less than one volt	The solenoid should click when activated
A/T RELAY	12	A/T control relay	Actuator test in scope mode, data list No.54. Control relay is OFF for three seconds.		Data list No.54 • During test: 0 V • Normal: Battery voltage [12 V]
L/R SOL	01	Low-reverse solenoid valve	Drive the solenoid valve specified by the scan tool MB991958 (MUT-III sub assembly) 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			

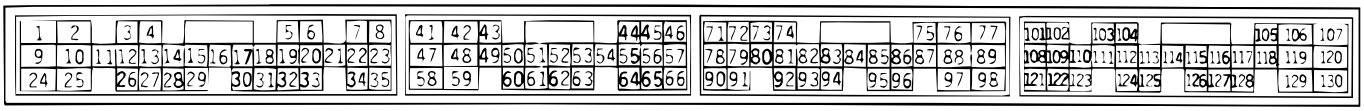
INVECS-II CANCEL COMMAND

M1231009500305

MUT-III SCAN TOOL DISPLAY	ITEM NO.	ITEM	CONTENT	REMARKS
Std. SIFT 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) The INVECS-II cancel command will last until the ignition switch is turned from "ON" to "LOCK"(OFF) or vice versa.

PCM TERMINAL VOLTAGE REFERENCE CHART FOR TRANSAXLE OPERATION

M1231008400338



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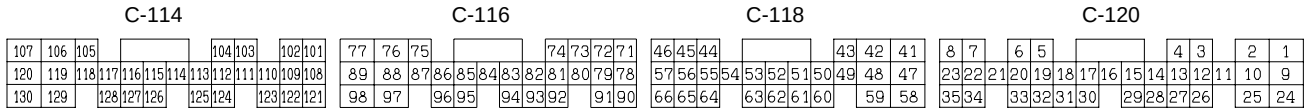
TERMINAL NO.	INSPECTION ITEMS	INSPECTION REQUIREMENT	NORMAL CONDITION
50	A/T control relay	Always	1 V or less
75	Auto-cruise signal	Ignition switch: ON	Battery positive voltage
76	Ground	Always	1 V or less
77	Solenoid valve power supply	Ignition switch: LOCK (OFF)	1 V or less
		Ignition switch: ON	Battery positive voltage
80	Vehicle speed signal	• Measure between terminals 80 and ground with an oscilloscope. • Engine: 2,000 r/min • Gear range: 3rd gear	Refer to P.23A-321, Inspection Procedure Using an Oscilloscope.
88	Ground	Always	1 V or less
89	Solenoid valve power supply	Ignition switch: LOCK (OFF)	1 V or less
		Ignition switch: ON	Battery positive voltage
97	Ground	Always	1 V or less
101	Transmission range switch: P	• Ignition switch: ON • Transmission range: P	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
102	Transmission range switch: D	• Ignition switch: ON • Transmission range: D	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
103	Input shaft speed sensor	• Measure between terminals 16 and 103 with an oscilloscope. • Engine: 2,000 r/min • Gear range: 3rd gear	Refer to P.23A-321, Inspection Procedure Using an Oscilloscope.
104	Output shaft speed sensor	• Measure between terminals 16 and 104 with an oscilloscope. • Engine: 2,000 r/min • Gear range: 3rd gear	Refer to P.23A-321, Inspection Procedure Using an Oscilloscope.
106	Second solenoid valve	• Engine: Idling • Gear range: 2nd gear	Battery positive voltage
		• Engine: Idling • Transmissione range: P	6 – 9 V
107	Torque converter clutch solenoid valve	• Engine: Idling • Transmission range: P	Battery positive voltage

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TERMINAL NO.	INSPECTION ITEMS	INSPECTION REQUIREMENT	NORMAL CONDITION
108	Transmission range switch: R	• Ignition switch: ON • Transmission range: R	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
109	Transmission range switch: 3	• Ignition switch: ON • Transmission range: 3	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
110	Transmission range switch: L	• Ignition switch: ON • Transmission range: L	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
120	Under drive solenoid valve	• Engine: Idling • Gear range: 1st gear	Battery positive voltage
		• Engine: Idling • Transmission range: P	6 – 9 V
121	Transmission range switch: N	• Ignition switch: ON • Transmission range: N	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
122	Transmission range switch: 2	• Ignition switch: ON • Transmission range: 2	Battery positive voltage
		• Ignition switch: ON • Transmission range: Other than above	1 V or less
123	Stoplight switch	Brake pedal: Depressed	Battery positive voltage
		Brake pedal: Released	1 V or less
124	Transmission fluid temperature sensor	• Ignition switch: ON • Transmission fluid temperature: 20°C (68°F)	3.8 – 4.0 V
		• Ignition switch: ON • Transmission fluid temperature: 40°C (104°F)	3.2 – 3.4 V
		• Ignition switch: ON • Transmission fluid temperature: 80°C (176°F)	1.7 – 1.9 V
129	Low-reverse solenoid valve	• Engine: Idling • Transmission range: P	Battery positive voltage
		• Engine: Idling • Gear range: 2nd gear	6 – 9 V
130	Overdrive solenoid valve	• Engine: Idling • Gear range: 3rd gear	Battery positive voltage
		• Engine: Idling • Transmission range: P	6 – 9 V

PCM TERMINAL RESISTANCE AND CONTINUITY INSPECTION CHART

M1231013400226



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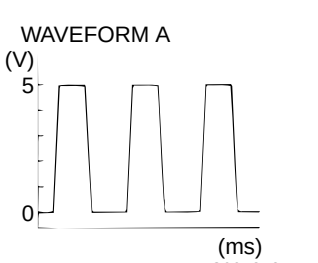
TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (CHECK CONDITION)
57 – 124	Transmission fluid temperature sensor	16.7 – 20.5 kΩ [at 0°C (32°F)]
		7.3 – 8.9 kΩ [at 20°C (68°F)]
		3.4 – 4.2 kΩ [at 40°C (104°F)]
		1.9 – 2.2 kΩ [at 60°C (140°F)]
		1.0 – 1.2 kΩ [at 80°C (176°F)]
		0.57 – 0.69 kΩ [at 100°C (212°F)]

INSPECTION PROCEDURE USING AN OSCILLOSCOPE

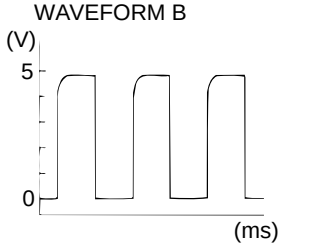
M1231008500335

TERMINAL NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION (WAVEFORM SAMPLE)
45	Crankshaft position sensor	Transmission range: N	Idling (Vehicle stopped)	Waveform A
103	Input shaft speed sensor	Gear range: 3rd gear	Driving at constant speed of 50 km/h (31 mph) in 3rd gear (1,400 – 1,700 r/min)	Waveform B
104	Output shaft speed sensor			
80	Vehicle speed signal			Waveform C
129	Low-reverse solenoid valve	• Ignition switch: ON • Transmission range: P • Engine: Stopped • Throttle (Accelerator) opening voltage: 1 V or less	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			

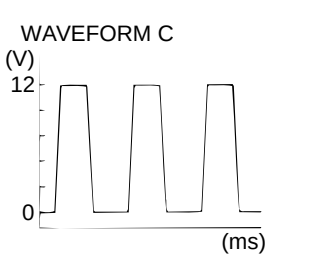
Waveform sample



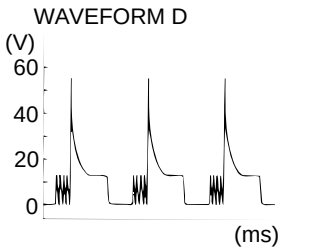
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A/T FAULTY OPERATION PREVENTION MECHANISM DIAGNOSIS

INTRODUCTION TO A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS

M1232001600259

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 TROUBLESHOOTING STRATEGY

M1232001700256

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 following the Symptom Chart.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1232001800446

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Selector lever can be moved from "P" to "R" position without depressing brake pedal when ignition key is at any position other than "LOCK" (OFF) position.	1	P.23A-323
Selector lever cannot be moved from "P" to "R" position with brake pedal depressed when ignition key is at any position other than "LOCK" (OFF) position.	2	P.23A-324
Selector lever can be moved from "P" to "R" position with brake pedal depressed when ignition key is at "LOCK" (OFF) position.	3	P.23A-325
Selector lever cannot be moved from "P" to "R" position smoothly.	4	P.23A-326
Selector lever cannot be moved from "P" to "R" position.	5	P.23A-327
Ignition key cannot be turned to "LOCK" (OFF) position when selector lever is at "P" position.	6	P.23A-328
Ignition key can be turned to "LOCK" (OFF) position when selector lever is at any position other than "P" position.	7	P.23A-329

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Selector Lever can be Moved from "P" to "R" Position without Depressing Brake Pedal when Ignition Key is at any Position Other than "LOCK" (OFF) Position.

TECHNICAL DESCRIPTION (COMMENT)
Lock cam or shift lock cable may be defective.

TROUBLESHOOTING HINTS
- Malfunction of lock cam
- Malfunction of shift lock cable

DIAGNOSIS

STEP 1. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 2.
NO : Install the lock cam correctly. Refer to P.23A-348. When the brake pedal is released with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 2. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 3.
NO : Replace the lock cam. Refer to P.23A-348. When the brake pedal is released with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 3. Check the fit of the shift lock cable.

Q: Is the shift lock cable installed correctly?
YES : Go to Step 4.
NO : Install the shift lock cable correctly. Refer to P.23A-349. When the brake pedal is released with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 4. Check the shift lock cable.

Q: Is the shift lock cable in good condition?
YES : No action to be taken.
NO : Replace the shift lock cable. Refer to P.23A-349. When the brake pedal is released with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

INSPECTION PROCEDURE 2: Selector Lever cannot be Moved from "P" to "R" Position with Brake Pedal Depressed when Ignition Key is at any Position Other than "LOCK" (OFF) Position.

TECHNICAL DESCRIPTION (COMMENT)
Selector lever assembly, shift lock cable, key interlock cable, transaxle 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 transaxle control cable
- Malfunction of lock cam

DIAGNOSIS

STEP 1. Check the connection of lock cam and key interlock cable.

Q: Is the connection of lock cam and key interlock cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of lock cam. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 2. Check the connection of selector lever assembly and transaxle control cable.

Q: Is the connection of selector lever assembly and shift transaxle control cable in good condition?
YES : Go to Step 3.
NO : Repair the connection of selector lever assembly and transaxle control cable. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 3. Check the fit of the shift lock cable.

Q: Is the shift lock cable installed correctly?
YES : Go to Step 4.
NO : Install the shift lock cable correctly. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 4. Check the shift lock cable.

Q: Is the shift lock cable in good condition?
YES : Go to Step 5.
NO : Replace the shift lock cable. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 5. Check the fit of the key interlock cable.

Q: Is the key interlock cable installed correctly?
YES : Go to Step 6.
NO : Install the key interlock cable correctly. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 6. Check the key interlock cable.

Q: Is the key interlock cable in good condition?
YES : Go to Step 7.
NO : Replace the key interlock cable. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 7. Check the fit of the transaxle control cable.

Q: Is the transaxle control cable installed correctly?
YES : Go to Step 8.
NO : Install the transaxle control cable correctly. Refer to P.23A-346. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.

STEP 8. Check the transaxle control cable.

Q: Is the transaxle control cable in good condition?
YES : Repair or replace the selector lever assembly. Refer to P.23A-346 and P.23A-348. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, check that the selector lever can be moved from "P" position to "R" position.
NO : Replace the transaxle control cable. Refer to P.23A-346. When the brake pedal is depressed with the ignition key at other positions than "LOCK" (OFF) position, 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" Position 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 key interlock cable

DIAGNOSIS

STEP 1. Check the connection of lock cam and key interlock cable.

Q: Is the connection of lock cam and key interlock cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of lock cam. When the brake pedal is depressed with the ignition key at the "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 2. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 3.
NO : Install the lock cam correctly. Refer to P.23A-348. When the brake pedal is depressed with the ignition key at the "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 3. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 4.
NO : Replace the lock cam. Refer to P.23A-348. When the brake pedal is depressed with the ignition key at the "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 4. Check the fit of the key interlock cable.

Q: Is the key interlock cable installed correctly?
YES : Go to Step 5.
NO : Install the key interlock cable correctly. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at the "LOCK" (OFF) position, check that the selector lever can not be moved from "P" position to "R" position.

STEP 5. Check the key interlock cable.

Q: Is the key interlock cable in good condition?
YES : No action to be taken.
NO : Replace the key interlock cable. Refer to P.23A-349. When the brake pedal is depressed with the ignition key at the "LOCK" (OFF) position, 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" Position Smoothly.

TECHNICAL DESCRIPTION (COMMENT)
Key interlock cable, shift lock cable, transaxle control cable, lock cam, or selector lever assembly may be defective.

TROUBLESHOOTING HINTS
- Malfunction of key interlock cable
- Malfunction of shift lock cable
- Malfunction of transaxle control cable
- Malfunction of lock cam
- Malfunction of selector lever assembly

DIAGNOSIS

STEP 1. Check the connection of lock cam and key interlock cable.

Q: Is the connection of lock cam and key interlock cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of lock cam and shift lock cable. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 2. Check the connection of selector lever assembly and transaxle control cable.

Q: Is the connection of selector lever assembly and transaxle control cable in good condition?
YES : Go to Step 3.
NO : Repair the connection of selector lever assembly and transaxle control cable. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 3. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 4.
NO : Install the lock cam correctly. Refer to P.23A-348. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 4. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 5.
NO : Replace the lock cam. Refer to P.23A-348. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 5. Check the fit of the shift lock cable.

Q: Is the shift lock cable installed correctly?
YES : Go to Step 6.
NO : Install the shift lock cable correctly. Refer to P.23A-349. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 6. Check the shift lock cable.

Q: Is the shift lock cable in good condition?
YES : Go to Step 7.
NO : Replace the shift lock cable. Refer to P.23A-349. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 7. Check the fit of the key interlock cable.

Q: Is the key interlock cable installed correctly?
YES : Go to Step 8.
NO : Install the key interlock cable correctly. Refer to P.23A-349. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 8. Check the key interlock cable.

Q: Is the key interlock cable in good condition?
YES : Go to Step 9.
NO : Replace the key interlock cable. Refer to P.23A-349. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 9. Check the fit of the transaxle control cable.

Q: Is the transaxle control cable installed correctly?
YES : Go to Step 10.
NO : Install the transaxle control cable correctly. Refer to P.23A-346. Check that the selector lever can be moved from "P" position to "R" position smoothly.

STEP 10. Check the transaxle control cable.

Q: Is the transaxle control cable in good condition?
YES : Repair or replace the selector lever assembly. Refer to P.23A-346 and P.23A-348. Check that the selector lever can be moved from "P" position to "R" position smoothly.
NO : Replace the transaxle control cable. Refer to P.23A-346. Check that the selector lever can be moved from "P" position to "R" position smoothly.

INSPECTION PROCEDURE 5: Selector Lever cannot be Moved from "R" to "P" Position.

TECHNICAL DESCRIPTION (COMMENT)
Selector lever assembly, transaxle control cable, or lock cam may be defective.

TROUBLESHOOTING HINTS
- Malfunction of selector lever assembly
- Malfunction of transaxle control cable
- Malfunction of lock cam

DIAGNOSIS

STEP 1. Check the connection of selector lever assembly and transaxle control cable.

Q: Is the connection of selector lever assembly and transaxle control cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of selector lever assembly and transaxle control cable. Check that the selector lever can be moved from "R" position to "P" position.

STEP 2. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 3.
NO : Install the lock cam correctly. Refer to P.23A-348. Check that the selector lever can be moved from "R" position to "P" position.

STEP 3. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 4.
NO : Replace the lock cam. Refer to P.23A-348. Check that the selector lever can be moved from "R" position to "P" position.

STEP 4. Check the fit of the transaxle control cable.

Q: Is the transaxle control cable installed correctly?
YES : Go to Step 5.
NO : Install the transaxle control cable correctly. Refer to P.23A-346. Check that the selector lever can be moved from "R" position to "P" position.

STEP 5. Check the transaxle control cable.

Q: Is the transaxle control cable in good condition?
YES : Repair or replace the selector lever assembly. Refer to P.23A-346 and P.23A-348. Check that the selector lever can be moved from "R" position to "P" position smoothly.
NO : Replace the transaxle control cable. Refer to P.23A-346. Check that the selector lever can be moved from "R" position to "P" position.

INSPECTION PROCEDURE 6: Ignition Key cannot be Turned to the "LOCK" (OFF) Position when Selector Lever is at "P" Position.

TECHNICAL DESCRIPTION (COMMENT)
Lock cam, steering lock cylinder assembly, transaxle control cable, or key interlock cable may be defective.

TROUBLESHOOTING HINTS
- Malfunction of lock cam
- Malfunction of key interlock cable
- Malfunction of transaxle control cable
- Malfunction of steering lock cylinder assembly

DIAGNOSIS

STEP 1. Check the connection of lock cam and key interlock cable.

Q: Is the connection of lock cam and key interlock cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of lock cam. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

STEP 2. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 3.
NO : Install the lock cam correctly. Refer to P.23A-348. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

STEP 3. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 4.
NO : Replace the lock cam. Refer to P.23A-348. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

STEP 4. Check the fit of the key interlock cable.

Q: Is the key interlock cable installed correctly?
YES : Go to Step 5.
NO : Install the key interlock cable correctly. Refer to P.23A-349. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

STEP 5. Check the key interlock cable.

Q: Is the key interlock cable in good condition?
YES : Go to Step 6.
NO : Replace the key interlock cable. Refer to P.23A-349. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

STEP 6. Check the fit of the transaxle control cable.

Q: Is the transaxle control cable installed correctly?
YES : Replace the steering lock cylinder assembly. Refer to P.37A-25 and P.37A-28. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at "P" position.
NO : Install the transaxle control cable correctly. Refer to P.23A-346. Check that the ignition key can be turned to the "LOCK" (OFF) position with the selector lever at "P" position.

INSPECTION PROCEDURE 7: Ignition Key can be Turned to the "LOCK" (OFF) Position when Selector Lever is at any Position Other than "P" Position.

TECHNICAL DESCRIPTION (COMMENT)
Lock cam, steering lock cylinder assembly, transaxle control cable, or key interlock cable may be defective.

TROUBLESHOOTING HINTS
- Malfunction of lock cam
- Malfunction of steering lock cylinder assembly
- Malfunction of transaxle control cable
- Malfunction of key interlock cable

DIAGNOSIS

STEP 1. Check the connection of lock cam and key interlock cable.

Q: Is the connection of lock cam and key interlock cable in good condition?
YES : Go to Step 2.
NO : Repair the connection of lock cam. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

STEP 2. Check the fit of the lock cam.

Q: Is the lock cam installed correctly?
YES : Go to Step 3.
NO : Install the lock cam correctly. Refer to P.23A-348. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

STEP 3. Check the lock cam.

Q: Is the lock cam in good condition?
YES : Go to Step 4.
NO : Replace the lock cam. Refer to P.23A-348. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

STEP 4. Check the fit of the key interlock cable.

Q: Is the key interlock cable installed correctly?
YES : Go to Step 5.
NO : Install the key interlock cable correctly. Refer to P.23A-349. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

STEP 5. Check the key interlock cable.

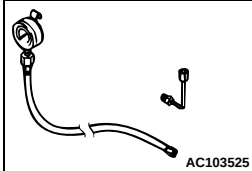
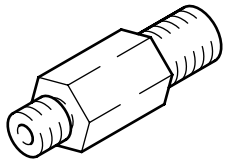
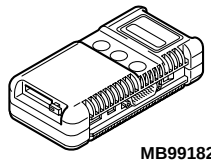
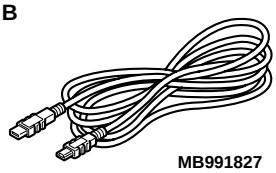
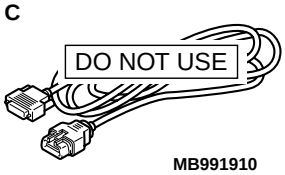
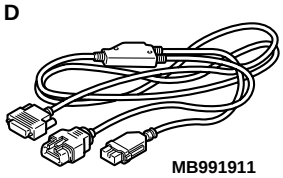
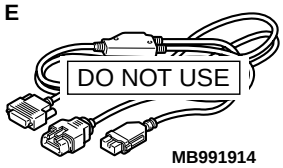
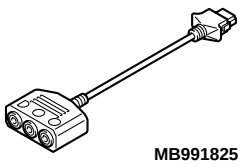
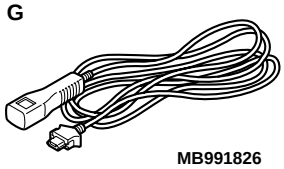
Q: Is the key interlock cable in good condition?
YES : Go to Step 6.
NO : Replace the key interlock cable. Refer to P.23A-349. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

STEP 6. Check the fit of the transaxle control cable.

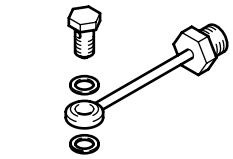
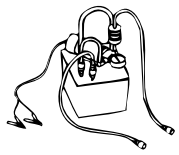
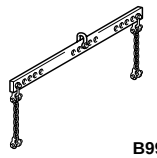
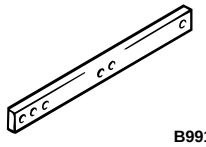
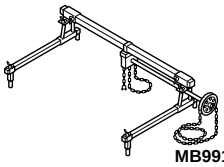
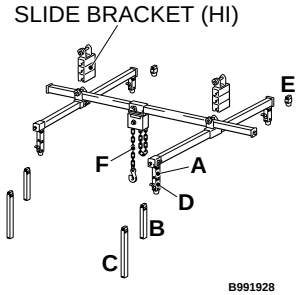
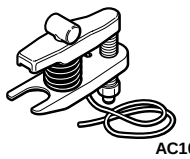
Q: Is the transaxle control cable installed correctly?
YES : Replace the steering lock cylinder assembly. Refer to P.37A-25 and P.37A-28. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.
NO : Install the transaxle control cable correctly. Refer to P.23A-346. Check that the ignition key can not be turned to the "LOCK" (OFF) position with the selector lever at any position other than "P" position.

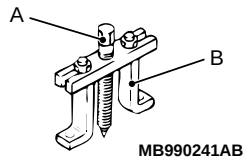
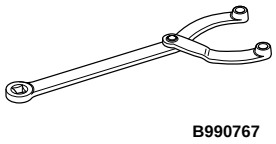
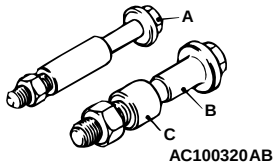
SPECIAL TOOLS

M1231000600468

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 AC103525	MD998330 (Includes MD998331) Oil pressure gauge (3.0 MPa, 427 psi)	MD998330-01	Measurement of hydraulic pressure
	MD998332 Adapter	MD998332-01	Connection for oil pressure gauge
A  MB991824 B  MB991827 C  MB991910 D  MB991911 E  MB991914 F  MB991825 G  MB991826 MB991958	MB991958 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991914 F: MB991825 G: MB991826 MUT-III sub assembly A: Vehicle communication interface (V.C.I.) B: MUT-III USB cable C: MUT-III main harness A (Vehicles with CAN communication system) D: MUT-III main harness B (Vehicles without CAN communication system) E: MUT-III main harness C (for Daimler Chrysler models only) F: MUT-III measurement adapter G: MUT-III trigger harness	MB991824-KIT *NOTE: G: MB991826 MUT-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	Checking diagnostic trouble codes **⚠ CAUTION** **MUT-III Main Harness B (MB991911) should be used. MUT-III main harness A and C should not be used for this vehicle.**

TSB Revision

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998900 Adapter	MIT220433	Connection for oil pressure gauge
	MB995062 Flushing tool	MLR-6906B or Equivalent	Flushing cooler and tube
 B991454	MB991454 Engine hanger balancer	MZ203827-01	When the engine hanger is used: Supporting the engine assembly during removal and installation of the transaxle assembly *NOTE: Special tool MB991454 is a part of engine hanger attachment set MB991453.*
 B991527	MB991527 Hanger	–	
 MB991895	MB991895 Engine hanger	–	
 B991928	MB991928 Engine hanger A: MB991929 Joint (50) ×2 B: MB991930 Joint (90) ×2 C: MB991931 Joint (140) ×2 D: MB991932 Foot (standard) ×4 E: MB991933 Foot (short) ×2 F: MB991934 Chain and hook assembly	–	
 AC106827	MB991897 Ball joint remover	MB991113-01, MB990635-01 or general service tool	Knuckle and tie rod end ball joint breakaway torque check *NOTE: Steering linkage puller(MB990635 or MB991113)is also used to disconnect knuckle and tie rod end ball joint.*

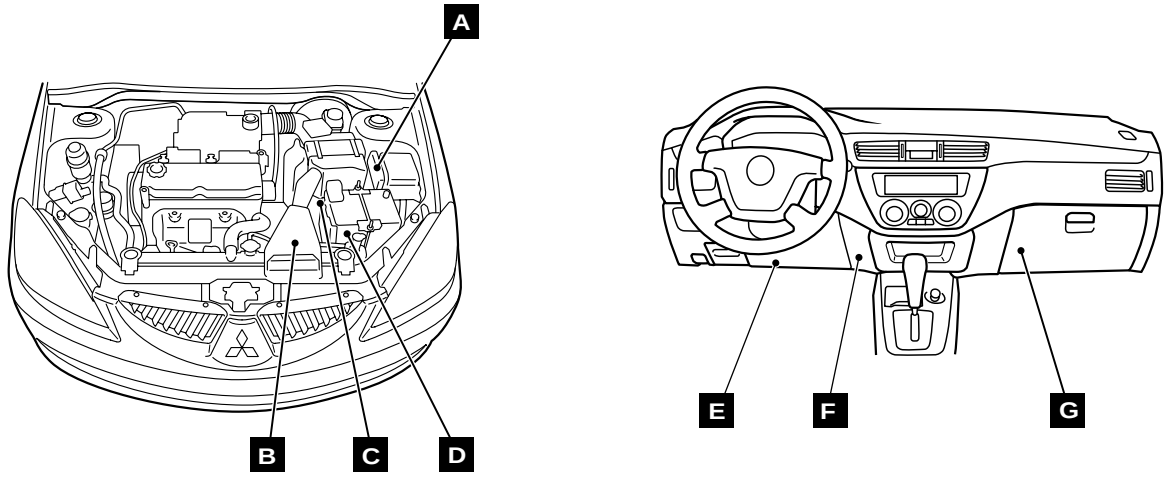
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990241 Axle shaft puller A: MB990242 Puller shaft B: MB990244 Puller bar	MB990241-01 or General service tool	Removal of the drive shaft
	MB990767 End yoke holder	MB990767-01	Fixing of the hub
	A: MB991017 B: MB990998 C: MB991000 A, B: Front hub remover and installer C: Spacer	MB990998-01	• Removal of the hub • Provisional holding of the wheel bearing • Measurement of hub starting torque • Measurement of wheel bearing end play *NOTE: MB991000, which belongs to MB990998, should be used as a spacer.*
	MB991460 Plug	General service tool	Prevention of transmission fluid drain and of entry of foreign objects

ON-VEHICLE SERVICE

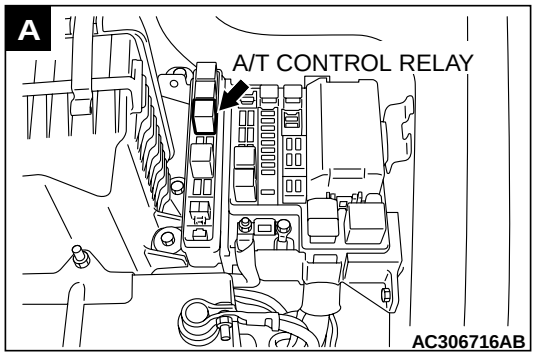
A/T CONTROL COMPONENT LAYOUT

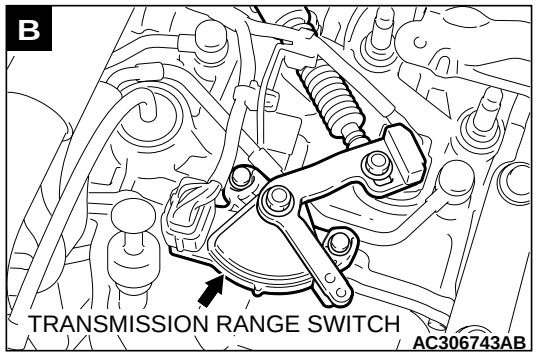
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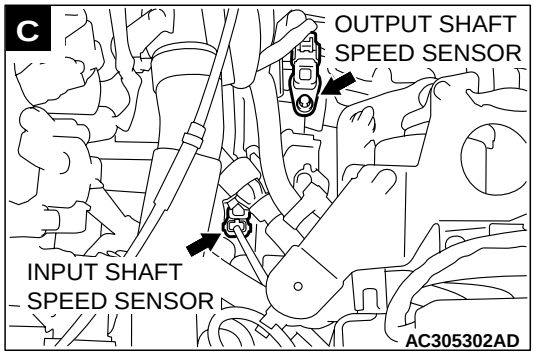
NAME	SYMBOL	NAME	SYMBOL
A/T control relay	A	Powertrain control module (PCM)	G
A/T control solenoid valves	D	Stoplight switch	E
Data link connector	F	Transmission fluid temperature sensor	D
Input shaft speed sensor	C	Transmission range switch	B
Output shaft speed sensor	C		

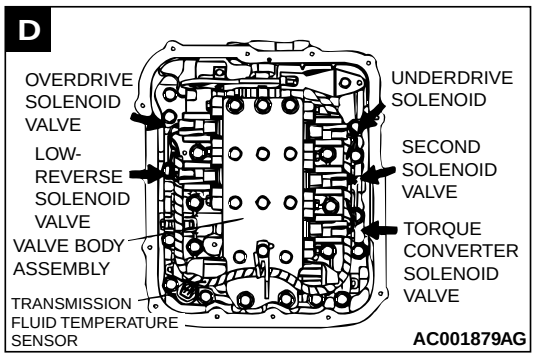


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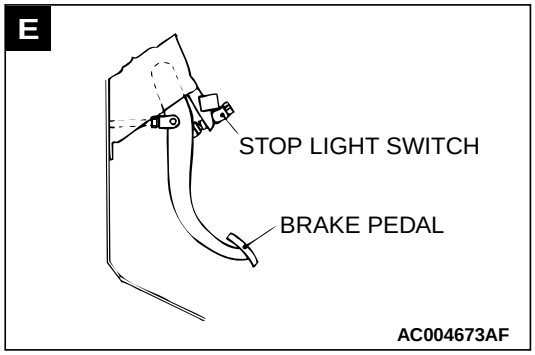


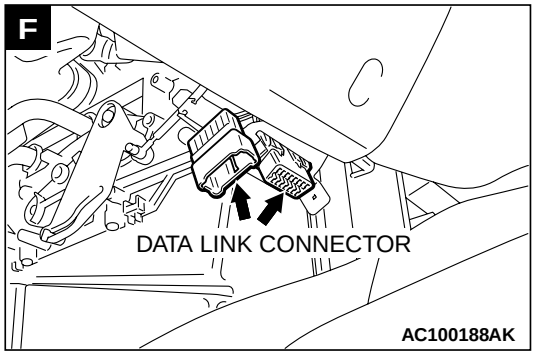


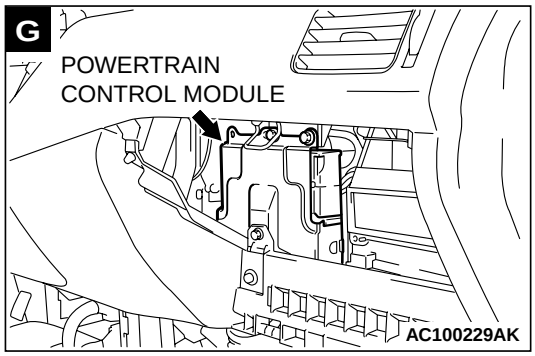




TSB Revision







ESSENTIAL SERVICE

TRANSMISSION FLUID CHECK

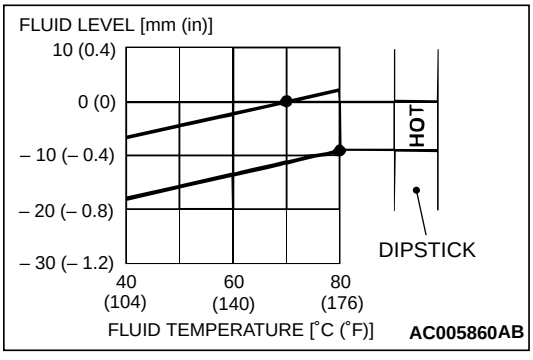
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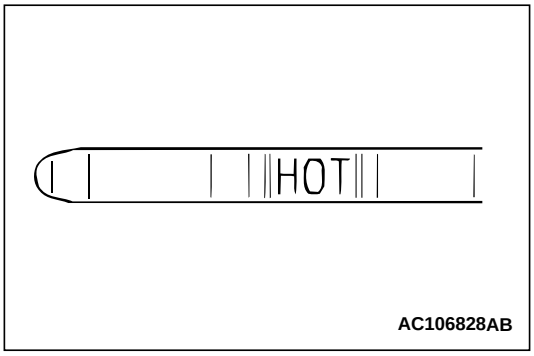
1. Drive the vehicle until the transmission fluid temperature rises to the normal operating temperature [70 – 80°C (158 – 176°F)].

   NOTE: The transmission fluid temperature is measured with scan tool MB991958 (MUT-III sub assembly).

   NOTE: If it takes some amount of time until the transmission fluid reaches its normal operating temperature [70 – 80°C (158 – 176°F)], check the transmission 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 transmission fluid.

   NOTE: If the transmission fluid smells as if it is burnt, it means that the transmission fluid has been contaminated by fine particles from the bushings and friction materials. Transaxle overhaul and cooler line flushing may be necessary.





5. Check transmission fluid level is at the "HOT" mark on the dipstick. If the transmission fluid level is less than this, add DIAMOND ATF SP III until the level reaches the "HOT" mark.

   NOTE: If the transmission fluid level is too low, the oil pump will draw in air along with the transmission fluid, which will cause to form bubbles. If the transmission fluid level is too high, rotating components inside the transaxle will churn the fluid and air into a foamy liquid. Both conditions (level too low or too high) will 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. Also, foaming can cause transmission fluid to escape from the transaxle vent where it may be mistaken for a leak.
6. Securely insert the dipstick.

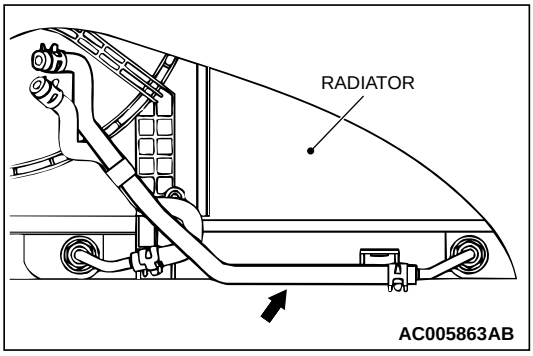
   NOTE: The transmission fluid should always be replaced under the following conditions:

   - *When troubleshooting the transaxle.*
   - *When overhauling the transaxle.*
   - *When the transmission fluid is noticeably dirty or burnt (driving under severe conditions).*

TRANSMISSION FLUID CHANGE

M1231021500080

If you have an transmission fluid changer, use this changer to replace the transmission fluid. If you do not have an transmission fluid changer, replace the transmission fluid by the following procedure.



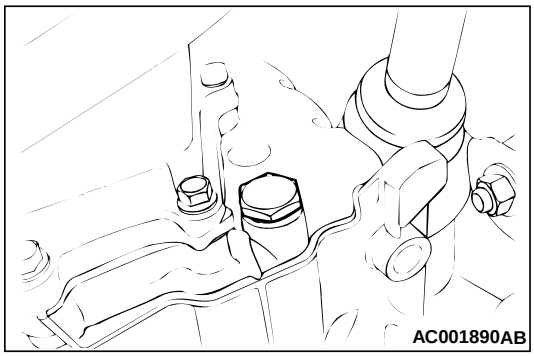
1. Disconnect the hose shown in the illustration which connects the transaxle and the oil cooler (inside the radiator). Place a container under the hose to collect the discharge.

⚠ CAUTION

The engine should be stopped within one minute after it is started. If all the transmission fluid has drained out before then, the engine should be stopped at that point.

2. Start the engine and let the transmission fluid drain out. (Running conditions: "N" range with engine idling)

   Approximately 3.5 dm^3 (3.7 quarts) of transmission fluid should be removed.


AC001890AB

3. Remove the drain plug from the bottom of the transaxle case to drain the transmission fluid.

   Approximately 2.0 dm^3 (2.1 quarts) of transmission fluid should be removed.

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 transmission fluid can not be added.

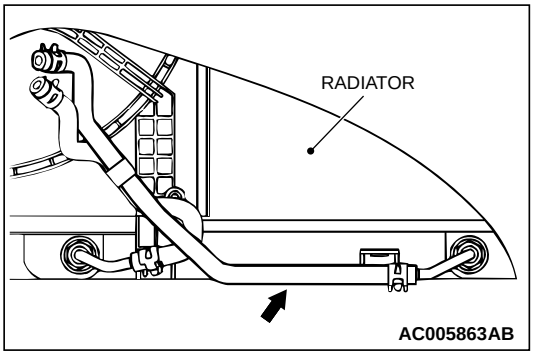
5. Add new transmission fluid (DIAMOND ATF SP III) through the oil filter tube.

   Approximately 5.5 dm^3 (5.8 quarts) of transmission fluid should be added.

6. Repeat the procedure in Step 2. (to pump out the rest of the contaminated transmission fluid)
7. Add new transmission fluid (DIAMOND ATF SP III) through the oil filter tube.

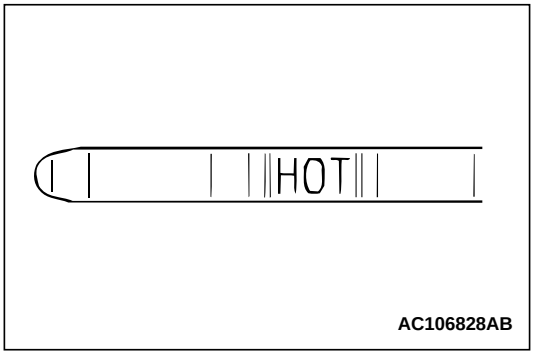
   Approximately 3.5 dm^3 (3.7 quarts) of transmission fluid should be added.

   NOTE: Check for contamination or a burnt odor. If the transmission fluid is still contaminated or burnt, repeat Steps 6 and 7 before proceeding to Step 8.



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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.

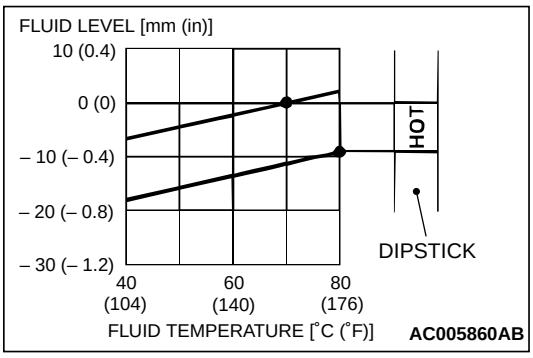


AC106828AB

11. Check that the transmission fluid level is at the "COLD" mark on the dipstick. If the level is less than this, add transmission fluid.
12. Drive the vehicle until the transmission fluid temperature rises to the normal operating temperature [70 – 80°C (158 – 176°F)], and then check the transmission fluid level again. The transmission fluid level must be at the "HOT" mark.

    NOTE: The transmission fluid temperature is measured with scan tool MB991958 (MUT-III sub assembly).

    NOTE: The "COLD" level is for reference only; the "HOT" level should be regarded as the standard level.



NOTE: If it takes some amount of time until the transmission fluid reaches its normal operating temperature [70 – 80°C (158 – 176°F)], check the transmission fluid level by referring to the left diagram.

13. When the transmission fluid is less than the specified level, add transmission fluid.
    When the transmission fluid is greater than the specified level, drain the excess fluid through the drain plug to adjust the transmission fluid to the specified level.
14. Firmly insert the dipstick into the oil filler tube.

FLUSHING COOLERS AND TUBES

M1231013000369

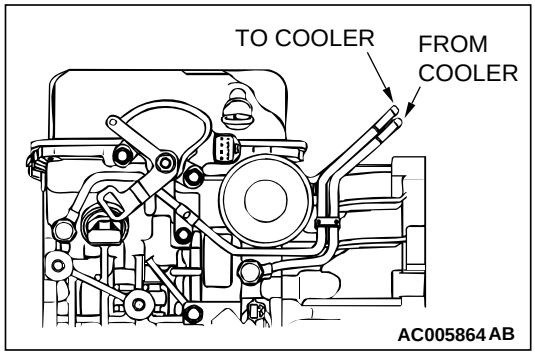
Required Special Tool:
MB995062: Flushing Tool

⚠ WARNING

- ***Wear protective eyewear that meets the requirements of ANSI Z87.1 – 1968 and OSHA. 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 eyes or skin. If it does, flush 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 transmission 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 transmission 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 special tool MB995062 Flushing Tool. 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 with 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 the filler plug on special tool MB995062.
3. Verify that 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.

5. Connect the pressure line to the OUTLET line (from cooler).
6. Connect the return line to the INLET line (to cooler).
7. Turn the pump "ON" for two to three minutes to flush the cooler(s) and lines. Monitor the pressure readings. 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(s).
8. Turn the pump "OFF."
9. Disconnect the suction line from the reservoir at the cover plate. Disconnect the 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(s) and lines. Turn the pump "OFF."
11. Place the suction line into a one quart container of DIAMOND ATF SP III or equivalent transmission fluid.
12. Turn the pump "ON" until all transmission fluid is removed from the one quart container and lines. This purges any residual cleaning solvent from the transaxle cooler(s) 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.

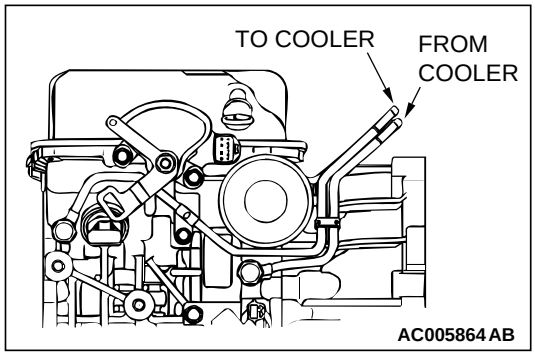
OIL COOLER FLOW CHECK

M1231013100236

After the new or repaired transaxle has been installed, fill to the proper level with DIAMOND ATF SP III. The flow should be checked using the following procedure:

⚠ CAUTION

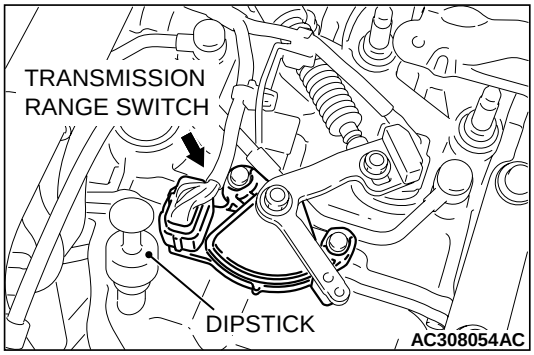
With the fluid set at the proper level, transmission fluid collection should not exceed one quart or internal damage to the transaxle may occur.

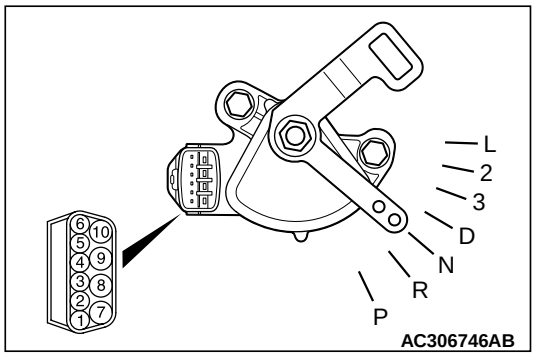


1. Disconnect the OUTLET line (from cooler) at the transaxle and place a collecting container under the disconnected line.
2. Run the engine at curb idle speed with the shift selector in neutral.
3. If transmission fluid flow is intermittent or it takes more than 20 seconds to collect one quart of transmission fluid, replace the cooler.
4. If flow is within acceptable limits, reconnect the cooler line. Then fill the transaxle to the proper level, using DIAMOND ATF SP III.

TRANSMISSION RANGE SWITCH CHECK

M1231021600162

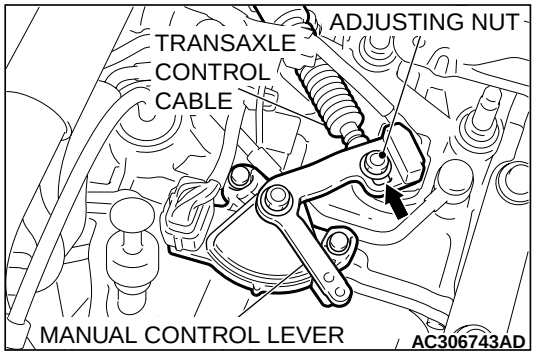




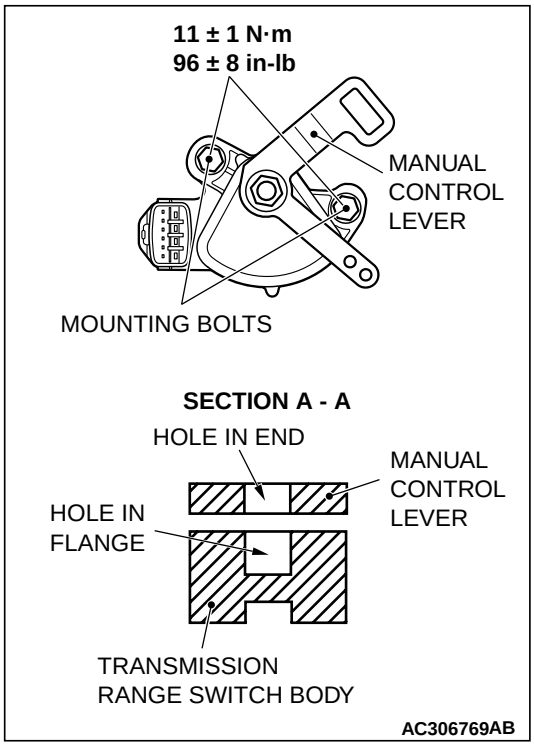
TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	3 – 8, 9 – 10	Less than 2 ohms.
R	7 – 8	
N	4 – 8, 9 – 10	
D	1 – 8	
3	5 – 8	
2	2 – 8	
L	6 – 8	

TRANSMISSION RANGE SWITCH AND CONTROL CABLE ADJUSTMENT

M1231021700084



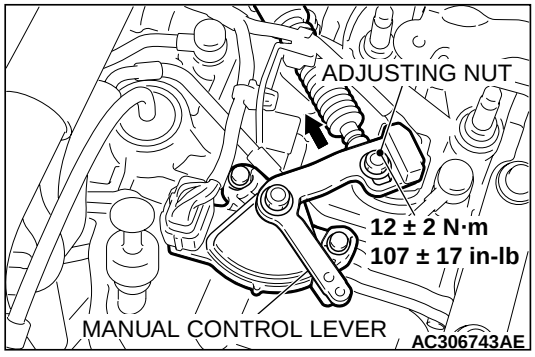
1. Set the selector lever to the "N" position.
2. Loosen the control cable to the manual control lever coupling nut to free the cable and lever.
3. Set the manual control lever to the neutral position.



4. Loosen the transmission range 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 transmission range switch body flange are aligned.

   NOTE: The transmission range switch body can be aligned by inserting a 5-mm diameter steel bar into the end hole of the manual control lever and the flange hole of the transmission range switch body.
5. Tighten the transmission range 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 push 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 (107 ± 17 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 using scan tool MB991958 (MUT-III sub assembly).

AUTOMATIC TRANSAXLE CONTROL COMPONENT CHECK

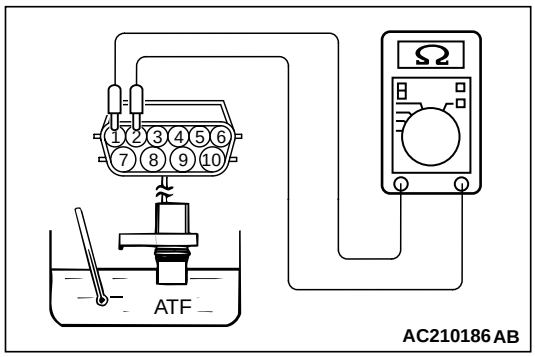
CRANKSHAFT POSITION SENSOR CHECK

M1231009000377

Refer to GROUP 13A, Diagnosis – Inspection Procedure Using an Oscilloscope P.13A-880.

TRANSMISSION FLUID TEMPERATURE SENSOR CHECK

M1231021800081



1. Remove the transmission fluid temperature sensor.
2. Measure the resistance between terminals 1 and 2 of the transmission fluid temperature sensor connector.

Standard value:

TRANSMISSION 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. If the transmission fluid temperature sensor resistance is outside the specified range, replace the transmission fluid temperature sensor.

TRANSMISSION RANGE SWITCH CHECK

M1231021600173

Refer to P.23A-339.

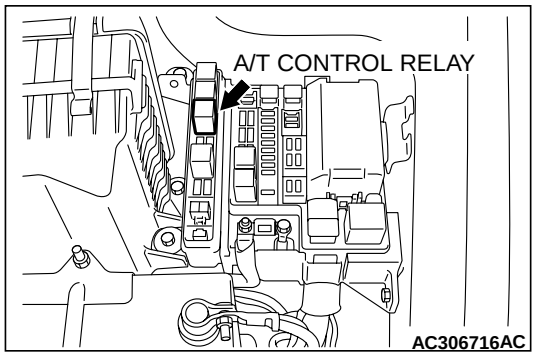
STOPLIGHT SWITCH CHECK

M1231009100211

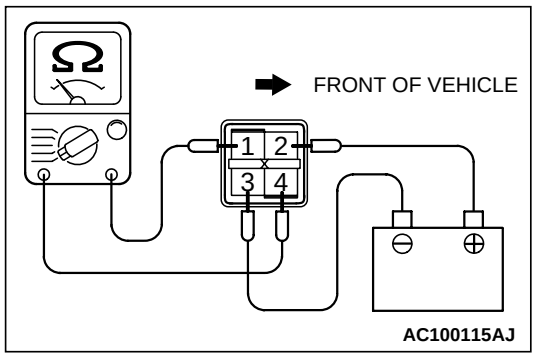
Refer to GROUP 35A, Brake Pedal – Brake Pedal Inspection P.35A-35.

A/T CONTROL RELAY CHECK

M1231009300260



1. Remove the A/T control relay.



2. Use jumper wires to connect A/T control relay terminal 3 to the negative battery terminal and terminal 2 to the positive battery terminal.
3. Check for continuity between A/T control relay terminals 1 and 4 when the jumper wires are connected to and disconnected from the battery.

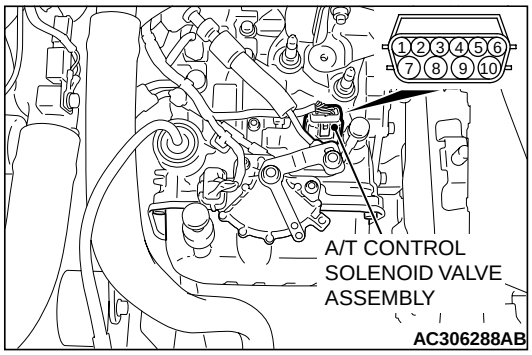
JUMPER WIRE	CONTINUITY BETWEEN TERMINALS NO.1 AND NO.4
Connected	Continuity
Disconnected	No continuity

4. If there is any problem with the A/T control relay, replace it.

SOLENOID VALVE CHECK

M1231009400289

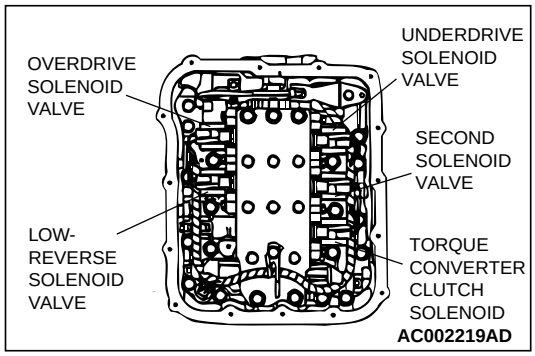
1. Use scan tool MB991958 (MUT-III sub assembly) to measure the transmission fluid temperature. The desired transmission fluid temperature setting for performing the solenoid valve check is 20°C (68°F).
2. Remove the A/T control solenoid valve assembly connector.
3. Measure the resistance between the solenoid valve terminals.
4. The measured resistance of the solenoid valve when the transmission fluid temperature is 20°C (68°F) should match the specified resistance on the chart below.



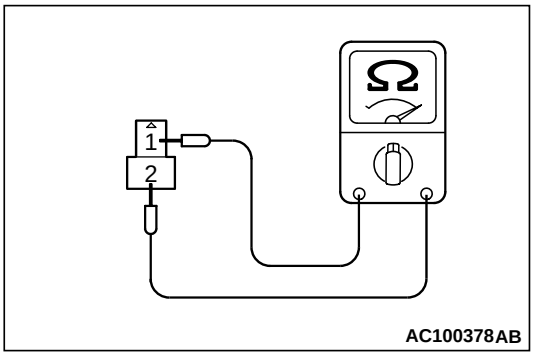
Specified resistance:

TERMINAL NO.	NAME	RESISTANCE
7 - 10	Torque converter clutch solenoid valve	2.7 – 3.4 Ω [at 20°C (68°F)]
6 - 10	Low-reverse solenoid valve	
4 - 9	Second solenoid valve	
3 - 9	Underdrive solenoid valve	
5 - 9	Overdrive solenoid valve	

5. If the solenoid valve resistance is within the specified range, check the power supply and the ground circuits.
6. If the solenoid valve resistance is not within the specified range, drain the transmission fluid and remove the valve body cover.



7. Disconnect the connector of any solenoid valves that are not within the specified range.



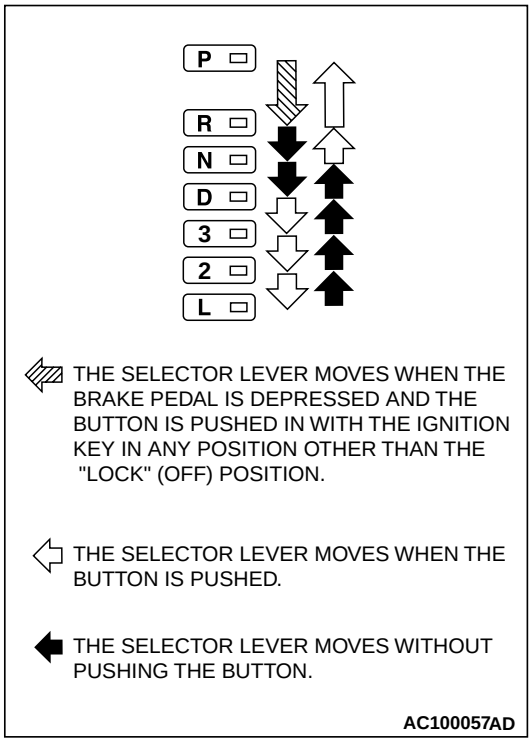
8. Measure the resistance between terminals 1 and 2 of any solenoid valve that was not within the specified range.

   Specified resistance: 2.7 – 3.4 Ω [at 20°C (68°F)]

9. If the resistance is not within the specified range, replace the solenoid valve.
10. If the resistance is within the specified range, check the wiring harness between the affected A/T control solenoid valve assembly and the solenoid valve. If a problem is not found in the above steps, check the solenoid valve O-rings and replace them if necessary.

SELECTOR LEVER OPERATION CHECK

M1231001300448



1. Apply the parking brake, and check that the selector lever moves smoothly and accurately to each position.
2. Check that the engine starts when the selector lever is in 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 the "N" position to the "D", "3", "2" or "L" position, and that the vehicle reverses when the selector lever is moved to the "R" position.
4. Stop the engine.
5. Turn the ignition switch to the "ON" position, and check that the backup lamp illuminates when the selector lever is shifted from the "P" to the "R" position.

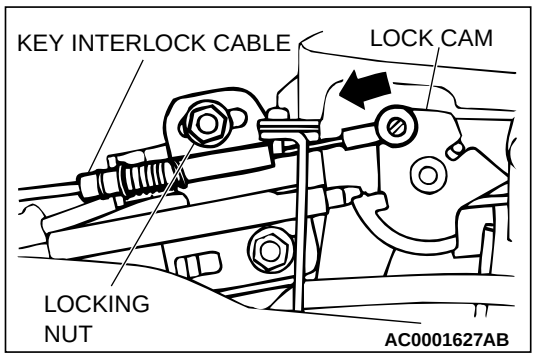
   NOTE: The A/T mis-operation prevention mechanism prevents movement of the selector lever from the "P" position if the ignition switch is in a position other than "LOCK" (OFF) and the brake pedal is not depressed.

KEY INTERLOCK MECHANISM CHECK

M1232000900332

1. Perform the following inspection.

INSPECTION PROCEDURE	INSPECTION REQUIREMENTS	KEY INTERLOCK (NORMAL OPERATION)	
1	Brake pedal: Depressed	Ignition key position: "LOCK" (OFF) or removed	Unable to push in the selector lever push button and move the lever out of the "P" position.
2		Ignition key position: "ACC"	Able to push in the selector lever push button, move the lever out of the "P" position, and shift to any position.
3	Brake pedal: Not depressed	Selector lever: Other than "P" position	Unable to turn the ignition key to the "LOCK" (OFF) position.
4		Selector lever: "P" position	Able to turn the ignition key to the "LOCK" (OFF) position.



2. When any of the above checks are not normal, adjust the key interlock cable by following procedure.
   (1) Remove the floor console. (Refer to GROUP 52A – Front floor console P.52A-8.)
   (2) Shift the selector lever to "P" position.
   (3) Turn the ignition key to the "LOCK" (OFF) position.
   (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.

   Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)

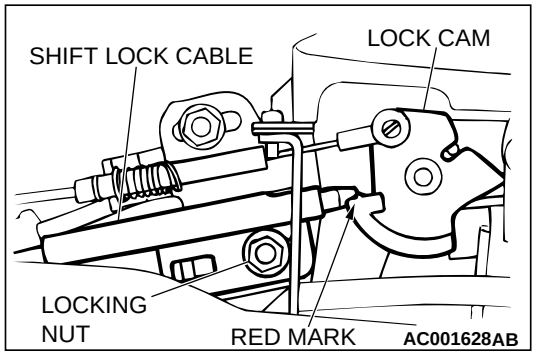
   (6) Install the floor console. (Refer to GROUP 52A – Front floor console P.52A-8.)
3. After adjusting, check the operation once more. If the operation is still incorrect, replace the key interlock cable. (Refer to P.23A-349.)

SHIFT LOCK MECHANISM CHECK

M1232001000321

1. Perform the following inspections.

INSPECTION PROCEDURE	INSPECTION REQUIREMENTS		CHECK DETAILS (NORMAL OPERATION)
1	Brake pedal: Not depressed	Ignition key position: "ACC"	When the selector lever push button is depressed, the selector lever can not be shifted out of the "P" position.
2	Brake pedal: Depressed		When the selector lever push button is depressed, the selector lever can be shifted smoothly to other positions.
3	Brake pedal: Not depressed		When the selector lever push button is depressed, the selector lever can be shifted smoothly from the "R" position to the "P position.



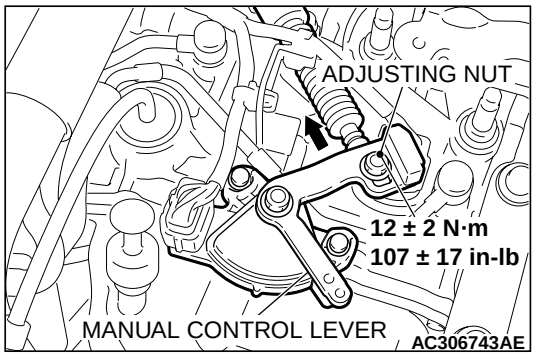
2. When any of the above shift lock inspection procedures fail, adjust the shift lock cable as follows:
   (1) Remove the flont floor console assembly. (Refer to GROUP 52A – Front Floor Console P.52A-8.)
   (2) Shift the selector lever to the "P" position.
   (3) Loosen the lock nut on the shift lock cable.
   (4) Adjust the cable so that the end of the shift lock cable is above the red line on the lock cam and tighten the locknut.

   Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)

   (5) After adjusting, retest the shift lock cable operation. Replace the shift lock cable if it does not operate properly. (Refer to P.23A-349.)
   (6) Install the flont floor console assembly. (Refer to GROUP 52A – Front Floor Console P.52A-8.)

TRANSAXLE CONTROL CABLE ADJUSTMENT

M1231028000086



1. Move the selector lever to the "N" position.
2. Loosen the upper control lever adjusting nut.
3. Gently push the transaxle control cable in the direction of the arrow, and then tighten the adjusting nut.

   Tightening torque: 12 ± 2 N·m (107 ± 17 in-lb)

4. Check that the transaxle shifts to the correct range corresponding to the position of the selector lever, and that it functions correctly in that range.

TRANSAXLE CONTROL

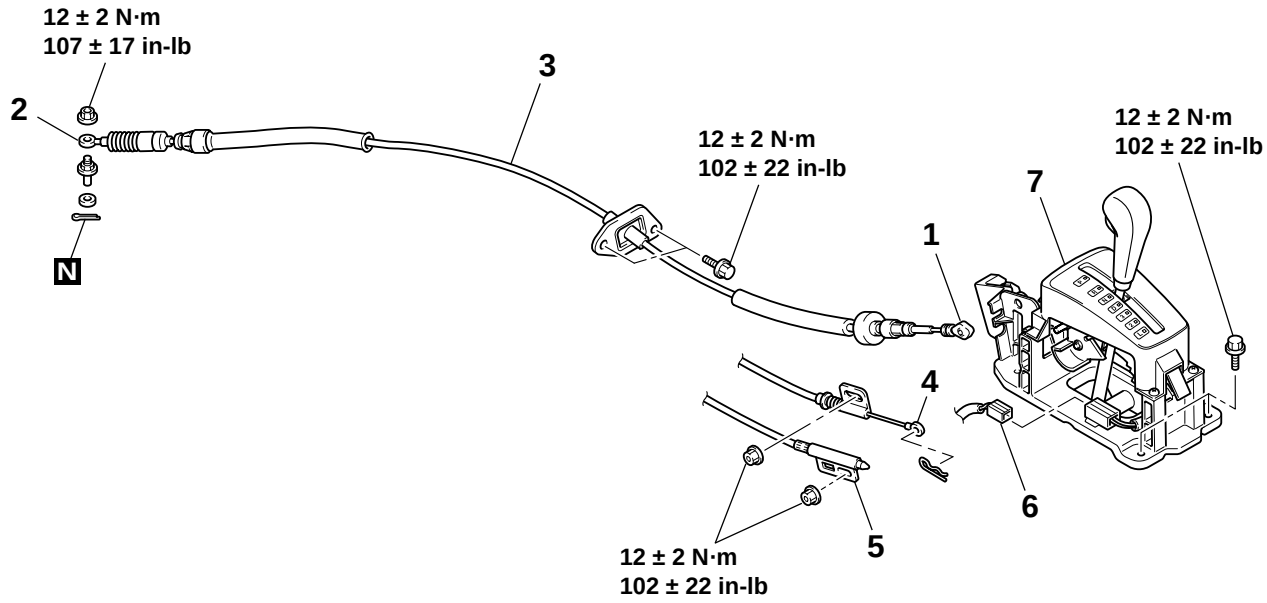
REMOVAL AND INSTALLATION

M1231006600381

⚠ ***WARNING***

When removing and installing the transaxle control cable, key interlock cable and shift lock cable, be careful not to hit 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.
- Front Floor Console Removal and Installation (Refer to GROUP 52A, Front Floor Console P.52A-8.)
- Selector Lever Operation Check (Refer to P.23A-343.)



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TRANSAXLE CONTROL CABLE REMOVAL STEPS
- SHIFT THE SELECTOR LEVER TO "N" POSITION.

1. TRANSAXLE CONTROL CABLE CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)

>>C<< 2. TRANSAXLE CONTROL CABLE CONNECTION (TRANSAXLE SIDE)
- SRS-ECU (REFER TO GROUP 52B, SRS CONTROL UNIT P.52B-202.)
- HEATER/COOLER UNIT (REFER TO GROUP 55, HEATER/COOLER UNIT, HEATER CORE AND EVAPORATOR P.55-108.)

3. TRANSAXLE CONTROL CABLE

SELECTOR LEVER ASSEMBLY REMOVAL STEPS

1. TRANSAXLE CONTROL CABLE CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)

>>B<< 4. KEY INTERLOCK CABLE CONNECTION (SELECTOR LEVER SIDE)

>>A<< 5. SHIFT LOCK CABLE CONNECTION (SELECTOR LEVER SIDE)

6. A/T SELECTOR LEVER POSITION ILLUMINATION LIGHT CONNECTOR

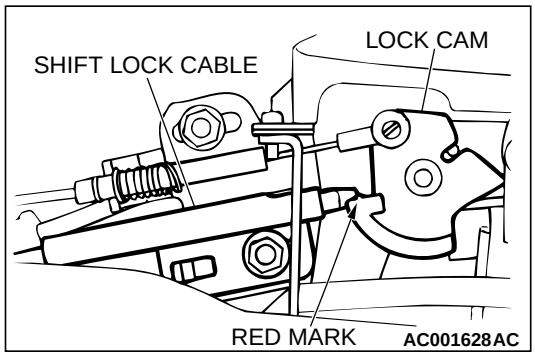
7. SELECTOR LEVER ASSEMBLY

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INSTALLATION SERVICE POINT

>>A<< SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

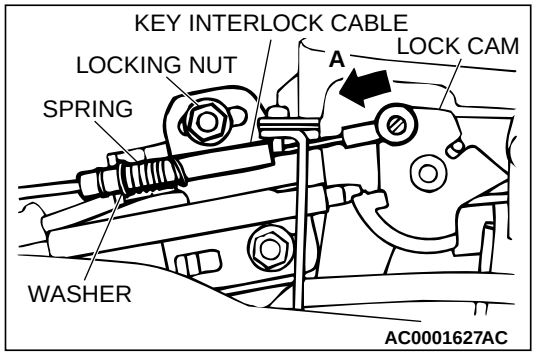
1. Shift the selector lever to the "P" position.
2. Fasten the shift lock cable at the position where the end of the shift lock cable is above the red line on the lock cam.



>>B<< KEY INTERLOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Shift the selector lever to the "P" position.
2. Turn the ignition key to the "LOCK" (OFF) position.
3. Slide the washer and spring toward the lock cam, insert the cable into the stand off bracket and release the spring.
4. Lightly push the key interlock cable into the key interlock cable housing toward the arrow (A) direction until the cable movement stops and the cable end eye is aligned with the shaft on the lock cam. Tighten the lock nut. Snap the cable end eye onto the shaft of the lock cam.

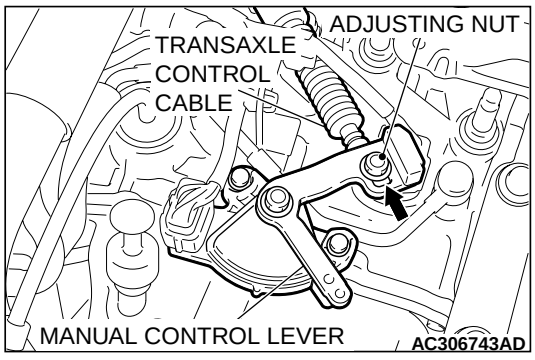
   Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)



>>C<< TRANSAXLE CONTROL CABLE (TRANSAXLE SIDE) INSTALLATION

1. Place the transaxle manual control lever in the "N" position.
2. Place the selector lever in the "N" position.
3. Place the cable stud into the manual control lever slot and install the nut loosely. Gently pull the transaxle control cable into the manual control lever slot until the cable is taut. Tighten the nut to the specified torque.

   Tightening torque: 12 ± 2 N·m (107 ± 17 in-lb)



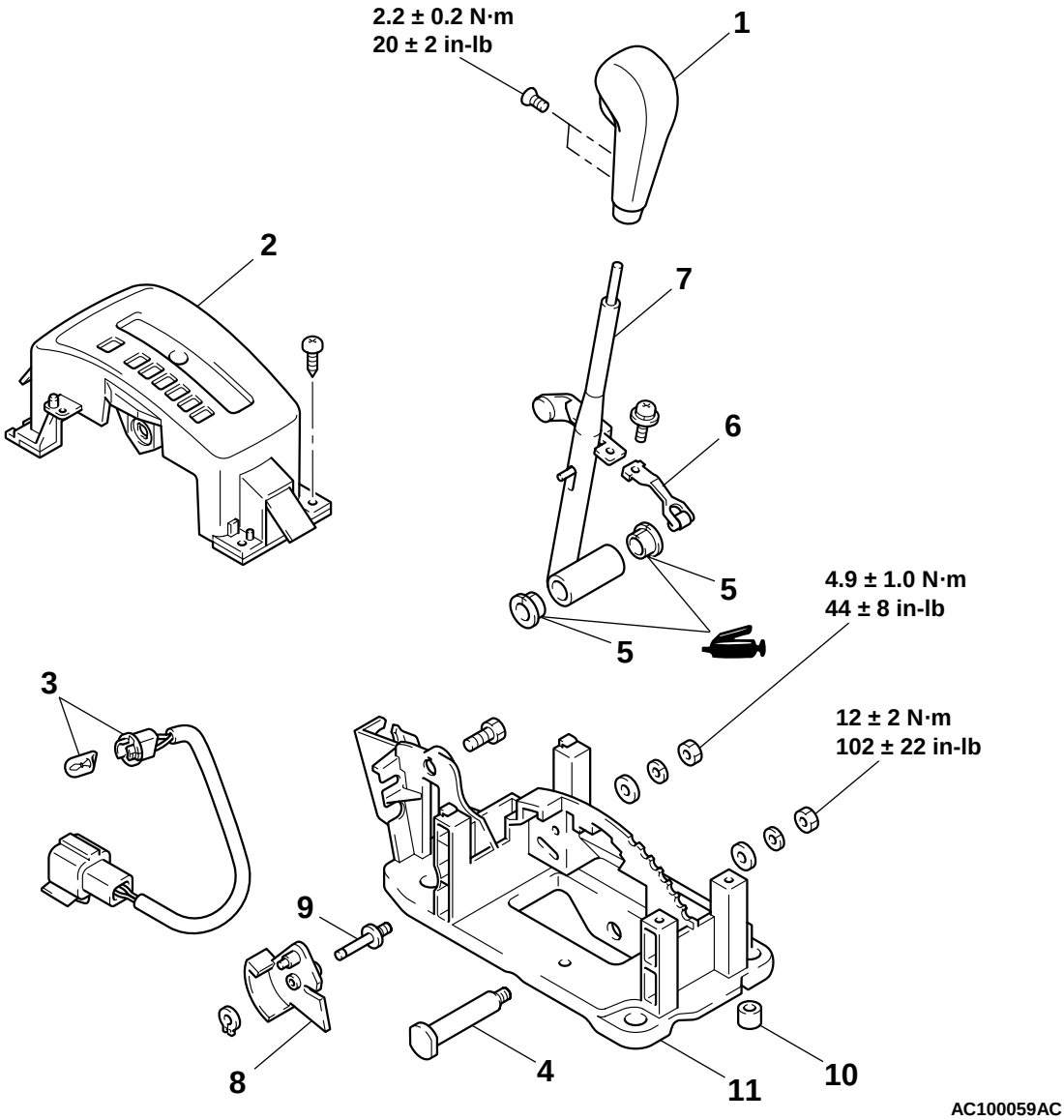
INSPECTION

M1231030000146

Check the cable assembly for function and for damage.

DISASSEMBLY AND ASSEMBLY

M1231006800385



REMOVAL STEPS

1. SHIFT KNOB
2. INDICATOR PANEL ASSEMBLY
3. POSITION ILLUMINATION LIGHT ASSEMBLY
4. BOLT
5. BUSHING

REMOVAL STEPS (Continued)

6. DETENTE SPRING
7. LEVER SUB ASSEMBLY
8. LOCK CAM
9. LOCK CAM PIN
10. COLLAR
11. BASE BRACKET

A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS

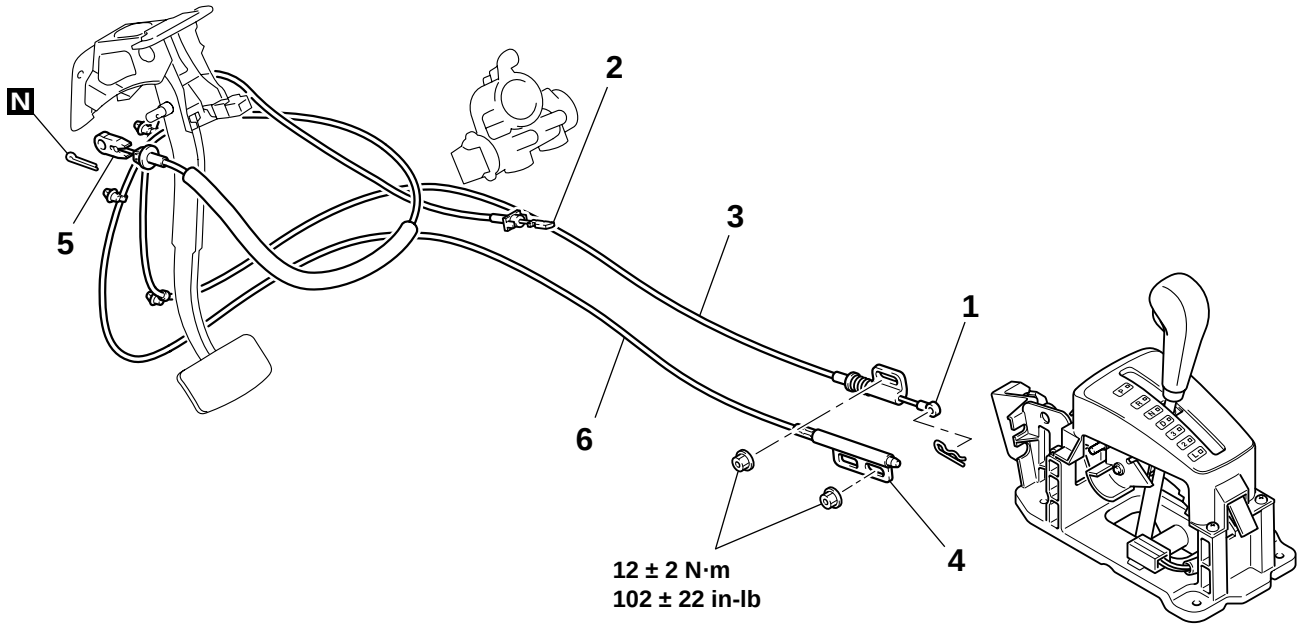
REMOVAL AND INSTALLATION

M1232001200488

⚠ ***WARNING***

When removing and installing the key interlock cable and shift lock cable, be careful not to hit the SRS-ECU.

Pre-removal and Post-installation Operation
Floor Console Removal and Installation (Refer to GROUP 52A, Floor Console P.52A-8.)



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KEY INTERLOCK CABLE REMOVAL STEPS

>>C<< 1. KEY INTERLOCK CABLE CONNECTION (SELECTOR LEVER SIDE)
- UNDER COVER (REFER TO GROUP 52A, INSTRUMENT PANEL ASSEMBLY P.52A-3.)

<<A>> >>B<< 2. KEY INTERLOCK CABLE CONNECTION (STEERING LOCK CYLINDER SIDE)

3. KEY INTERLOCK CABLE

SHIFT LOCK CABLE REMOVAL STEPS

>>A<< 4. SHIFT LOCK CABLE CONNECTION (SELECTOR LEVER SIDE)
- UNDER COVER (REFER TO GROUP 52A, INSTRUMENT PANEL ASSEMBLY P.52A-3.)

5. SHIFT LOCK CABLE CONNECTION (BRAKE PEDAL SIDE)

6. SHIFT LOCK CABLE

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REMOVAL SERVICE POINT

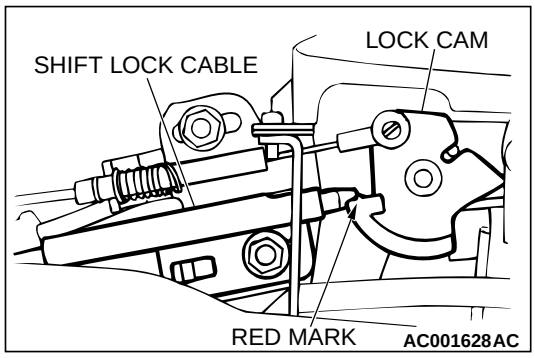
<<A>> KEY INTERLOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

Turn the ignition key to the "LOCK" (OFF) position and pull out the key interlock cable.

INSTALLATION SERVICE POINTS

>>A<< SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Shift the selector lever in the "P" position.
2. Fasten the shift lock cable at the position where the end of the shift lock cable is positioned above the red marking on the lock cam.
3. Check the operation of the selector lever. (Refer to P.23A-343.)



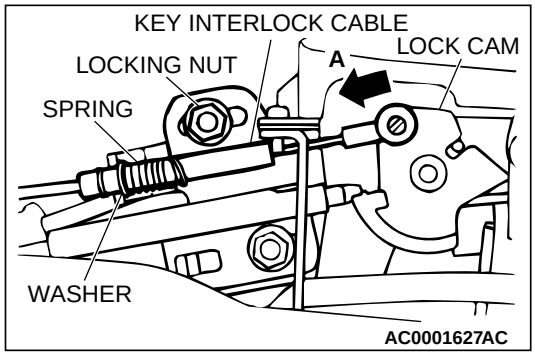
>>B<< KEY INTERLOCK CABLE (STEERING LOCK CYLINDER SIDE) INSTALLATION

Turn the ignition key to the "LOCK" (OFF) position and install the key interlock cable.

>>C<< KEY INTERLOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Shift the selector lever to the "P" position.
2. Turn the ignition key to the "LOCK" (OFF) position.
3. Slide the washer and spring toward the lock cam, insert the cable into the stand off bracket and release the spring.
4. Lightly push the key interlock cable into the key interlock cable housing toward the arrow (A) direction until the cable movement stops and the cable end eye is aligned with the shaft on the lock cam. Tighten the locking nut. Snap the cable end eye onto the shaft of the lock cam.

   Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)
5. Check the operation of the selector lever. (Refer to P.23A-343.)



INSPECTION

M1231030000157

Check the cable assembly for function and for damage.

TRANSAXLE ASSEMBLY

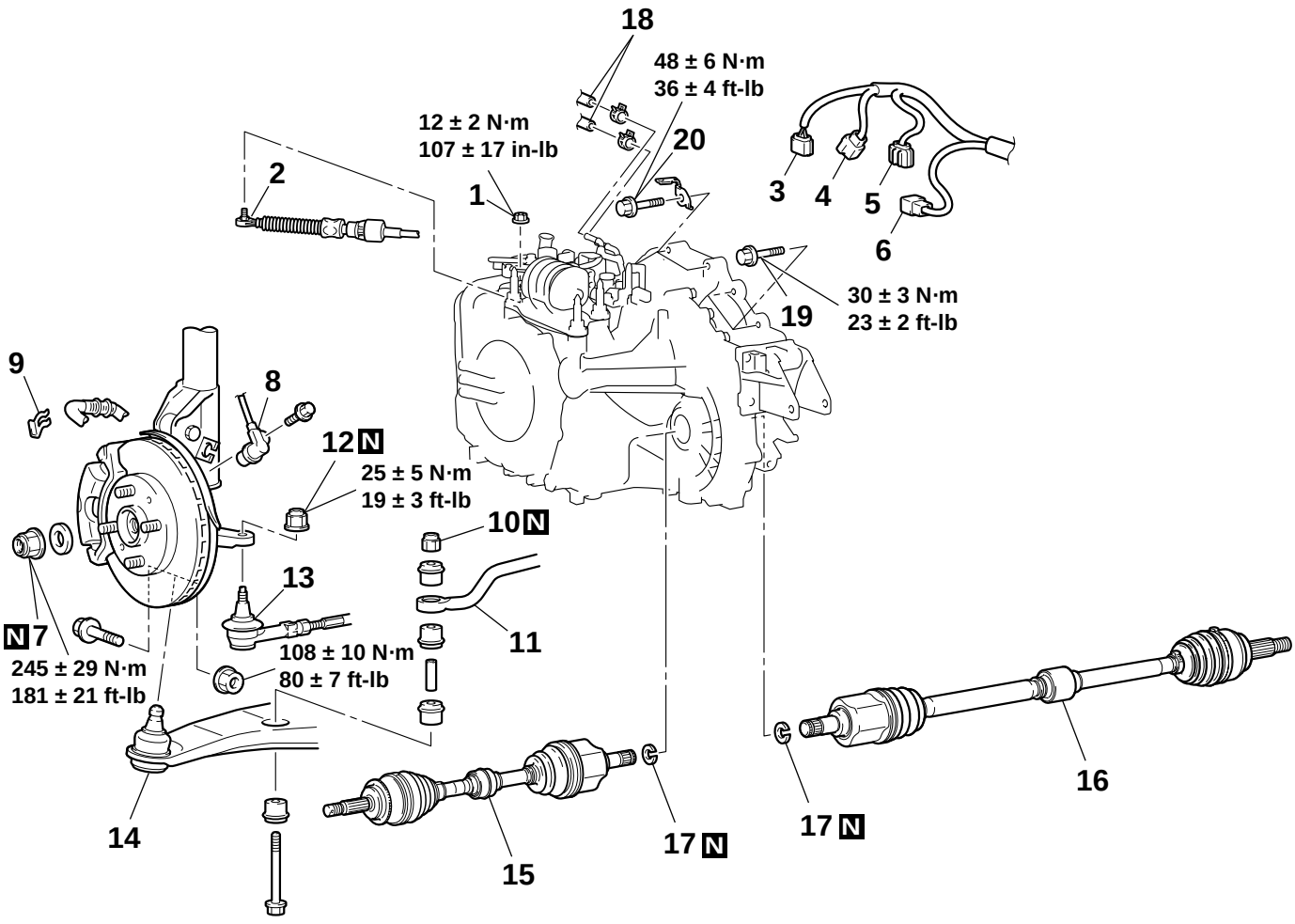
REMOVAL AND INSTALLATION

M1231005700512

⚠ 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-installation Operation	Post-installation Operation
• Front Under Cover, Side Under Cover Removal • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service P.14-25). • Transmission Fluid Draining (Refer to GROUP 00, Maintenance Service – Automatic Transaxle P.00-54). • Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-4). • Battery and Battery Tray Removal • Front Exhaust Pipe Removal (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-13).	• Front Exhaust Pipe Installation (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-13). • Battery and Battery Tray Installation • Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-4). • Transmission Fluid Supplying (Refer to GROUP 00, Maintenance Service – Automatic Transaxle P.00-54). • Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service P.14-25). • Front Under Cover, Side Under Cover Installation • Selector Lever Operation Check (Refer to P.23A-343). • Speedometer Operation Check (Refer to GROUP 54A, Combination Meter – On-vehicle Service – Speedometer Check P.54A-42). • Front Wheel Alignment Check and Adjustment (Refer to GROUP 33, On-vehicle Service – Front Wheel Alignment Check and Adjustment P.33A-7).



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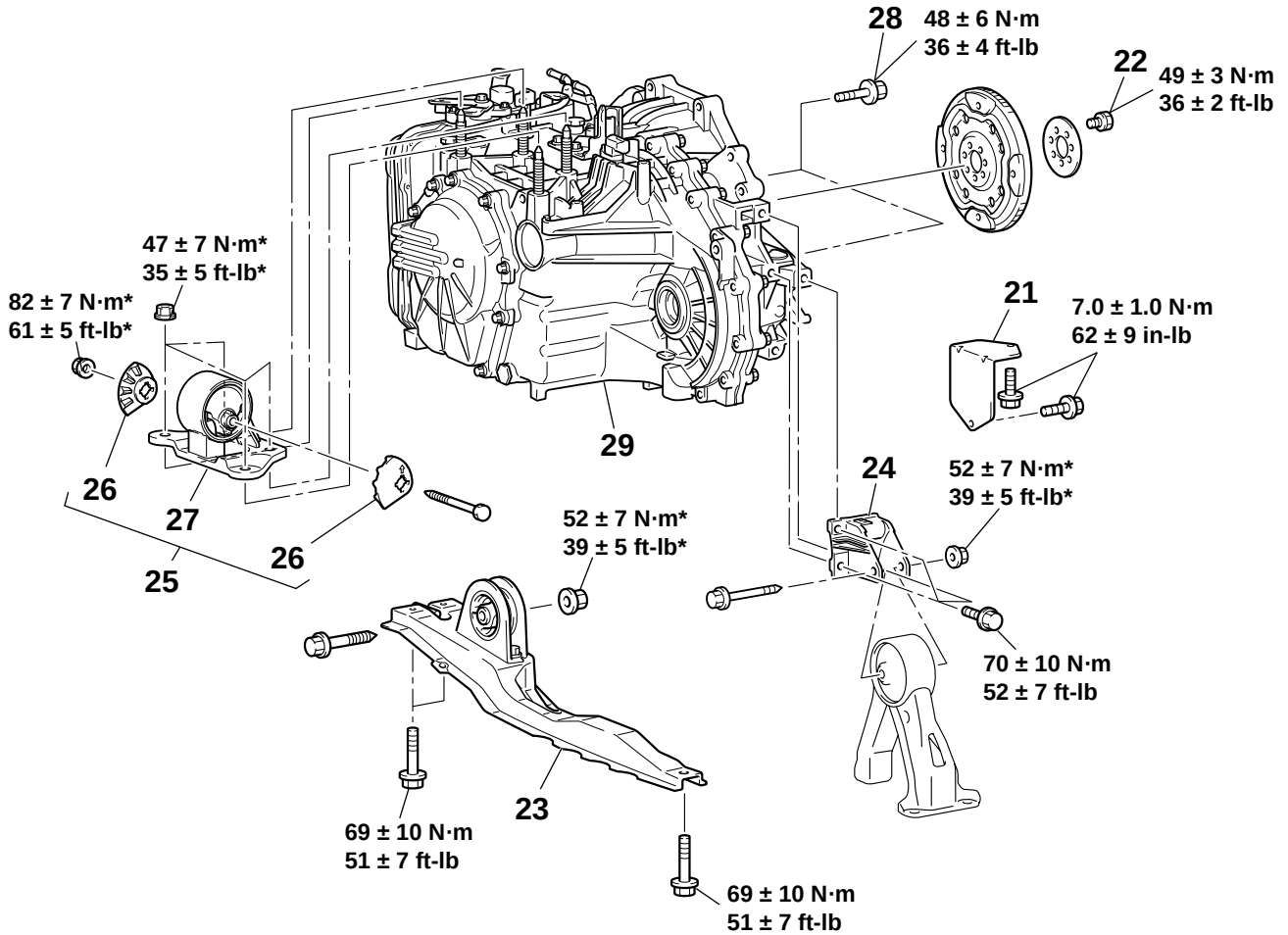
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REMOVAL STEPS

>>F<< 1. ADJUSTING NUT
>>E<< 2. TRANSAXLE CONTROL CABLE CONNECTION
3. INHIBITOR SWITCH SENSOR CONNECTOR
4. A/T CONTROL SOLENOID VALVE ASSEMBLY CONNECTOR
5. INPUT SHAFT SPEED SENSOR CONNECTOR
6. OUTPUT SHAFT SPEED SENSOR CONNECTOR
<<A>> >>E<< 7. DRIVE SHAFT NUT
8. WHEEL SPEED SENSOR
9. BRAKE HOSE CLAMP
10. SELF-LOCKING NUT (STABILIZER BAR CONNECTION)

REMOVAL STEPS (Continued)

>>D<< 11. STABILIZER LINK CONNECTION
12. SELF-LOCKING NUT (TIE ROD END CONNECTION)
<<B>> 13. TIE ROD END CONNECTION
14. LOWER ARM BALLJOINT CONNECTION
<<C>> >>C<< 15. DRIVE SHAFT <LH>
<<C>> >>C<< 16. DRIVE SHAFT <RH>
17. CIRCLIP
18. TRANSMISSION FLUID COOLER HOSE
19. STARTER MOTOR INSTALLATION BOLTS
20. TRANSAXLE ASSEMBLY UPPER PART COUPLING BOLTS



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REMOVAL STEPS

21. BELL HOUSING COVER
<<D>> 22. TORQUE CONVERTER AND DRIVE PLATE COUPLING BOLTS
23. CENTERMEMBER ASSEMBLY
24. REAR ROLL STOPPER BRACKET
- AIR CLEANER BRACKET

25. TRANSAXLE MOUNT BRACKET ASSEMBLY

REMOVAL STEPS (Continued)

>>B<< 26. TRANSAXLE MOUNT STOPPER
27. TRANSAXLE MOUNT BRACKET
<<E>>
- ENGINE ASSEMBLY SUPPORT
- LIFTING UP OF THE VEHICLE
- SUPPORT THE TRANSAXLE WITH A TRANSAXLE JACK

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REMOVAL STEPS (Continued)

28. TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLTS
>>A<< 29. TRANSAXLE ASSEMBLY

Required Special Tools:

- MB990767: End Yoke Holder
- MB991897: Ball Joint Remover
- MB990241: Axle shaft puller
- MB991017: Front Hub Remover and Installer
- MB991000: Spacer
- MB991460: Plug
- MB991527: Hanger
- MB991454: Engine Hanger Balancer (chain)
- MB991895: Engine Hanger
- MB991928: Engine Hanger
- MB991932: Foot (standard)
- MB991933: Foot (short)
- MB991930: Joint (90)
- MB991931: Joint (140)

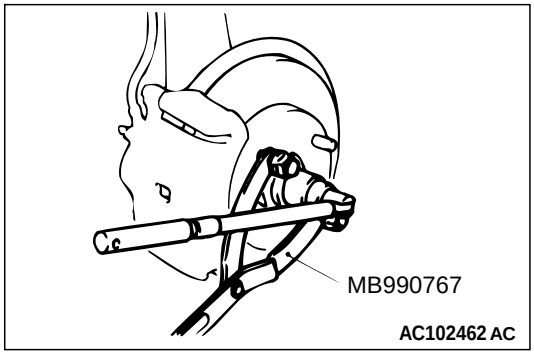
REMOVAL SERVICE POINTS

<<A>> DRIVE SHAFT NUT REMOVAL

⚠ CAUTION

Do not apply pressure to the wheel bearing by the vehicle weight to avoid possible damage when the drive shaft nut is loosened.

Use special tool MB990767 (end yoke holder) to fix the hub and remove the drive shaft nut.

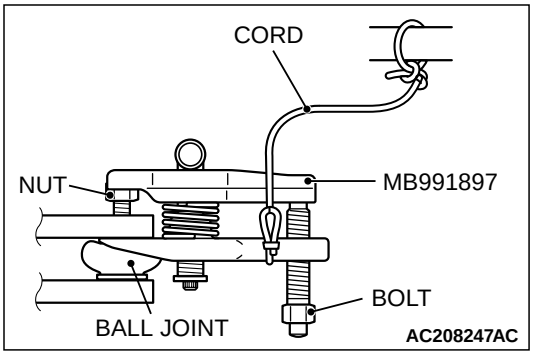


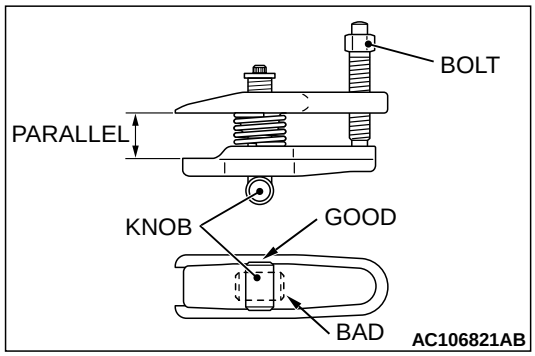
<<B>> TIE ROD END CONNECTION REMOVAL

⚠ CAUTION

- **Do not remove the nut from ball joint. Loosen it and use the special tool to avoid possible damage to ball joint threads.**
- **Hang the special tool with cord to prevent it from falling.**

1. Install special tool MB991897 (ball joint remover) as shown in the figure.

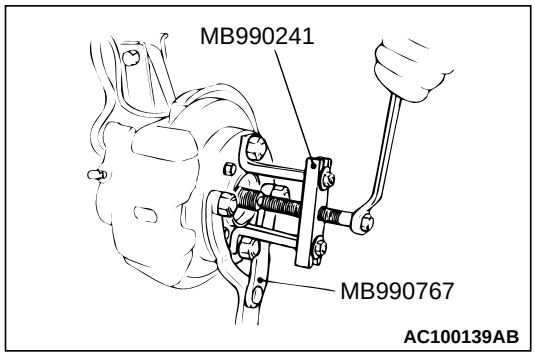




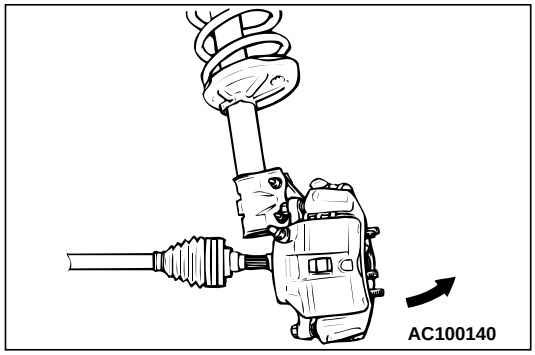
2. Turn the bolt and knob as necessary to make the jaws of special tool MB991897 (ball joint remover) parallel, tighten the bolt by hand and confirm that the jaws are still parallel.

   NOTE: When adjusting the jaws in parallel, make sure the knob is in the position shown in the figure.
3. Tighten the bolt with a wrench to disconnect the tie rod end and remove the self locking nut.

<<C>> DRIVE SHAFT/DRIVE SHAFT AND INNER SHAFT ASSEMBLY REMOVAL



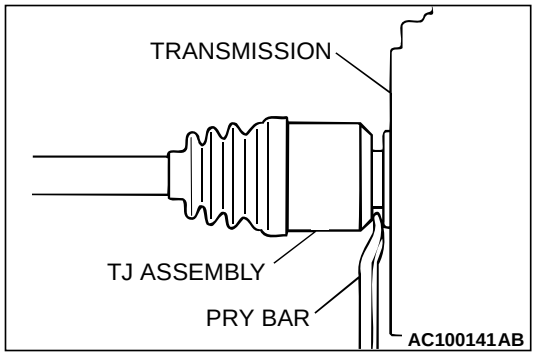
1. Use special tools MB990241 (axle shaft puller) and MB990767 (end yoke holder) to push out the drive shaft from the hub and knuckle.



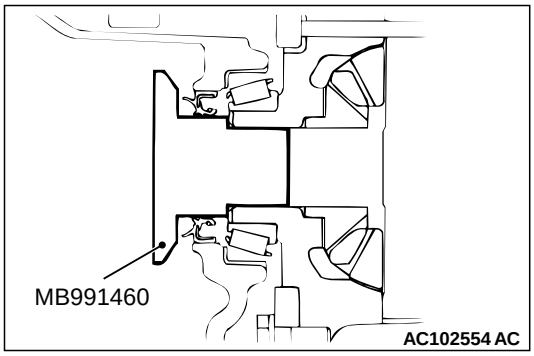
2. Remove the drive shaft from the hub by pulling the bottom of the brake disc towards you, and then remove the hub retaining bolts.

⚠ CAUTION

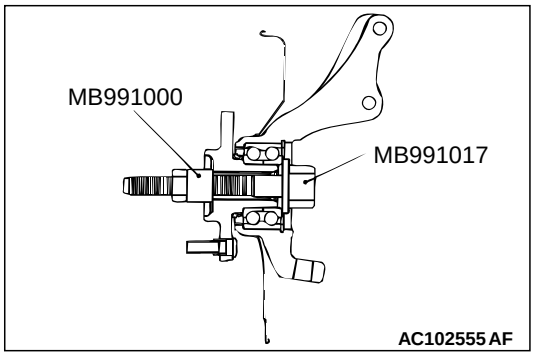
- **When pulling the drive shaft out from the transaxle, be careful that the spline part of the drive shaft does not damage the oil seal.**



3. Remove the drive shaft from the transaxle by the following procedure. Insert a pry bar between the transaxle case and the drive shaft, and then pry the drive shaft from the transaxle.



4. Use special tool MB991460 (plug) to prevent the entry of foreign material into the transaxle case.



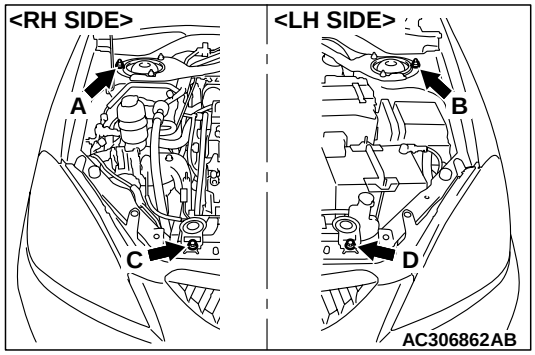
⚠ CAUTION
Do not apply pressure to the wheel bearing by the vehicle weight to avoid possible damage when the drive shaft is removed. If, however, vehicle weight must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using special tools MB991017 (front hub remover and installer) and MB991000 (spacer).

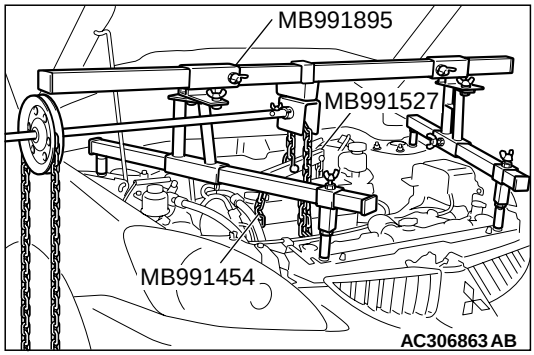
<<D>> TORQUE CONUERTER AND DRIVE PLATE COUPLING BOLTS REMOVAL

1. Remove the drive plate coupling bolts while turning the crank shaft.
2. Pry the torque converter towards the transaxle side. Remove the torque converter with the transaxle.

<<E>> ENGINE ASSEMBLY SUPPORTING

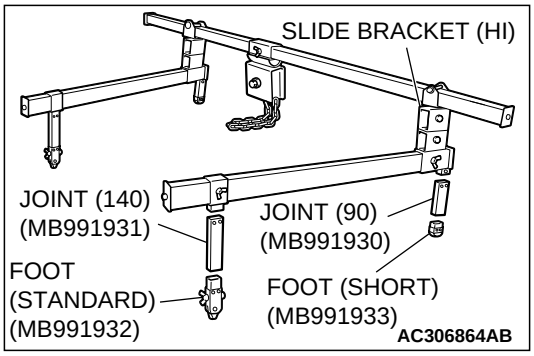
1. <Engine hanger (special tool MB991895) is used>
   (1) Set special tool MB991895 (engine hanger) to the front fender assembling bolts (A and B) and radiator support upper insulator attaching bolts (C and D) as shown.



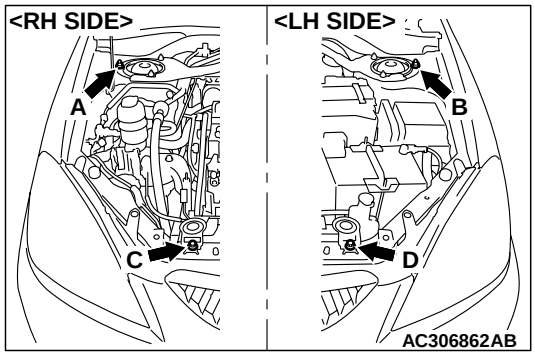


   (2) Set special tool MB991527 (hanger) and MB991454 (chain) to hold the engine/transaxle assembly.

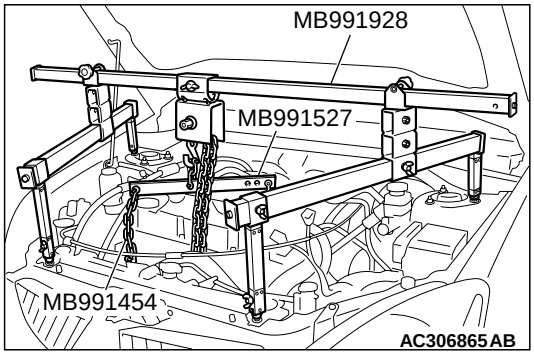
2. <Engine hanger (special tool MB991928) is used>



(1) Assemble the engine hanger (special tool MB991928). Attach following parts to the base hanger.)
- SLIDE BRACKET (HI)
- JOINT (140) (MB991931) <FRONT SIDE>
- FOOT (STANDARD) (MB991932) <FRONT SIDE>
- JOINT (90) (MB991930) <REAR SIDE>
- FOOT (SHORT) (MB991933) <REAR SIDE>



(2) Set special tool MB991928 (engine hanger) to the front fender assembling bolts (A and B) and radiator support upper insulator attaching bolts (C and D) as shown.



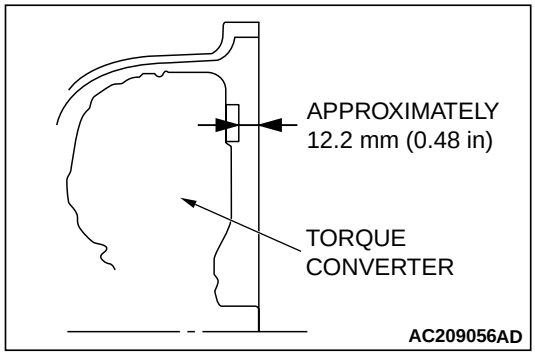
(3) Position special tool MB991527 (hanger) and MB991454 (chain) to hold the engine/transaxle assembly.

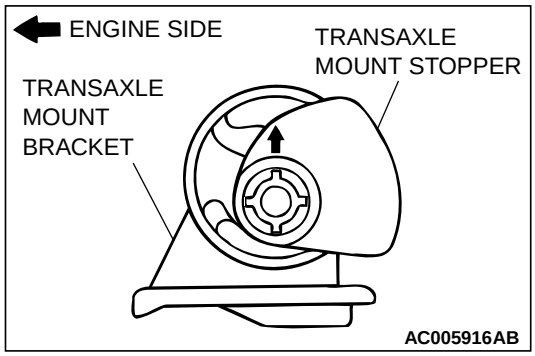
NOTE: Adjust the engine hanger balance by sliding the slide bracket (HI).

INSTALLATION SERVICE POINT

>>A<< TRANSAXLE ASSEMBLY INSTALLATION

Engage the torque converter into the transaxle side securely, and then assemble the transaxle assembly on the engine.





>>B<< TRANSAXLE MOUNT STOPPER INSTALLATION

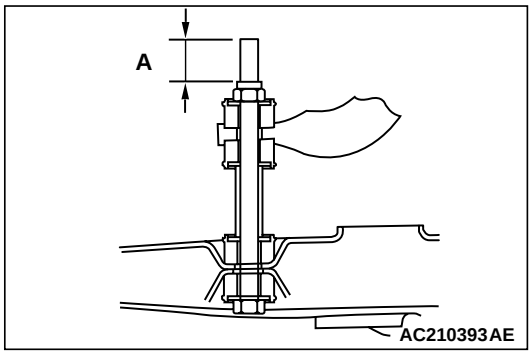
Install the transaxle mount stopper so that its arrow points upward.

>>C<< DRIVE SHAFT INSTALLATION

⚠ CAUTION

Do not damage the oil seal of the transaxle by the drive shaft spline.

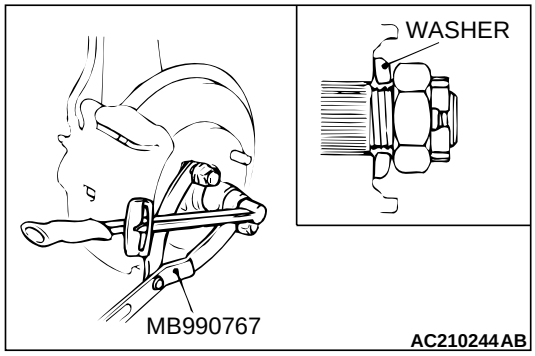
>>D<< STABILIZER RUBBER INSTALLATION



Install the stabilizer rubber and collar as shown in the figure, and tighten the self-locking nut so that the protruding length of the stabilizer bar mounting bolt protruding part meets its standard value (A).

Standard value: 22 ± 1.5 mm (0.87 ± 0.06 inch)

>>E<< DRIVE SHAFT NUT INSTALLATION



1. Be sure to install the drive shaft washer in the specified direction.

⚠ CAUTION

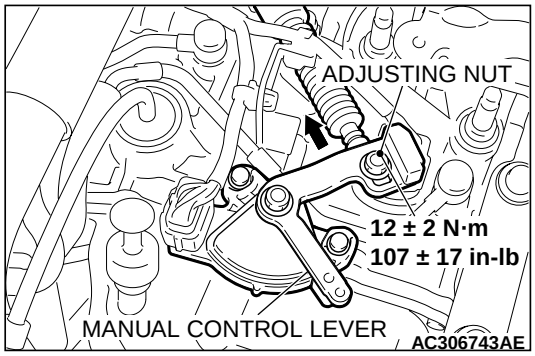
Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings. Otherwise the wheel bearing will be damaged.

2. Using special tool MB990767 (end yoke holder), tighten the drive shaft nut to the specified torque.

Tightening torque: 245 ± 29 N·m (181 ± 21 ft-lb)

>>F<< ADJUSTING NUT/TRANSAXLE CONTROL CABLE (TRANSAXLE SIDE) INSTALLATION

1. Place the selector lever and manual control lever in the “N” position.



2. Place the cable stud into the manual control lever slot and install the nut loosely. Gently push the transaxle control cable into the manual control lever slot until the cable is taut. Tighten the nut to the specified torque.

   Tightening torque: 12 ± 2 N·m (107 ± 17 in-lb)

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1231012400267

ITEM	SPECIFICATION
Transmission fluid change	
Transmission fluid drain plug	32 ± 2 N·m (24 ± 1 ft-lb)
Transmission range switch and control cable adjustment	
Adjusting nut	12 ± 2 N·m (107 ± 17 in-lb)
Transmission range switch body mounting bolt	11 ± 1 N·m (96 ± 8 in-lb)
Transaxle control	
Adjusting nut	12 ± 2 N·m (107 ± 17 in-lb)
Key inter lock cable attaching nut	12 ± 2 N·m (102 ± 22 in-lb)
Lock cam pin attaching nut	4.9 ± 1.0 N·m (44 ± 8 in-lb)
Selector lever assembly attaching bolt	12 ± 2 N·m (102 ± 22 in-lb)
Shift knob attaching screw	2.2 ± 0.2 N·m (20 ± 2 in-lb)
Shift lock cable attaching bolt nut	12 ± 2 N·m (102 ± 22 in-lb)
Shift lever bolt attaching nut	12 ± 2 N·m (102 ± 22 in-lb)
Transaxle control cable attaching bolt	12 ± 2 N·m (102 ± 22 in-lb)
Key interlock and shift lock mechanisms	
Key interlock cable attaching nut	12 ± 2 N·m (102 ± 22 in-lb)
Shift lock cable attaching nut	12 ± 2 N·m (102 ± 22 in-lb)
Transaxle assembly	
Adjusting nut	12 ± 2 N·m (107 ± 17 in-lb)
Bell housing cover attaching bolt	7.0 ± 1.0 N·m (62 ± 9 in-lb)
Center member attaching bolt	69 ± 10 N·m (51 ± 7 ft-lb)
Drive plate bolt	49 ± 3 N·m (36 ± 3 ft-lb)
Drive shaft nut	245 ± 29 N·m (181 ± 21 ft-lb)
Front roll stopper bracket retainer nut	52 ± 7 N·m (39 ± 5 ft-lb)
Lower arm connecting nut	108 ± 10 N·m (80 ± 7 ft-lb)
Rear roll stopper bracket attaching bolt	70 ± 10 N·m (52 ± 7 ft-lb)
Rear roll stopper bracket retainer nut	52 ± 7 N·m (39 ± 5 ft-lb)
Self-locking nut (tie rod end connection)	25 ± 5 N·m (19 ± 3 ft-lb)
Starter motor assembly attaching bolt	30 ± 3 N·m (23 ± 2 ft-lb)
Transaxle assembly upper part coupling bolt	48 ± 6 N·m (36 ± 4 ft-lb)
Transaxle assembly lower part coupling bolt	48 ± 6 N·m (36 ± 4 ft-lb)
Transaxle mount bracket attaching nut	47 ± 7 N·m (35 ± 5 ft-lb)
Transaxle mount stopper attaching nut	82 ± 7 N·m (61 ± 5 ft-lb)

SERVICE SPECIFICATIONS

M1231000300371

ITEM		STANDARD VALUE
Line pressure MPa (psi)		1.01 – 1.05 (147 – 152)
Protruding length of stabilizer bar mounting bolt mm (in)		22 ± 1.5 (0.87 ± 0.06)
Resistance of torque converter clutch control solenoid valve coil [at 20°C (68°F)] Ω		2.7 – 3.4
Resistance of low-reverse 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
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
Stall speed r/min		2,100 – 2,600
Transmission 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

LUBRICANT

M1231000400431

ITEM	SPECIFIED LUBRICANT	QUANTITY
Transmission fluid dm^3 (qt)	DIAMOND ATF SP III	7.7 (8.1)