DTC P0171: System too Lean (cylinder 1, 4)

⚠ CAUTION
If DTC P0171 has been set, TCL related DTC U1120 is also set. After P0171 has been diagnosed, don't forget to erase DTC U1120.

Fuel Trim Circuit
- Refer to DTC P0201 – Injector Circuit-cylinder 1 P.13A-464, DTC P0204 – Injector Circuit-cylinder 4 P.13A-494.

CIRCUIT OPERATION
- Refer to DTC P0201 – Injector Circuit-cylinder 1 P.13A-464, DTC P0204 – Injector Circuit-cylinder 4 P.13A-494.

TECHNICAL DESCRIPTION
- If a malfunction occurs in the fuel system, the fuel trim value becomes too large.
- The PCM checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS
Cylinder 1, 4 air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too lean.

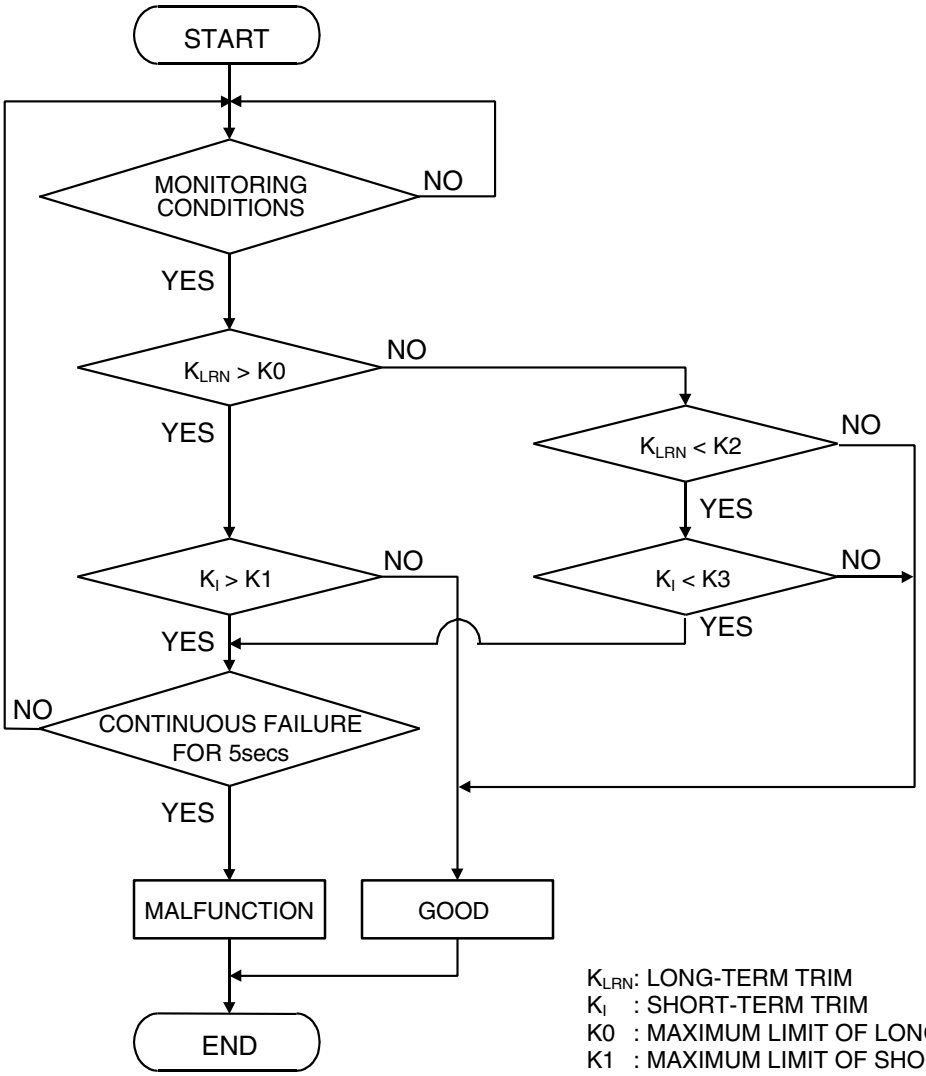
MONITOR EXECUTION
Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- Misfire monitor

Sensor (The sensor below is determined to be normal)
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



K_{LRN}: LONG-TERM TRIM
K_I : SHORT-TERM TRIM
K0 : MAXIMUM LIMIT OF LONG-TERM TRIM
K1 : MAXIMUM LIMIT OF SHORT-TERM TRIM
K2 : MINIMUM LIMIT OF LONG-TERM TRIM
K3 : MINIMUM LIMIT OF SHORT-TERM TRIM

AK204050

Check Conditions

- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +10.0 percent for 5 seconds. <Federal>

or

- Short-term fuel trim has continued to be higher than +7.0 percent for 5 seconds. <California>

TSB Revision

Check Conditions
- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be higher than +15.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent or 5 seconds.

or
- Short-term fuel trim has continued to be higher than +20.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent or 5 seconds.

or
- Short-term fuel trim has continued to be higher than +25.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 76°C (169°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria
- Long-term fuel trim has continued to be +12.5 percent for 2 seconds.

or
- Short-term fuel trim has continued to be +25.0 percent for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Mass airflow sensor failed.
- Injector (Number 1, 4) failed.
- Incorrect fuel pressure.
- Air drawn in from gaps in gasket, seals, etc.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Barometric pressure sensor failed.
- Manifold absolute pressure sensor failed.
- Exhaust leak.
- Use of incorrect or contaminated fuel.
- Harness damage in cylinder 1, 4 injector circuit or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Check for exhaust leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 15.
NO : Go to Step 2.

STEP 2. Check for intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 15.
NO : Go to Step 3.

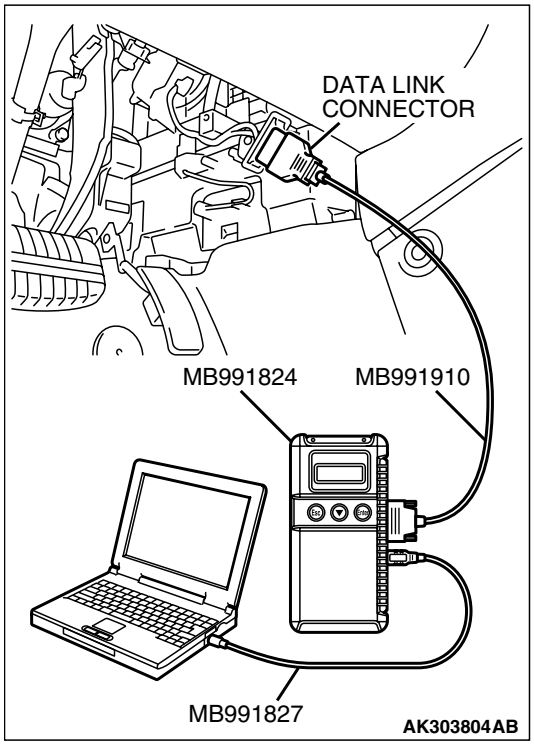
STEP 3. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.

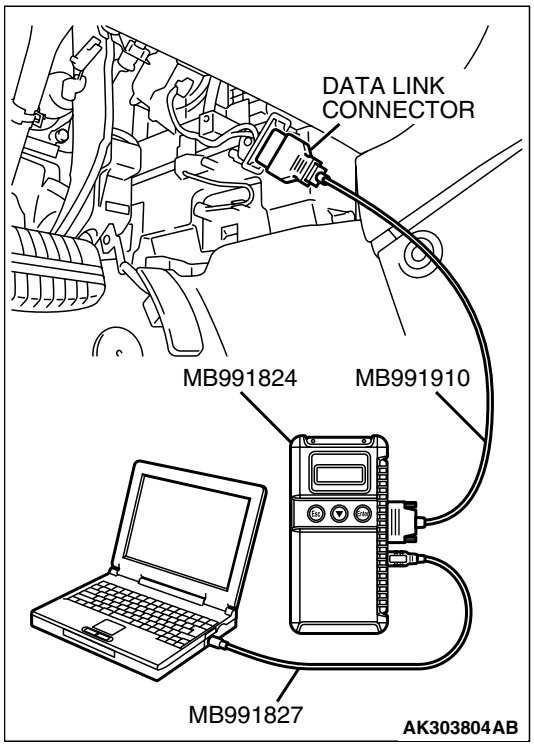
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - When idling, between 2.0 and 6.0 g/sec.
  - When 2,500 r/min, between 6.5 and 14.5 g/sec.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.
NO : Refer to DTC P0101 – Mass Airflow Circuit Range/Performance Problem P.13A-46, DTC P0102 – Mass Airflow Circuit Low Input P.13A-55, DTC P0103 – Mass Airflow Circuit High Input P.13A-65.





STEP 4. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

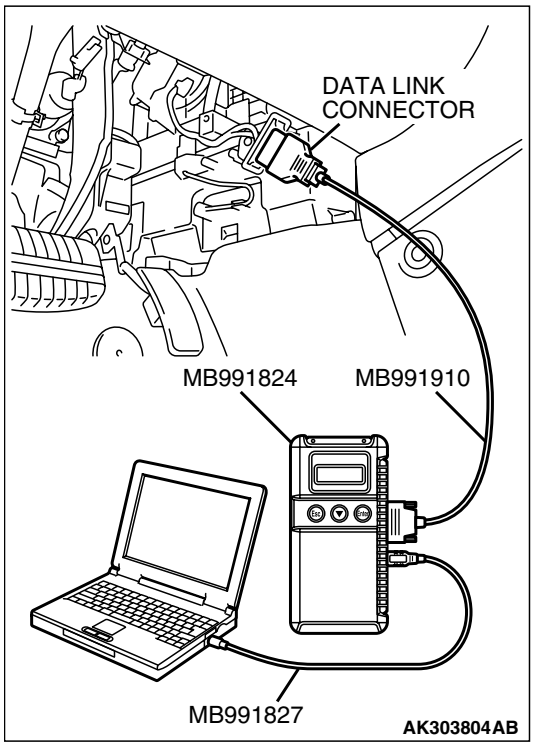
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
- The intake air temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 5.

NO : Refer to DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem P.13A-107, DTC P0112 – Intake Air Temperature Circuit Low Input P.13A-116, DTC P0113 – Intake Air Temperature Circuit High Input P.13A-123.



STEP 5. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

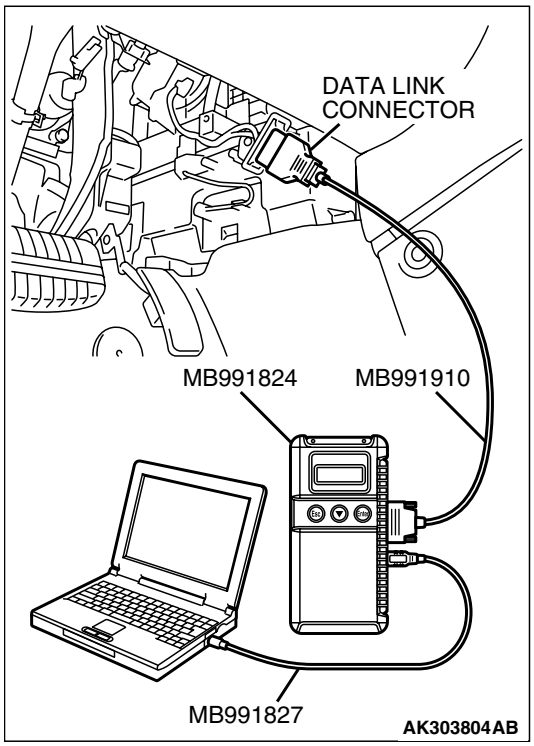
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
- The engine coolant temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 6.

NO : Refer to DTC P0116 – Engine Coolant Temperature Circuit Range/Performance ProblemP.13A-133, DTC P0117 – Engine Coolant Temperature Circuit Low Input P.13A-142, DTC P0118 – Engine Coolant Temperature Circuit High Input P.13A-149.



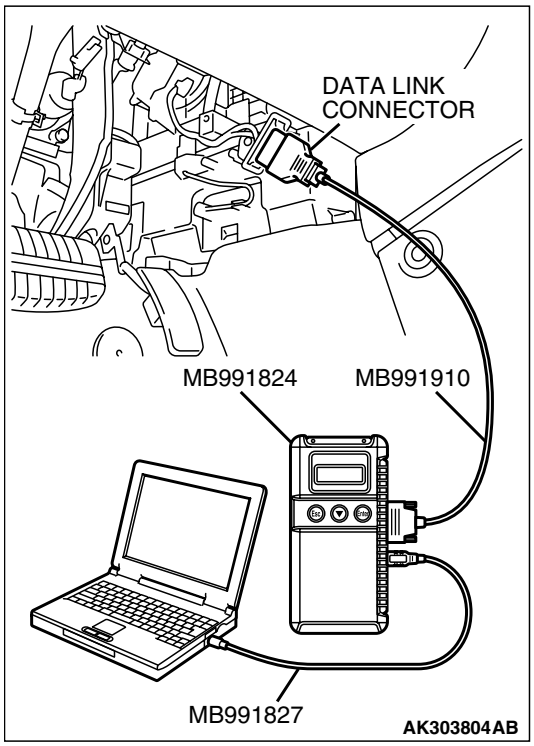
STEP 6. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

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

Q: Is the sensor operating properly?

YES : Go to Step 7.
NO : Refer to, DTC P2228 – Barometric Pressure Circuit Low Input P.13A-947, DTC P2229 – Barometric Pressure Circuit High Input P.13A-949.



STEP 7. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

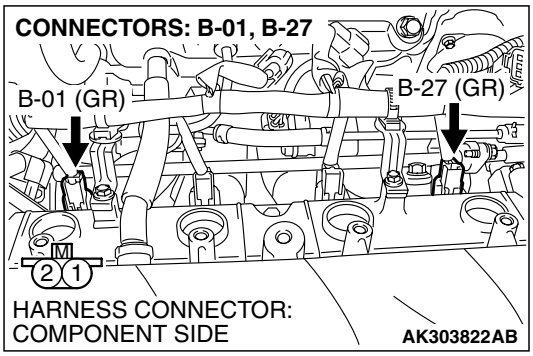
(1) Turn the ignition switch the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

(3) Start the engine.
- When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
- When the engine is suddenly revved, manifold absolute pressure varies.

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

Q: Is the sensor operating properly?

YES : Go to Step 8.
NO : Refer to DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem P.13A-72, DTC P0107 – Manifold Absolute Pressure Circuit Low Input P.13A-86, DTC P0108 – Manifold Absolute Pressure Circuit High Input P.13A-98.

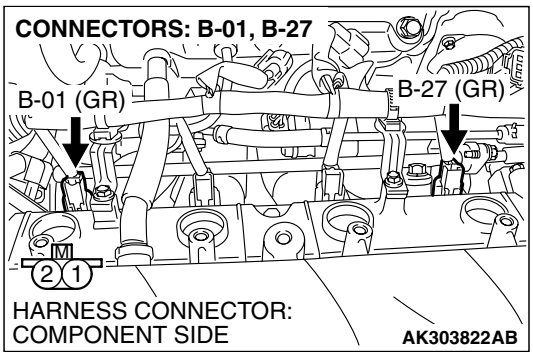


STEP 8. Check harness connector B-01, B-27 at injector for damage.

Q: Is the harness connector in good condition?

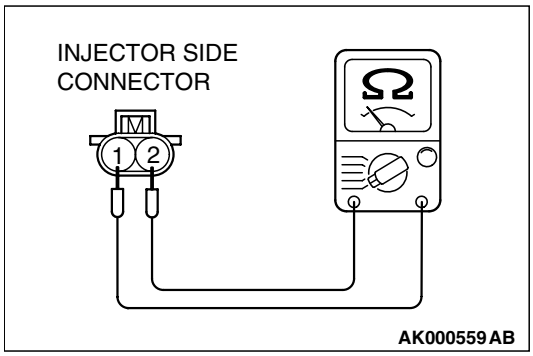
YES : Go to Step 9.

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



STEP 9. Check the cylinder 1, 4 injector.

(1) Disconnect the cylinder 1, 4 injector connector B-01, B-27.



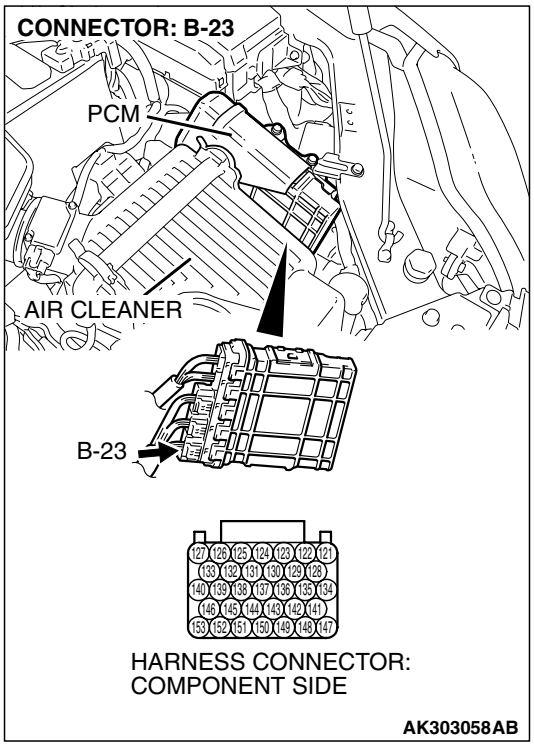
(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 10.

NO : Replace the injector. Then go to Step 15.

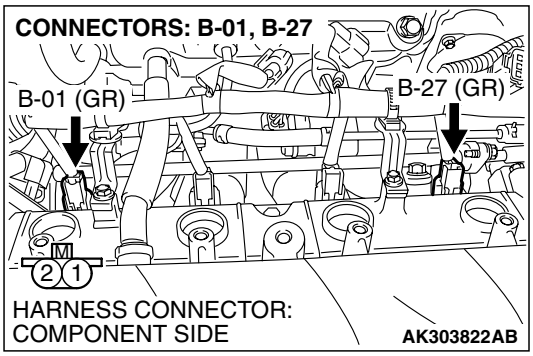


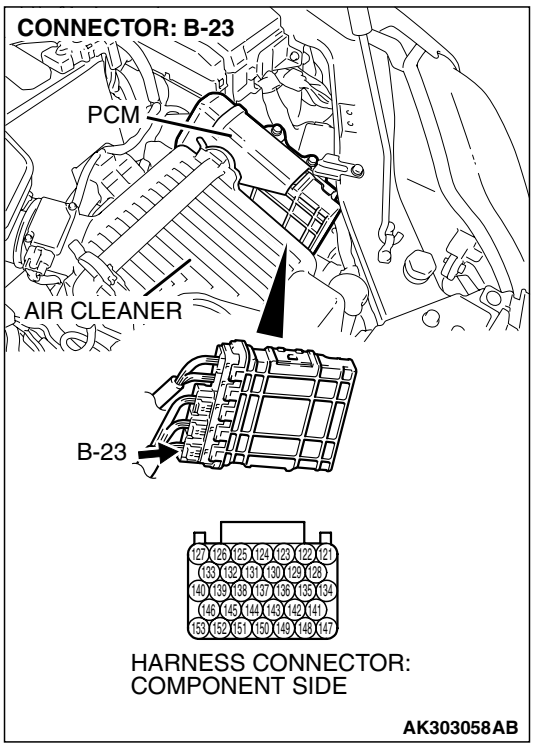
STEP 10. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

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





STEP 11. Check for harness damage between cylinder 1, 4 injector connector and PCM connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and PCM connector B-23 (terminal No. 153) at No. 1 cylinder injector.
b. Check the harness wire between injector connector B-27 (terminal No. 2) and PCM connector B-23 (terminal No. 139) at No. 4 cylinder injector.

Q: Is the harness wire in good condition?

YES : Go to Step 12.
NO : Repair it. Then go to Step 15.

STEP 12. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test P.13A-1124.

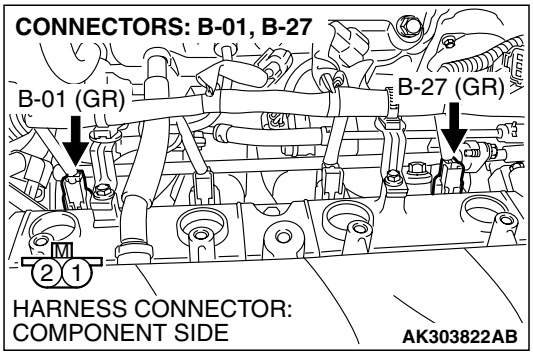
Q: Is the fuel pressure normal?

YES : Go to Step 13.
NO : Repair it. Then go to Step 15.

STEP 13. Check for entry of foreign matter (water, kerosene, etc.) into fuel.

Q: Are there any abnormalities?

YES : Replace the fuel. Then go to Step 15.
NO : Go to Step 14.



STEP 14. Replace the cylinder 1, 4 injector.

(1) Replace the cylinder 1, 4 injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0171 set?

YES : Replace the PCM. Then go to Step 15.
NO : The inspection is complete.

STEP 15. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is the DTC P0171 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0172: System too Rich (cylinder 1, 4)

⚠ CAUTION
If DTC P0172 has been set, TCL related DTC U1120 is also set. After P0172 has been diagnosed, don't forget to erase DTC U1120.

Fuel Trim Circuit

- Refer to DTC P0201 – Injector Circuit-cylinder 1 P.13A-464, DTC P0204 – Injector Circuit-cylinder 4 P.13A-494.

CIRCUIT OPERATION

- Refer to DTC P0201 – Injector Circuit-cylinder 1 P.13A-464, DTC P0204 – Injector Circuit-cylinder 4 P.13A-494.

TECHNICAL DESCRIPTION

- If a malfunction occurs in the fuel system, the fuel trim value becomes too small.
- The PCM checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Cylinder 1, 4 air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too rich.

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)

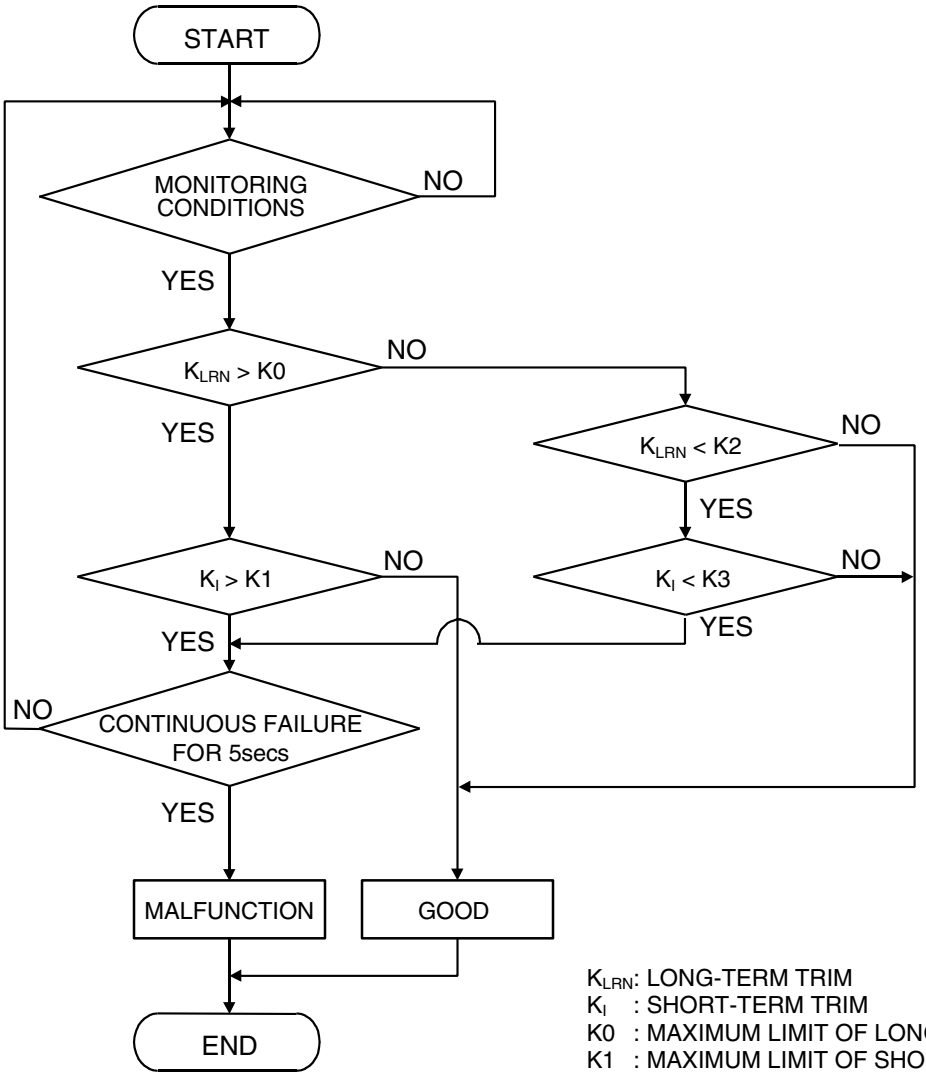
- Misfire monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



K_{LRN}: LONG-TERM TRIM
K_I : SHORT-TERM TRIM
K0 : MAXIMUM LIMIT OF LONG-TERM TRIM
K1 : MAXIMUM LIMIT OF SHORT-TERM TRIM
K2 : MINIMUM LIMIT OF LONG-TERM TRIM
K3 : MINIMUM LIMIT OF SHORT-TERM TRIM

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Check Conditions
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria
- Long-term fuel trim has continued to be lower than –12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be lower than –10.0 percent for 5 seconds.

Check Conditions
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria
- Long-term fuel trim has continued to be lower than –12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be lower than –15.0 percent for 5 seconds.

TSB Revision

Check Conditions

- Engine coolant temperature is higher than 76°C (169°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria

- Long-term fuel trim has continued to be –12.5 percent for 2 seconds.

or

- Short-term fuel trim has continued to be –25.0 percent for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.

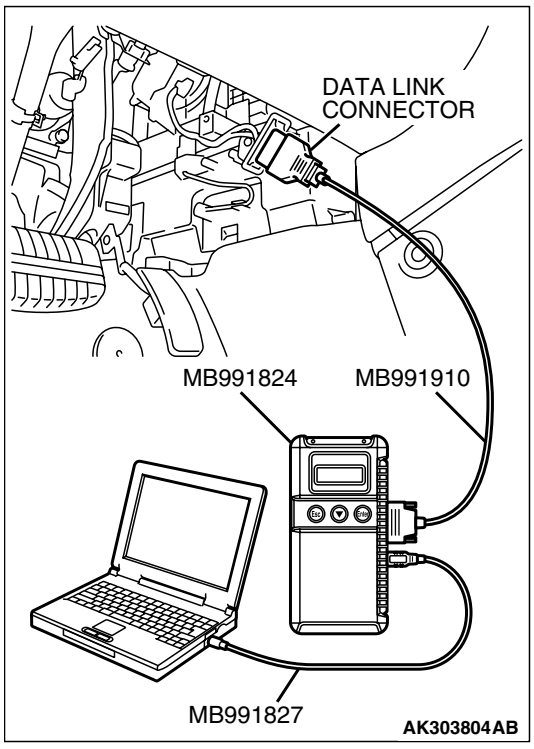
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Mass airflow sensor failed.
- Injector (Number 1, 4) failed.
- Incorrect fuel pressure.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Barometric pressure sensor failed.
- Manifold absolute pressure sensor failed.
- Harness damage in cylinder 1, 4 injector circuit or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.

⚠ CAUTION

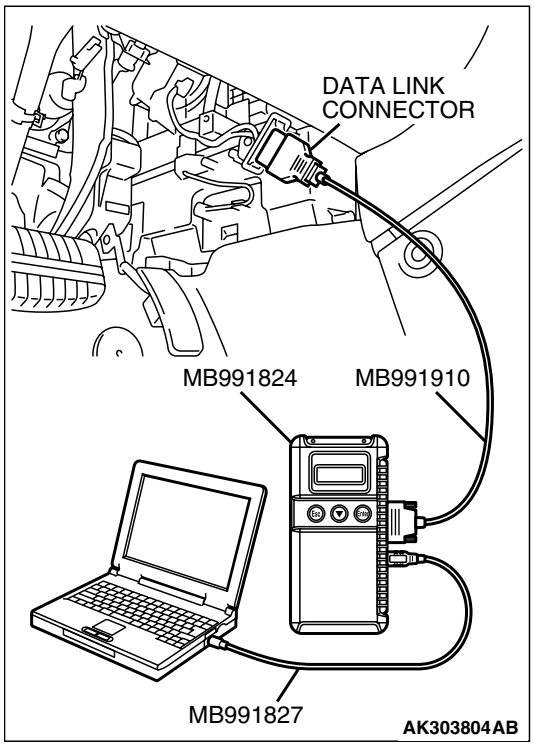
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - When idling, between 2.0 and 6.0 g/sec.
  - When 2,500 r/min, between 6.5 and 14.5 g/sec.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : YES: Go to Step 2.

NO : Refer to DTC P0101 – Mass Airflow Circuit Range/Performance Problem P.13A-46, DTC P0102 – Mass Airflow Circuit Low Input P.13A-55, DTC P0103 – Mass Airflow Circuit High Input P.13A-65.



STEP 2. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

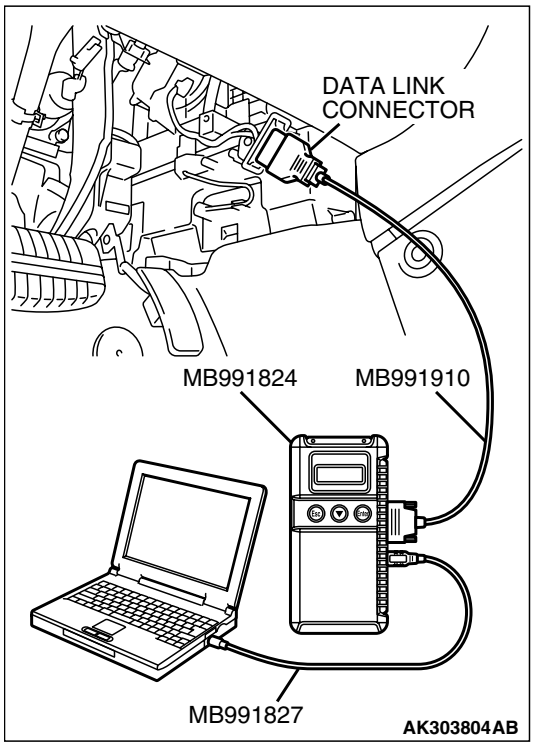
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
- The intake air temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 3.

NO : Refer to DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem P.13A-107, DTC P0112 – Intake Air Temperature Circuit Low Input P.13A-116, DTC P0113 – Intake Air Temperature Circuit High Input P.13A-123.



STEP 3. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

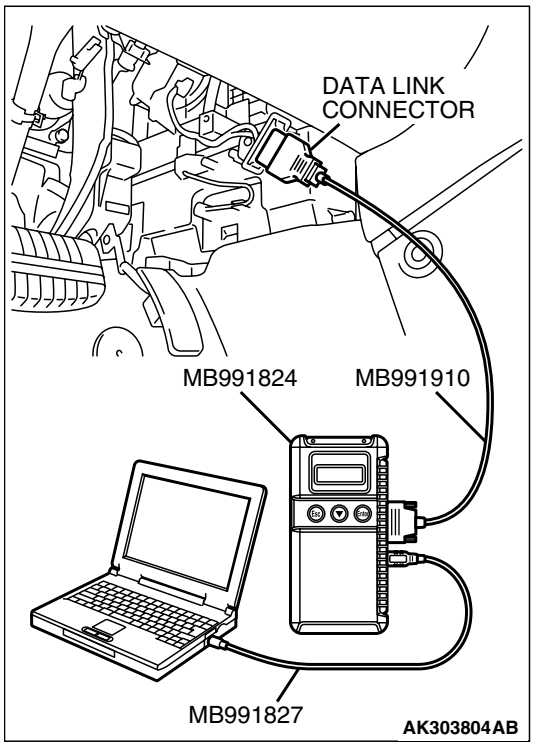
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
- The engine coolant temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 4.

NO : Refer to DTC P0116 – Engine Coolant Temperature Circuit Range/Performance ProblemP.13A-133, DTC P0117 – Engine Coolant Temperature Circuit Low Input P.13A-142, DTC P0118 – Engine Coolant Temperature Circuit High Input P.13A-149.



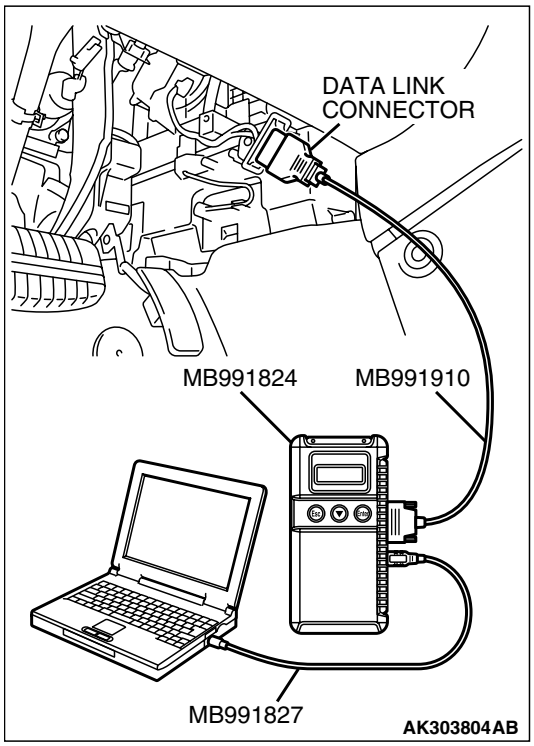
STEP 4. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

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

Q: Is the sensor operating properly?

YES : Go to Step 5.
NO : Refer to, DTC P2228 – Barometric Pressure Circuit Low Input P.13A-947, DTC P2229 – Barometric Pressure Circuit High Input P.13A-949.



STEP 5. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

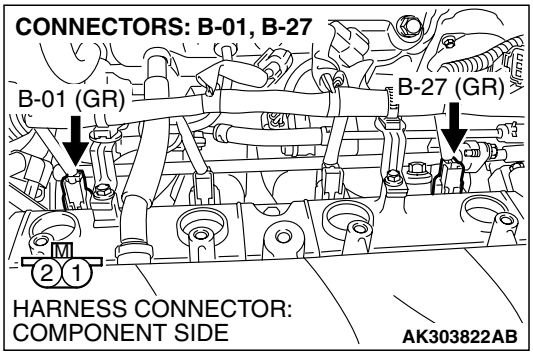
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

(3) Start the engine.
- When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
- When the engine is suddenly revved, manifold absolute pressure varies.

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

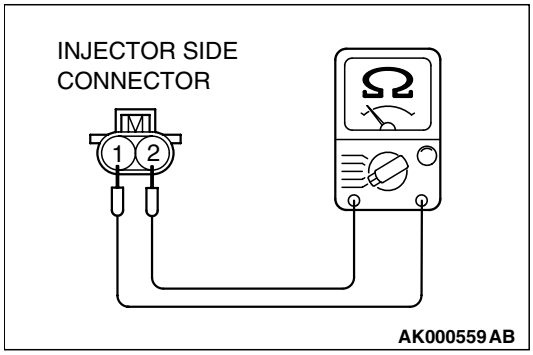
Q: Is the sensor operating properly?

YES : Go to Step 6.
NO : Refer to DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem P.13A-72, DTC P0107 – Manifold Absolute Pressure Circuit Low Input P.13A-86, DTC P0108 – Manifold Absolute Pressure Circuit High Input P.13A-98.



STEP 6. Check the cylinder 1, 4 injector.

(1) Disconnect the cylinder 1, 4 injector connector B-01, B-27.



(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

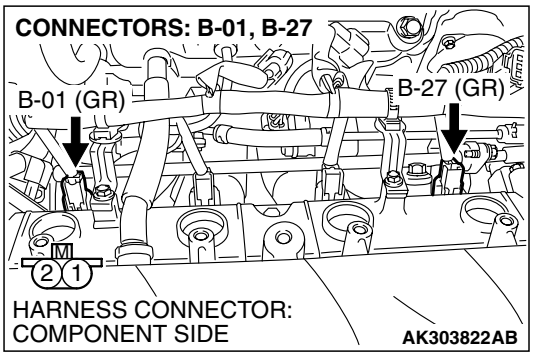
YES : Go to Step 7.
NO : Replace the injector. Then go to Step 9.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test P.13A-1124.

Q: Is the fuel pressure normal?

YES : Go to Step 8.
NO : Repair it. Then go to Step 9.



STEP 8. Replace the cylinder 1, 4 injector.

(1) Replace the cylinder 1, 4 injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0172 set?

YES : Replace the PCM. Then go to Step 9.
NO : The inspection is complete.

STEP 9. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0172 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0174: System too Lean (cylinder 2, 3)

⚠ CAUTION
If DTC P0174 has been set, TCL related DTC U1120 is also set. After P0174 has been diagnosed, don't forget to erase DTC U1120.

Fuel Trim Circuit
- Refer to DTC P0202 – Injector Circuit-cylinder 2 P.13A-474, DTC P0203 – Injector Circuit-cylinder 3 P.13A-484.

CIRCUIT OPERATION
- Refer to DTC P0202 – Injector Circuit-cylinder 2 P.13A-474, DTC P0203 – Injector Circuit-cylinder 3 P.13A-484.

TECHNICAL DESCRIPTION
- If a malfunction occurs in the fuel system, the fuel trim value becomes too large.
- The PCM checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS
Cylinder 2, 3 air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too lean.

MONITOR EXECUTION
Continuous

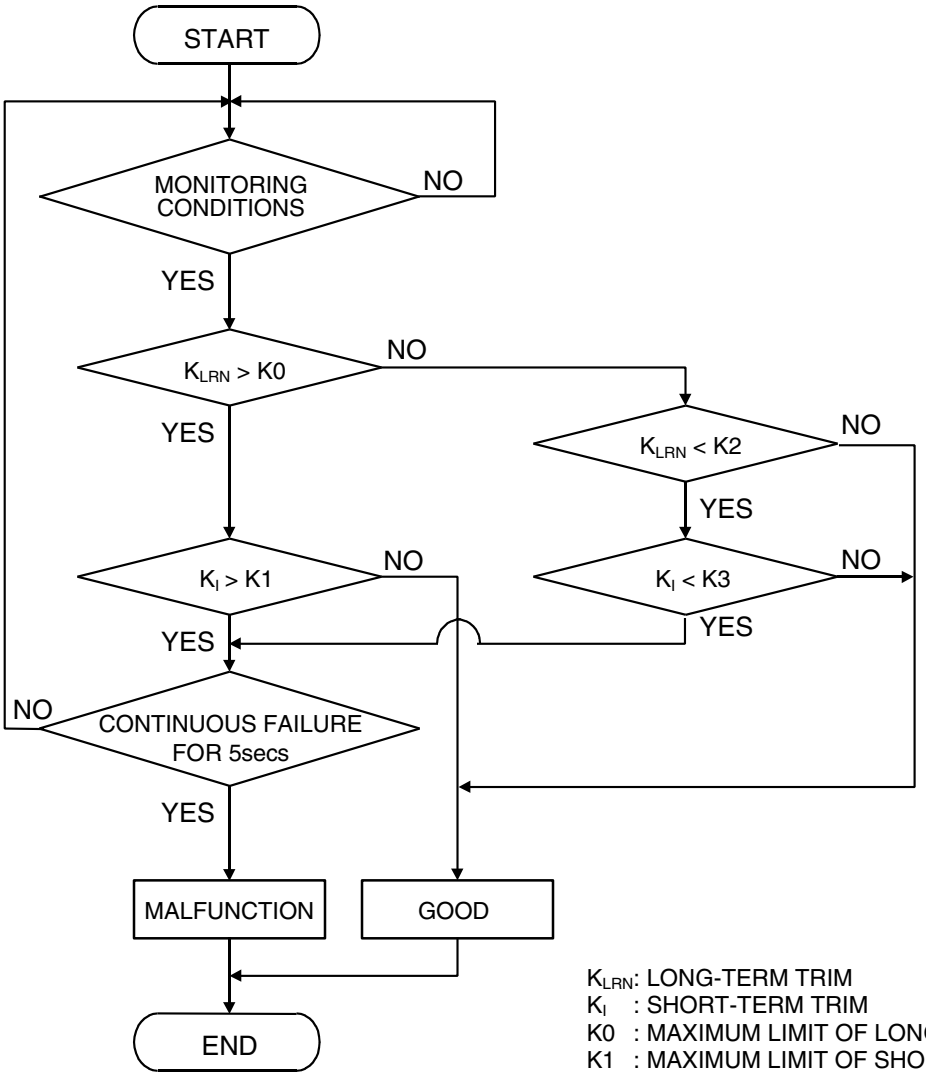
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

Sensor (The sensor below is determined to be normal)
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



K_{LRN}: LONG-TERM TRIM
K_I : SHORT-TERM TRIM
K0 : MAXIMUM LIMIT OF LONG-TERM TRIM
K1 : MAXIMUM LIMIT OF SHORT-TERM TRIM
K2 : MINIMUM LIMIT OF LONG-TERM TRIM
K3 : MINIMUM LIMIT OF SHORT-TERM TRIM

AK204050

Check Conditions

- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +10.0 percent for 5 seconds. <Federal>

or

- Short-term fuel trim has continued to be higher than +7.0 percent for 5 seconds. <California>

TSB Revision

Check Conditions
- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be higher than +15.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be higher than +20.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria
- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or
- Short-term fuel trim has continued to be higher than +25.0 percent for 5 seconds.

Check Conditions
- Engine coolant temperature is higher than 76°C (169°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria
- Long-term fuel trim has continued to be +12.5 percent for 2 seconds.

or
- Short-term fuel trim has continued to be +25.0 percent for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Mass airflow sensor failed.
- Injector (Number 2, 3) failed.
- Incorrect fuel pressure.
- Air drawn in from gaps in gasket, seals, etc.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Barometric pressure sensor failed.
- Manifold absolute pressure sensor failed.
- Exhaust leak.
- Use of incorrect or contaminated fuel.
- Harness damage in cylinder 2, 3 injector circuit or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Check for exhaust leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 15.
NO : Go to Step 2.

STEP 2. Check for intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 15.
NO : Go to Step 3.

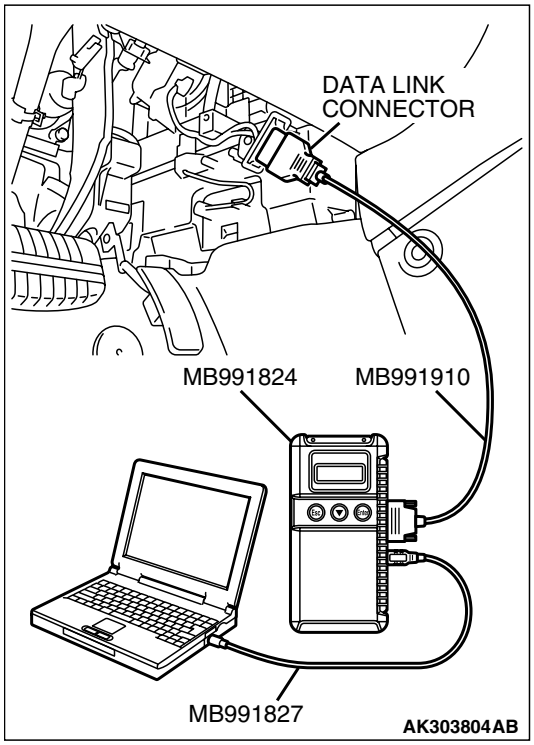
STEP 3. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.

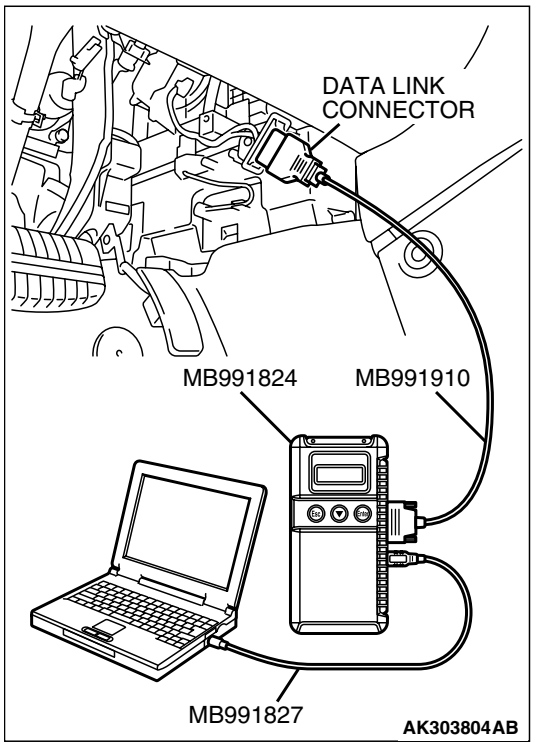
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - When idling, between 2.0 and 6.0 g/sec.
  - When 2,500 r/min, between 6.5 and 14.5 g/sec.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.
NO : Refer to DTC P0101 – Mass Airflow Circuit Range/Performance Problem P.13A-46, DTC P0102 – Mass Airflow Circuit Low Input P.13A-55, DTC P0103 – Mass Airflow Circuit High Input P.13A-65.





STEP 4. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

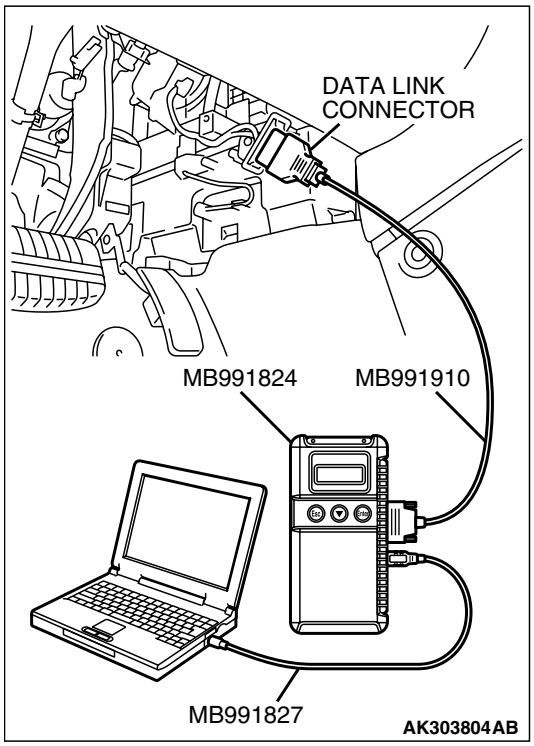
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
- The intake air temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 5.

NO : Refer to DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem P.13A-107, DTC P0112 – Intake Air Temperature Circuit Low Input P.13A-116, DTC P0113 – Intake Air Temperature Circuit High Input P.13A-123.



STEP 5. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

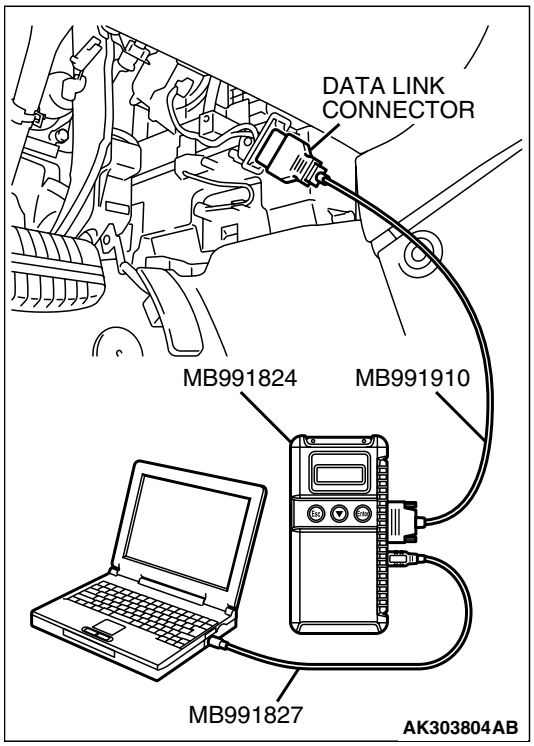
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
- The engine coolant temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 6.

NO : Refer to DTC P0116 – Engine Coolant Temperature Circuit Range/Performance Problem P.13A-133, DTC P0117 – Engine Coolant Temperature Circuit Low Input P.13A-142, DTC P0118 – Engine Coolant Temperature Circuit High Input P.13A-149.



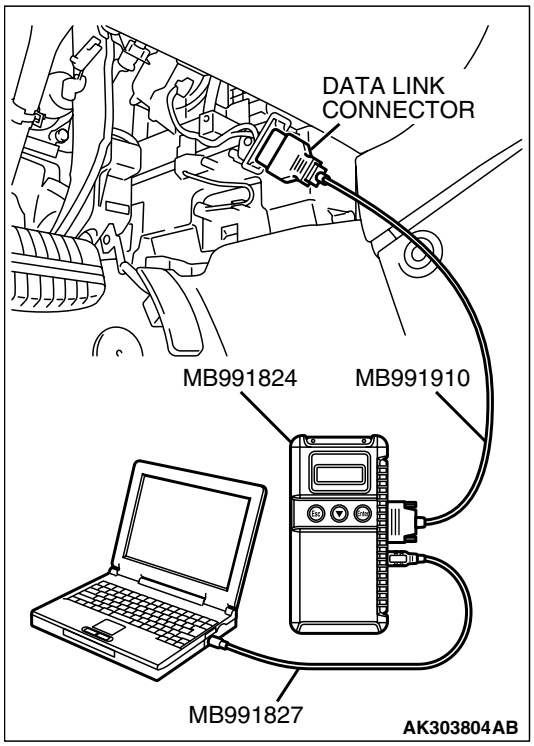
STEP 6. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

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

Q: Is the sensor operating properly?

YES : Go to Step 7.
NO : Refer to, DTC P2228 – Barometric Pressure Circuit Low Input P.13A-947, DTC P2229 – Barometric Pressure Circuit High Input P.13A-949.



STEP 7. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

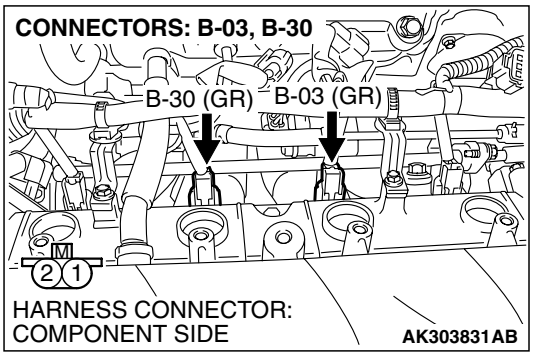
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

(3) Start the engine.
- When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
- When the engine is suddenly revved, manifold absolute pressure varies.

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

Q: Is the sensor operating properly?

YES : Go to Step 8.
NO : Refer to DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem P.13A-72, DTC P0107 – Manifold Absolute Pressure Circuit Low Input P.13A-86, DTC P0108 – Manifold Absolute Pressure Circuit High Input P.13A-98.

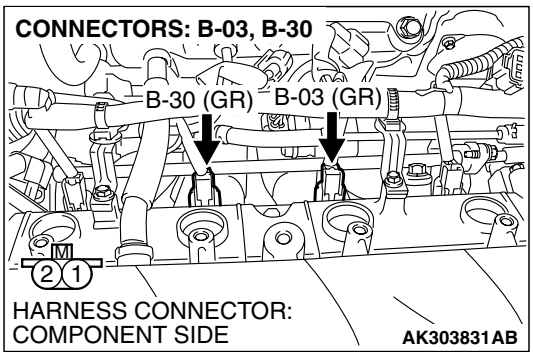


STEP 8. Check harness connector B-03, B-30 at injector for damage.

Q: Is the harness connector in good condition?

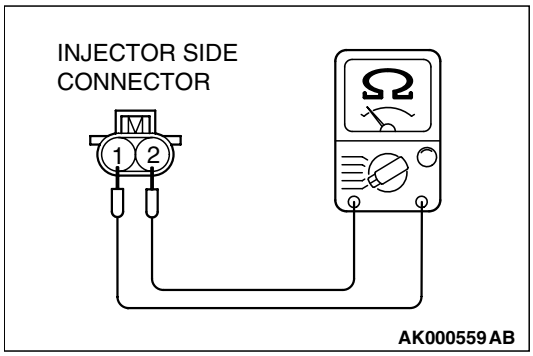
YES : Then go to Step 9.

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



STEP 9. Check the cylinder 2, 3 injector.

(1) Disconnect the cylinder 2, 3 injector connector B-03, B-30.



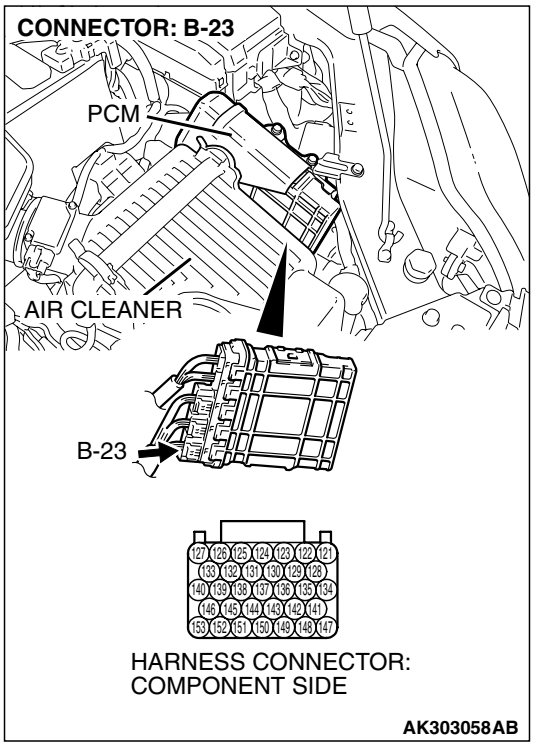
(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 10.

NO : Replace the injector. Then go to Step 15.

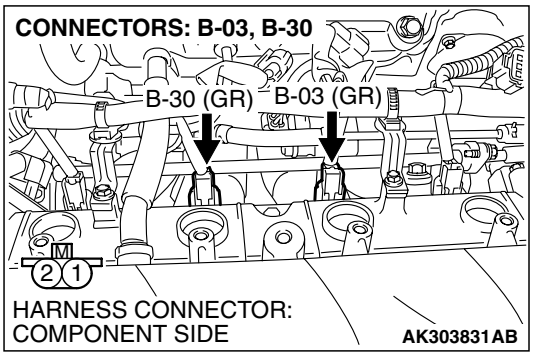


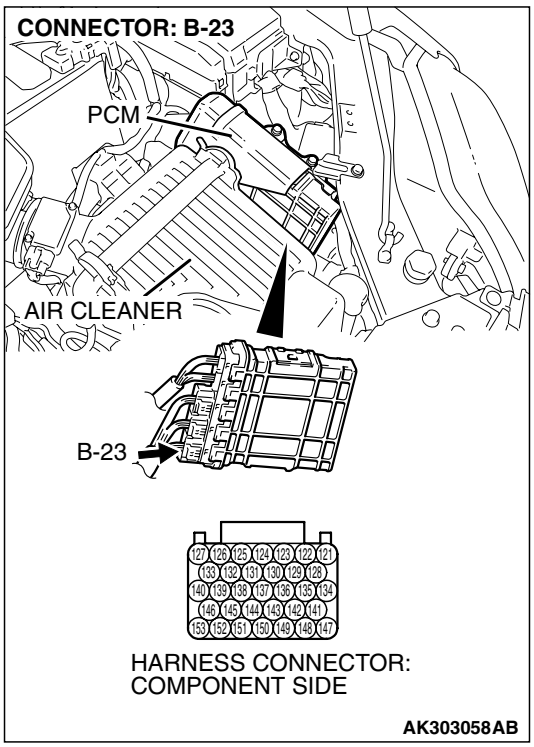
STEP 10. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

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





STEP 11. Check for harness damage between cylinder 2, 3 injector connector and PCM connector.

a. Check the harness wire between injector connector B-30 (terminal No. 2) and PCM connector B-23 (terminal No. 146) at No. 2 cylinder injector.
b. Check the harness wire between injector connector B-03 (terminal No. 2) and PCM connector B-23 (terminal No. 139) at No. 3 cylinder injector.

Q: Is the harness wire in good condition?

YES : Go to Step 12.
NO : Repair it. Then go to Step 15.

STEP 12. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test P.13A-1124.

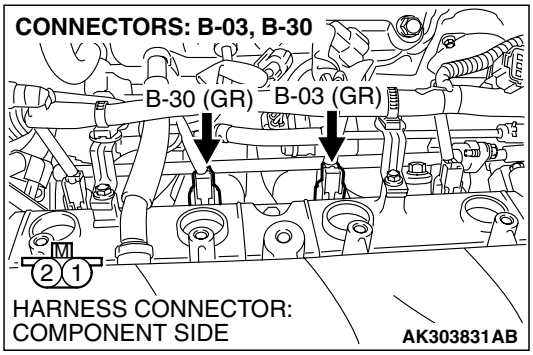
Q: Is the fuel pressure normal?

YES : Go to Step 13.
NO : Repair it. Then go to Step 15.

STEP 13. Check for entry of foreign matter (water, kerosene, etc.) into fuel.

Q: Are there any abnormalities?

YES : Replace the fuel. Then go to Step 15.
NO : Go to Step 14.



STEP 14. Replace the cylinder 2, 3 injector.

(1) Replace the cylinder 2, 3 injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(3) Check in the diagnostic trouble code (DTC).

Q: Is DTC P0174 set?

YES : Replace the PCM. Then go to Step 15.
NO : The inspection is complete.

STEP 15. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0174 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0175: System too Rich (cylinder 2, 3)

⚠ CAUTION
If DTC P0175 has been set, TCL related DTC U1120 is also set. After P0175 has been diagnosed, don't forget to erase DTC U1120.

Fuel Trim Circuit

- Refer to DTC P0202 – Injector Circuit-cylinder 2 P.13A-474, DTC P0203 – Injector Circuit-cylinder 3 P.13A-484.

CIRCUIT OPERATION

- Refer to DTC P0202 – Injector Circuit-cylinder 2 P.13A-474, DTC P0203 – Injector Circuit-cylinder 3 P.13A-484.

TECHNICAL DESCRIPTION

- If a malfunction occurs in the fuel system, the fuel trim value becomes too small.
- The PCM checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Cylinder 2, 3 air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too rich.

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)

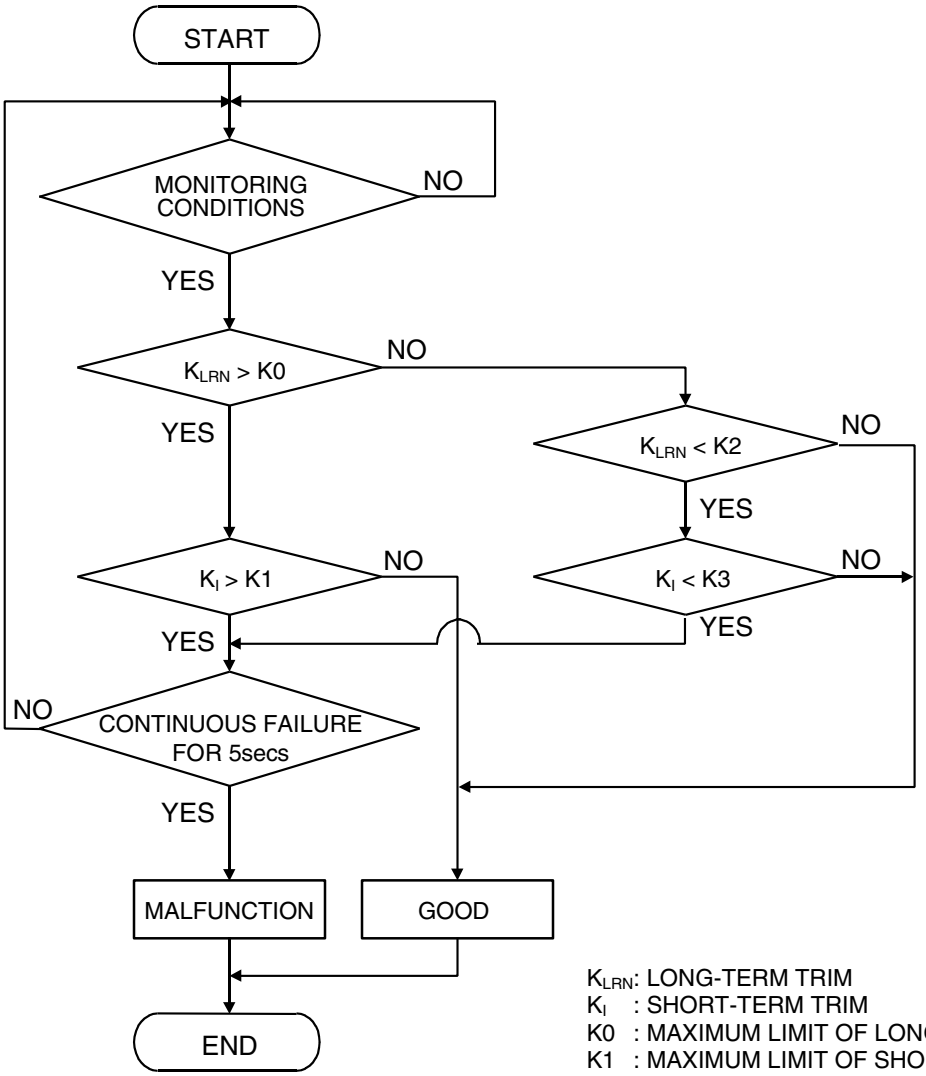
- Misfire monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



K_{LRN}: LONG-TERM TRIM
K_I : SHORT-TERM TRIM
K0 : MAXIMUM LIMIT OF LONG-TERM TRIM
K1 : MAXIMUM LIMIT OF SHORT-TERM TRIM
K2 : MINIMUM LIMIT OF LONG-TERM TRIM
K3 : MINIMUM LIMIT OF SHORT-TERM TRIM

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DTC SET CONDITIONS

Check Conditions

- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be lower than –12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be lower than –10.0 percent for 5 seconds.

Check Conditions

- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 76°C (169°F).
- Mass airflow sensor output is 6 g/sec or less.

Judgment Criteria

- Long-term fuel trim has continued to be lower than –12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be lower than –15.0 percent for 5 seconds.

TSB Revision

Check Conditions

- Engine coolant temperature is higher than 76°C (169°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria

- Long-term fuel trim has continued to be –12.5 percent for 2 seconds.

or

- Short-term fuel trim has continued to be –25.0 percent for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.

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

- Mass airflow sensor failed.
- Injector (Number 2, 3) failed.
- Incorrect fuel pressure.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Barometric pressure sensor failed.
- Manifold absolute pressure sensor failed.
- Harness damage in cylinder 2, 3 injector circuit or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.

⚠ CAUTION

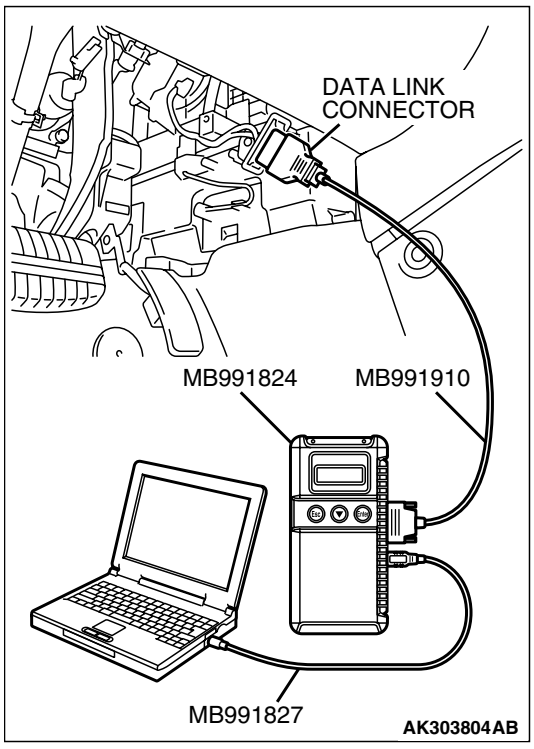
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

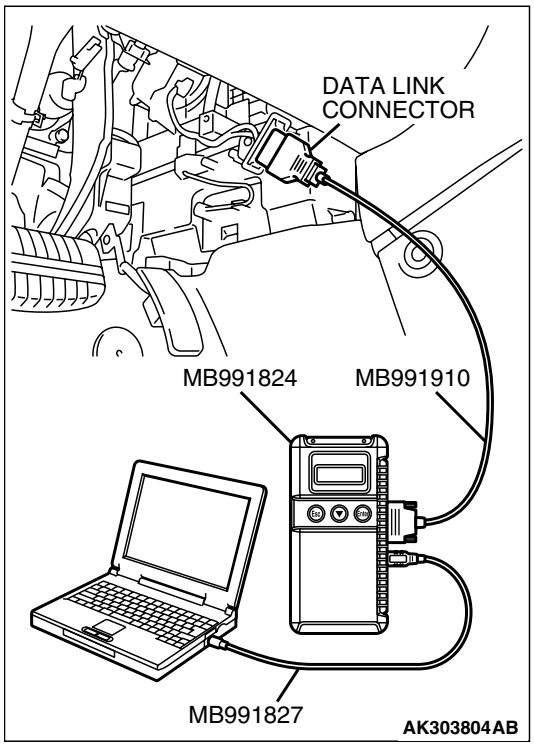
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - When idling, between 2.0 and 6.0 g/sec.
  - When 2,500 r/min, between 6.5 and 14.5 g/sec.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 2.

NO : Refer to DTC P0101 – Mass Airflow Circuit Range/Performance Problem P.13A-46, DTC P0102 – Mass Airflow Circuit Low Input P.13A-55, DTC P0103 – Mass Airflow Circuit High Input P.13A-65.





STEP 2. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

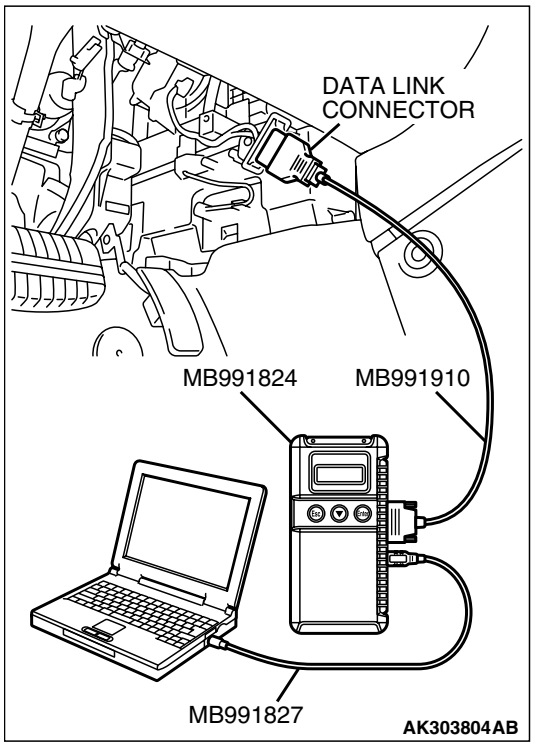
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
- The intake air temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 3.

NO : Refer to DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem P.13A-107 DTC P0112 – Intake Air Temperature Circuit Low Input P.13A-116, DTC P0113 – Intake Air Temperature Circuit High Input P.13A-123.



STEP 3. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

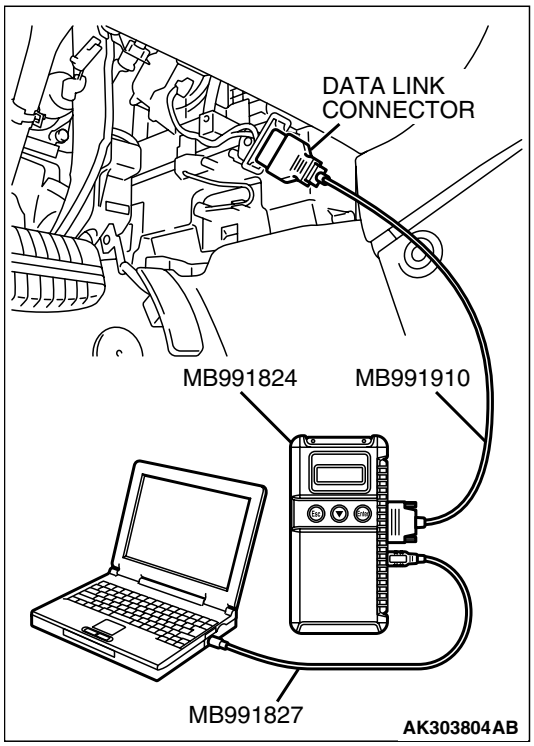
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
- The engine coolant temperature and temperature shown with the scan tool should approximately match.

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

Q: Is the sensor operating properly?

YES : Go to Step 4.

NO : Refer to DTC P0116 – Engine Coolant Temperature Circuit Range/Performance Problem P.13A-133, DTC P0117 – Engine Coolant Temperature Circuit Low Input P.13A-142, DTC P0118 – Engine Coolant Temperature Circuit High Input P.13A-149.



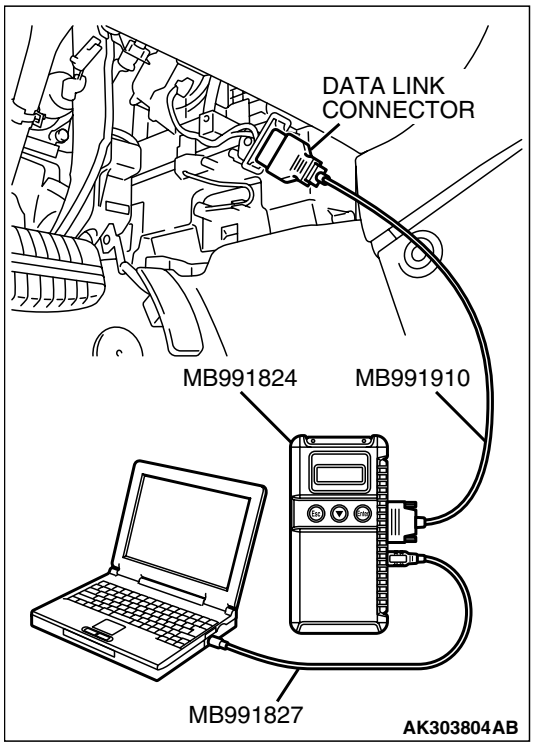
STEP 4. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa. (23.9 in.Hg)

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

Q: Is the sensor operating properly?

YES : Go to Step 5.
NO : Refer to, DTC P2228 – Barometric Pressure Circuit Low Input P.13A-947, DTC P2229 – Barometric Pressure Circuit High Input P.13A-949.



STEP 5. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

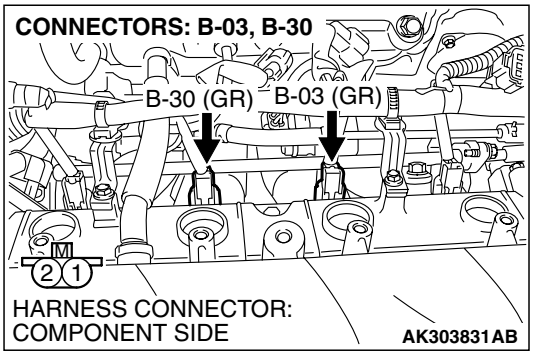
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
- When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
- When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
- When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
- When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).

(3) Start the engine.
- When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
- When the engine is suddenly revved, manifold absolute pressure varies.

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

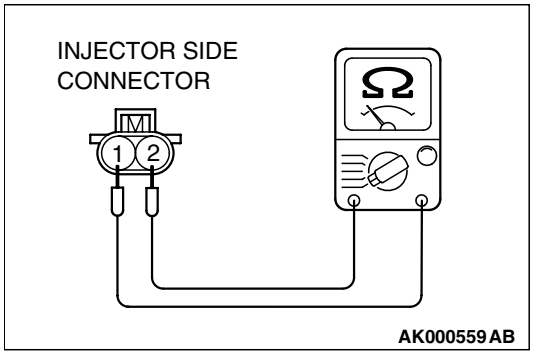
Q: Is the sensor operating properly?

YES : Go to Step 6.
NO : Refer to DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem P.13A-72, DTC P0107 – Manifold Absolute Pressure Circuit Low Input P.13A-86, DTC P0108 – Manifold Absolute Pressure Circuit High Input P.13A-98.



STEP 6. Check the cylinder 2, 3 injector.

(1) Disconnect the cylinder 2, 3 injector connector B-03, B-30.



(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 7.
NO : Replace the injector. Then go to Step 9.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test P.13A-1124.

Q: Is the fuel pressure normal?

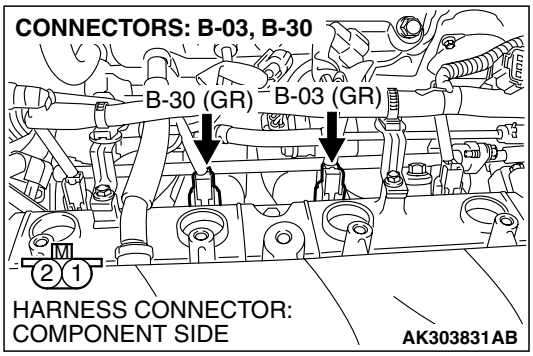
YES : Go to Step 8.
NO : Repair it. Then go to Step 9.

STEP 8. Replace the cylinder 2, 3 injector.

(1) Replace the cylinder 2, 3 injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0175 set?

YES : Replace the PCM. Then go to Step 9.
NO : The inspection is complete.



STEP 9. Test the OBD-II drive cycle.

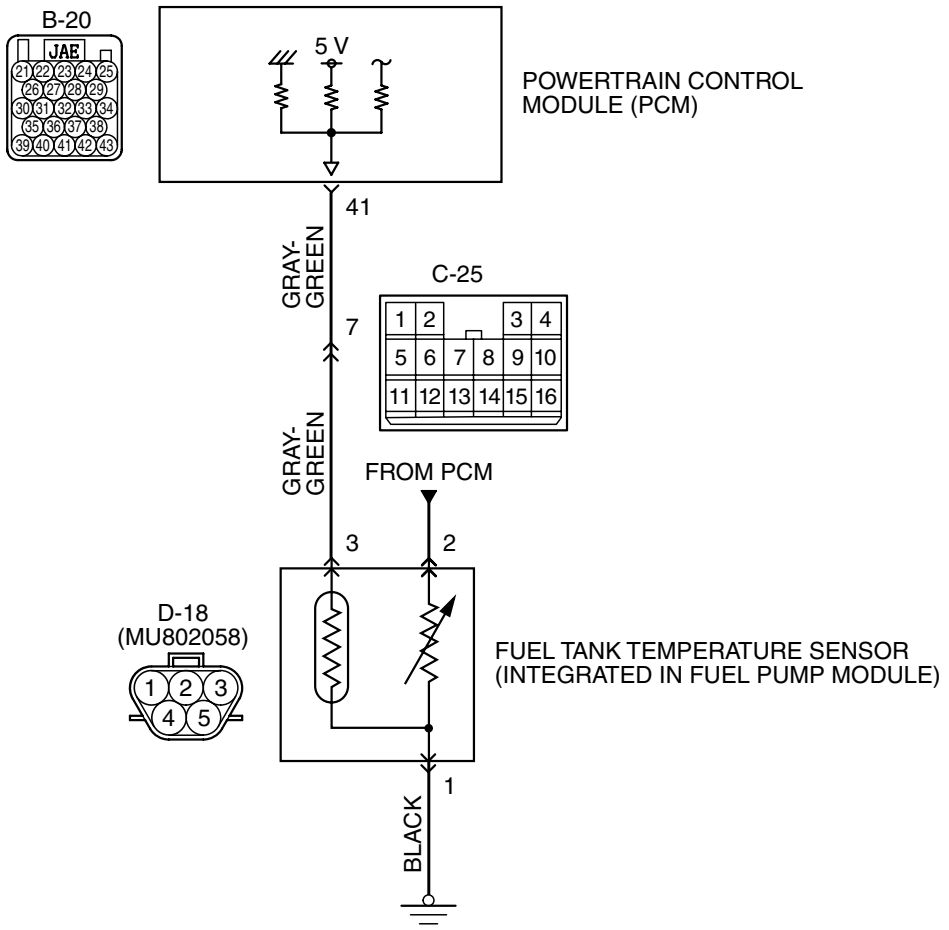
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0175 output?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0181: Fuel Tank Temperature Sensor Circuit Range/Performance

Fuel Tank Temperature Sensor Circuit



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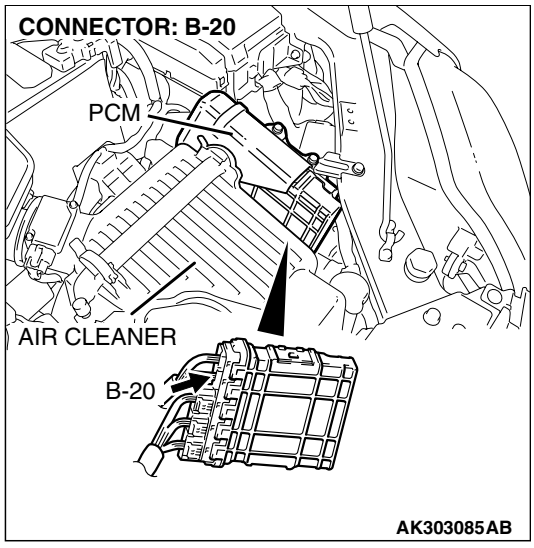

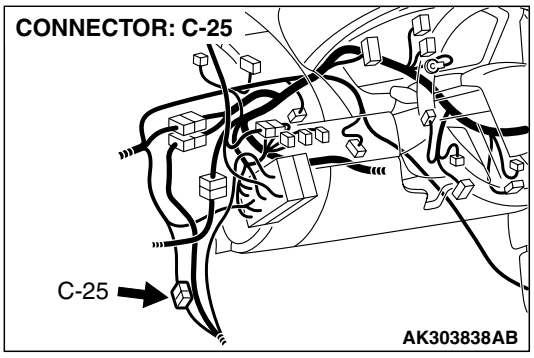

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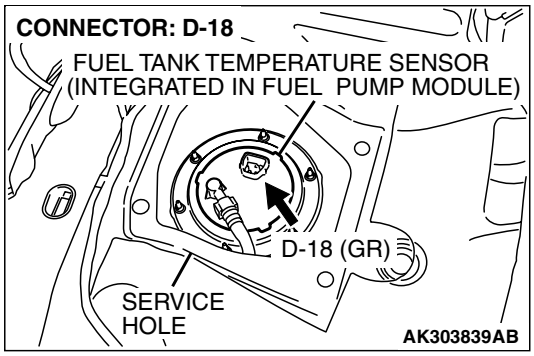


CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the PCM (terminal No. 41) via the resistor in the PCM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The PCM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature at engine start is higher than engine coolant temperature at engine start by specified value when engine is cold start condition.

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)

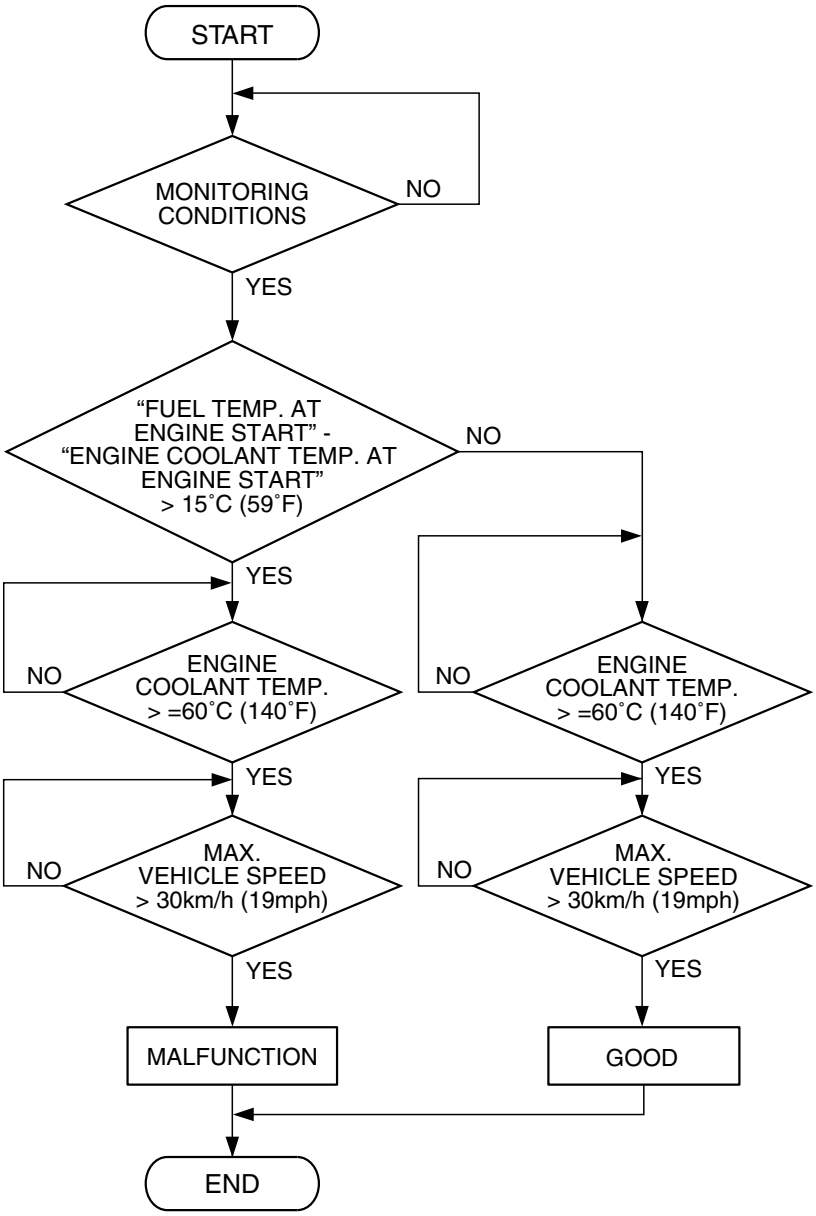
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- The engine coolant temperature – intake air temperature is 5°C (41°F) or less when the engine is started.
- The engine coolant temperature is between –10°C (14°F) and 36°C (97°F) when the engine is started.
- The engine coolant temperature is higher than 60°C (140°F).
- Maximum vehicle speed is higher than 30 km/h (19 mph) after the engine starting sequence has been completed.

Judgement Criteria

- The fuel tank temperature – engine coolant temperature is 15°C (59°F) or more when the engine is started.

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OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

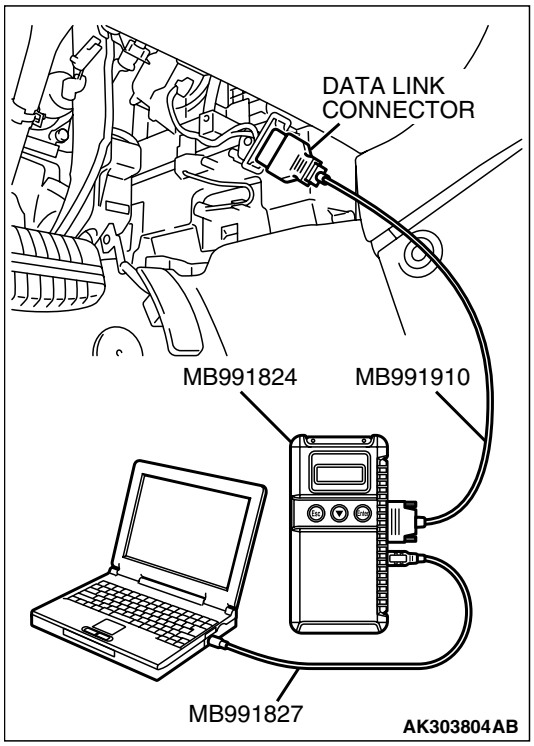
- Fuel tank temperature sensor failed.
- Open or shorted fuel tank temperature sensor circuit, harness damage, or connector damage.
- PCM failed.

NOTE: A diagnostic trouble code (DTC) could be output if the engine and the radiator have been flushed repeatedly when the engine coolant temperature was high (or the fuel tank temperature was high). Because this is not a failure, the DTC must be erased.
Make sure to test drive the vehicle in accordance with the OBD-II drive cycle pattern in order to verify that a DTC will not be output.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991923: Power Plant ECU Check Harness



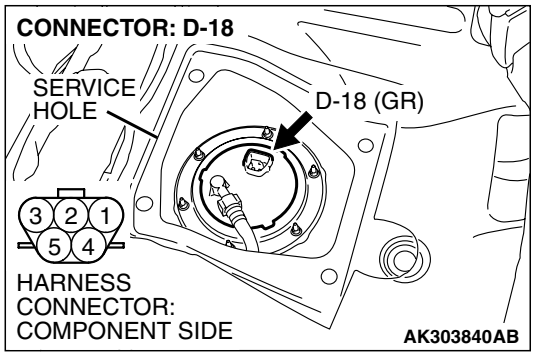
STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank Temperature Sensor.

⚠ 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) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 4A, Fuel Tank Temperature Sensor.
  - Approximately the same as the ambient air temperature when the engine is cooled.
(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 Malfunctions P.00-14.
NO : Go to Step 2.

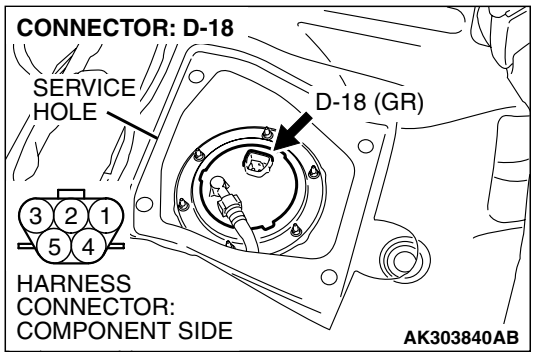


STEP 2. Check harness connector D-18 at the fuel tank temperature sensor for damage.

Q: Is the harness connector in good condition?

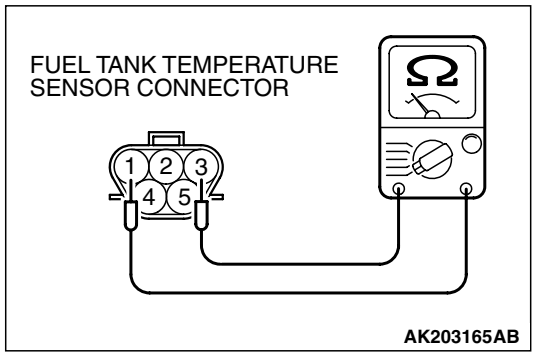
YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.



STEP 3. Check the fuel tank temperature sensor.

(1) Disconnect the fuel tank temperature sensor connector D-18.



(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

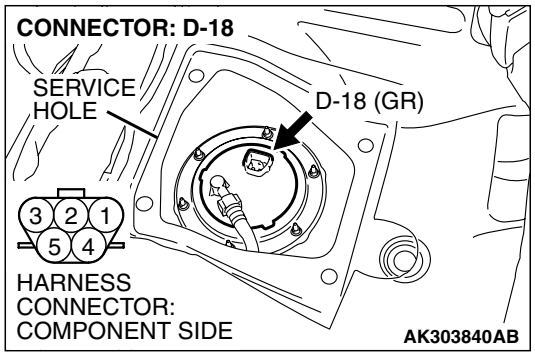
Standard value:
0.5 – 12.0 kΩ

Q: Is the measured resistance between 0.5 and 12.0 kΩ?

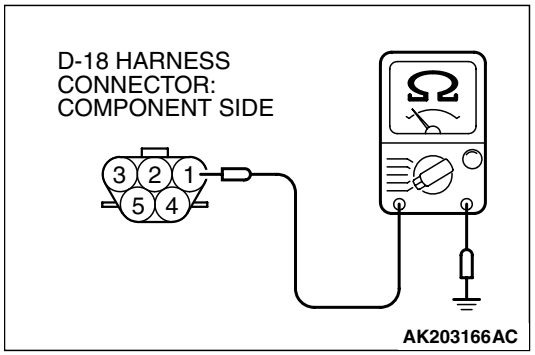
YES : Go to Step 4.

NO : Replace the fuel tank temperature sensor. Then go to Step 12.

STEP 4. Check the continuity at fuel tank temperature sensor harness side connector D-18.



(1) Disconnect the connector D-18 and measure at the harness side.



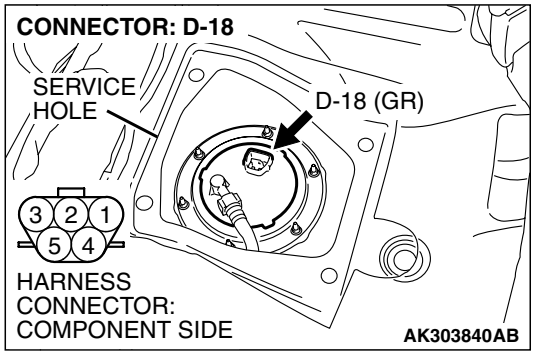
(2) Check for the continuity between terminal No. 1 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 5.

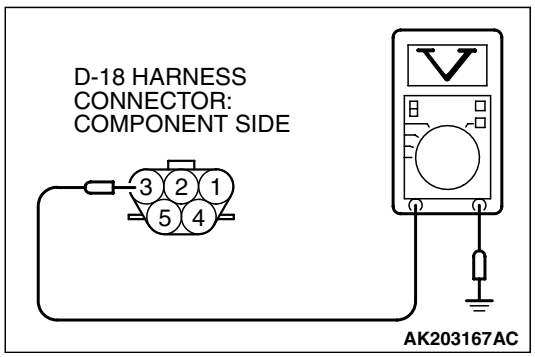
NO : Repair harness wire between fuel tank temperature sensor connector D-18 (terminal No. 1) and ground because of open circuit or harness damage. Then go to Step 12.

STEP 5. Measure the sensor supply voltage at fuel tank temperature sensor harness side connector D-18.



(1) Disconnect the connector D-18 and measure at the harness side.

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



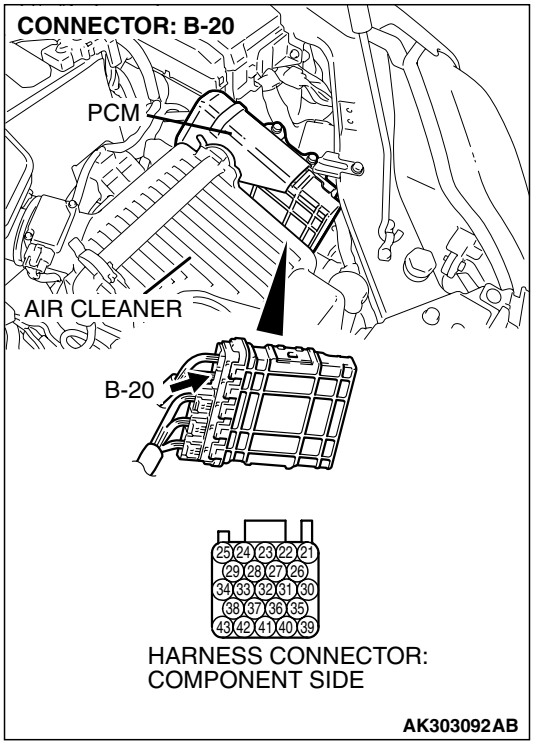
(3) Measure the voltage between terminal No. 3 and ground.
- Voltage should be between 4.5 and 4.9 volts

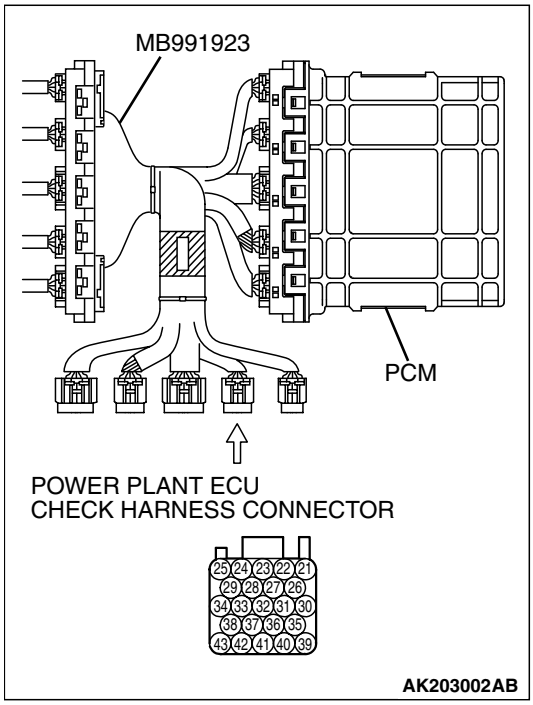
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 6.

NO : Go to Step 10.

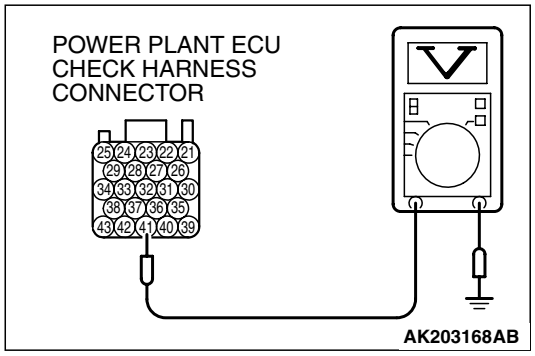




STEP 6. Measure the sensor supply voltage at PCM connector B-20 by using power plant ECU check harness special tool MB991923.

(1) Disconnect the all PCM connectors and connect power plant ECU check harness special tool MB991923 between the separated connectors.

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



(3) Measure the voltage between terminal No. 41 and ground.
- When fuel tank temperature is 0°C (32°F), voltage should be between 2.7 and 3.1 volts.
- When fuel tank temperature is 20°C (68°F), voltage should be between 2.1 and 2.5 volts.
- When fuel tank temperature is 40°C (104°F), voltage should be between 1.6 and 2.0 volts.
- When fuel tank temperature is 80°C (176°F), voltage should be between 0.8 and 1.2 volts.

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

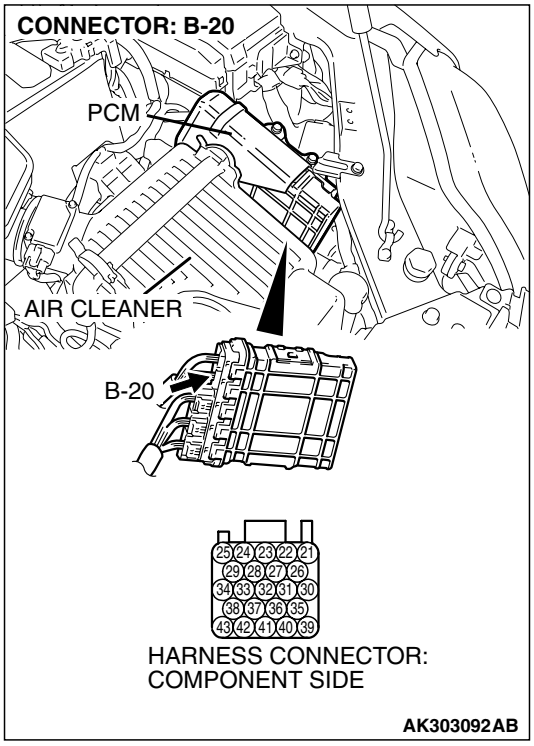
Q: Is the measured voltage normal?

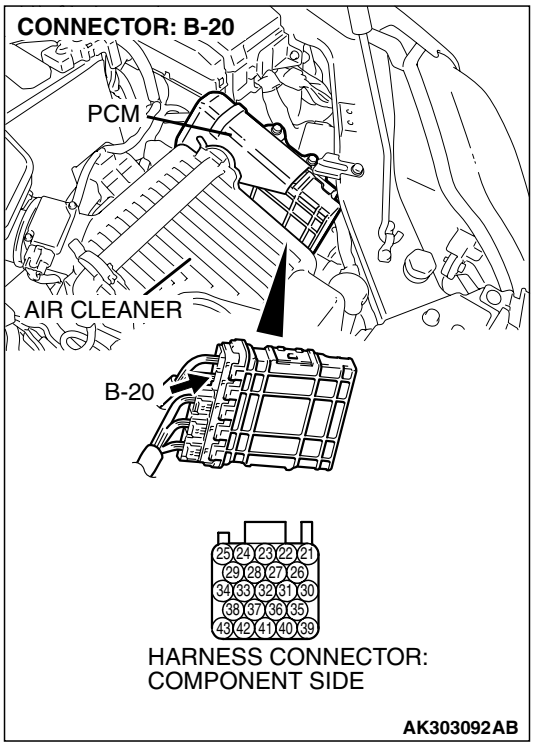
YES : Go to Step 7.
NO : Go to Step 8.

STEP 7. Check harness connector B-20 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Check harness connector C-25 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between fuel tank temperature sensor connector D-18 (terminal No. 3) and PCM connector B-20 (terminal No. 41) because of open circuit. Then go to Step 12.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.





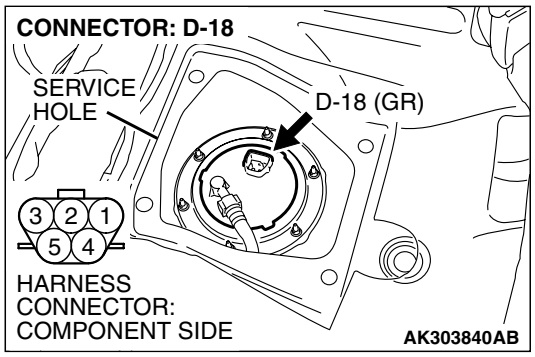
STEP 8. Check harness connector B-20 at PCM for damage.

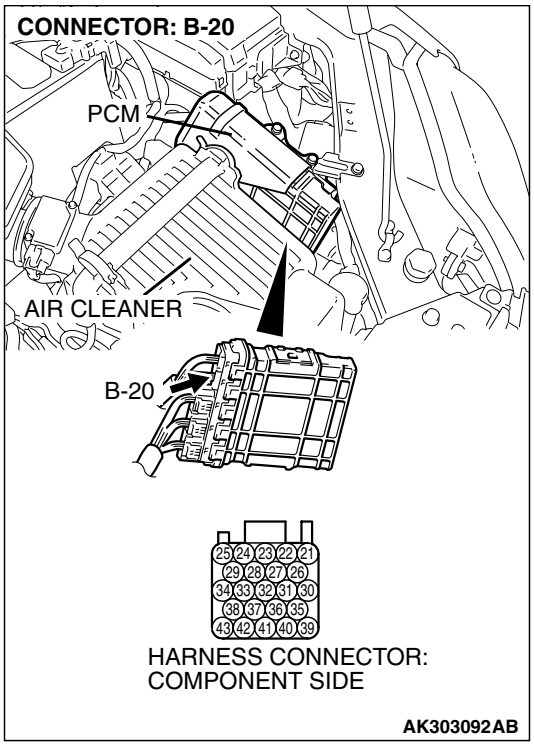
Q: Is the harness connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 9. Check for short circuit to ground between fuel tank temperature sensor connector D-18 (terminal No. 3) and PCM connector B-20 (terminal No. 41).

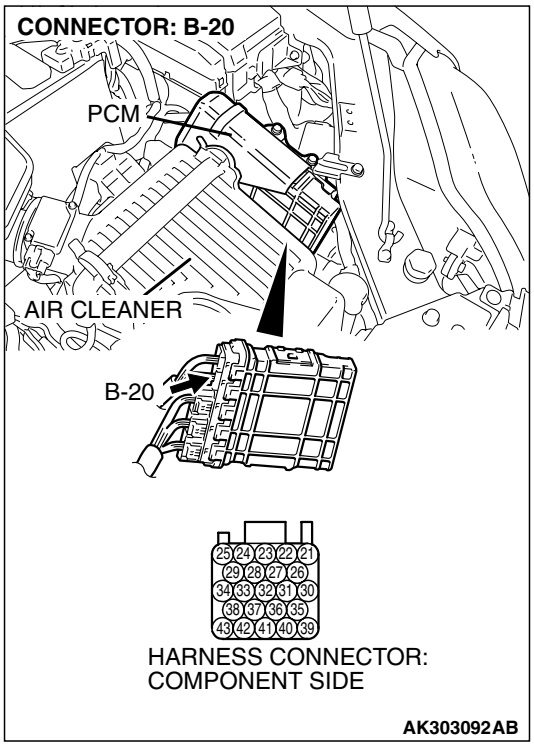




NOTE: Check harness after checking intermediate connector C-25. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 12.
NO : Repair it. Then go to Step 12.



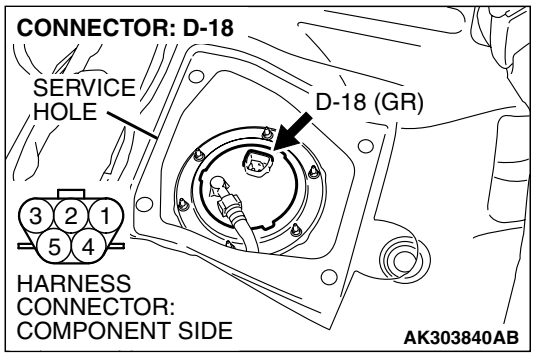
STEP 10. Check harness connector B-20 at PCM for damage.

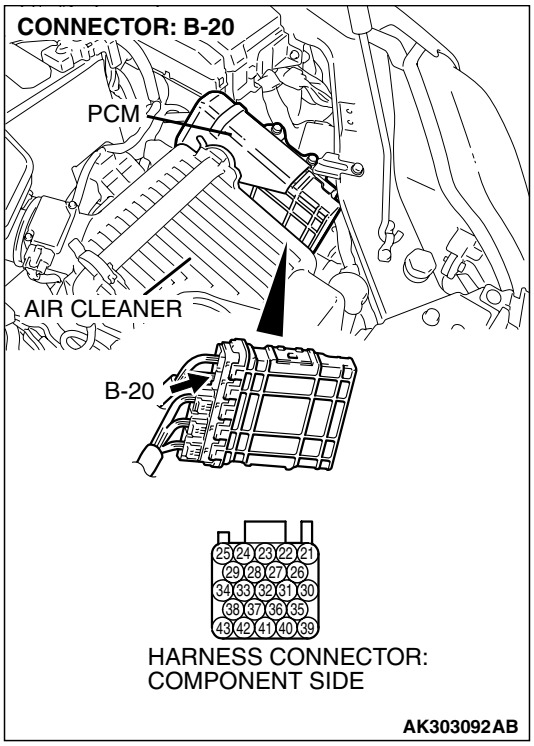
Q: Is the harness connector in good condition?

YES : Go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 11. Check for harness damage between fuel tank temperature sensor connector D-18 (terminal No. 3) and PCM connector B-20 (terminal No. 41).





NOTE: Check harness after checking intermediate connector C-25. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 12.
NO : Repair it. Then go to Step 12.

STEP 12. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0181 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

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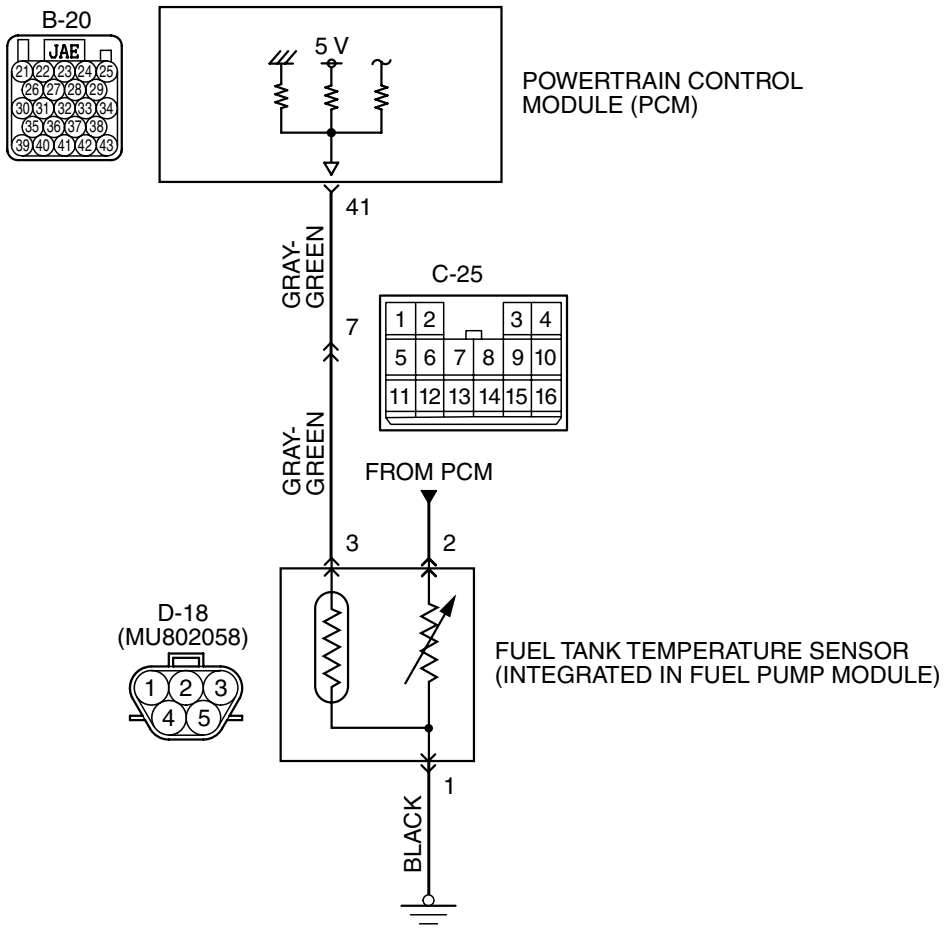
DTC P0182: Fuel Tank Temperature Sensor Circuit Low Input

Fuel Tank Temperature Sensor Circuit



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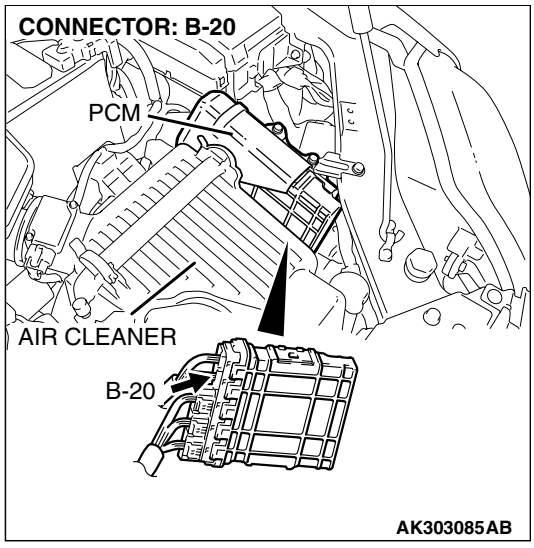

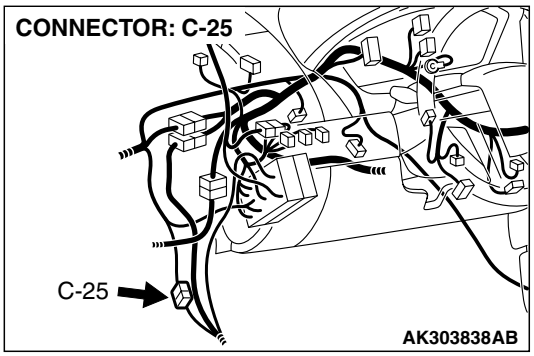

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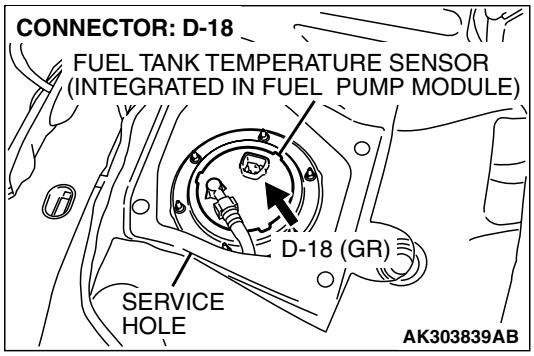


CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the PCM (terminal No. 41) via the resistor in the PCM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The PCM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature sensor output voltage is out of specified range.

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)

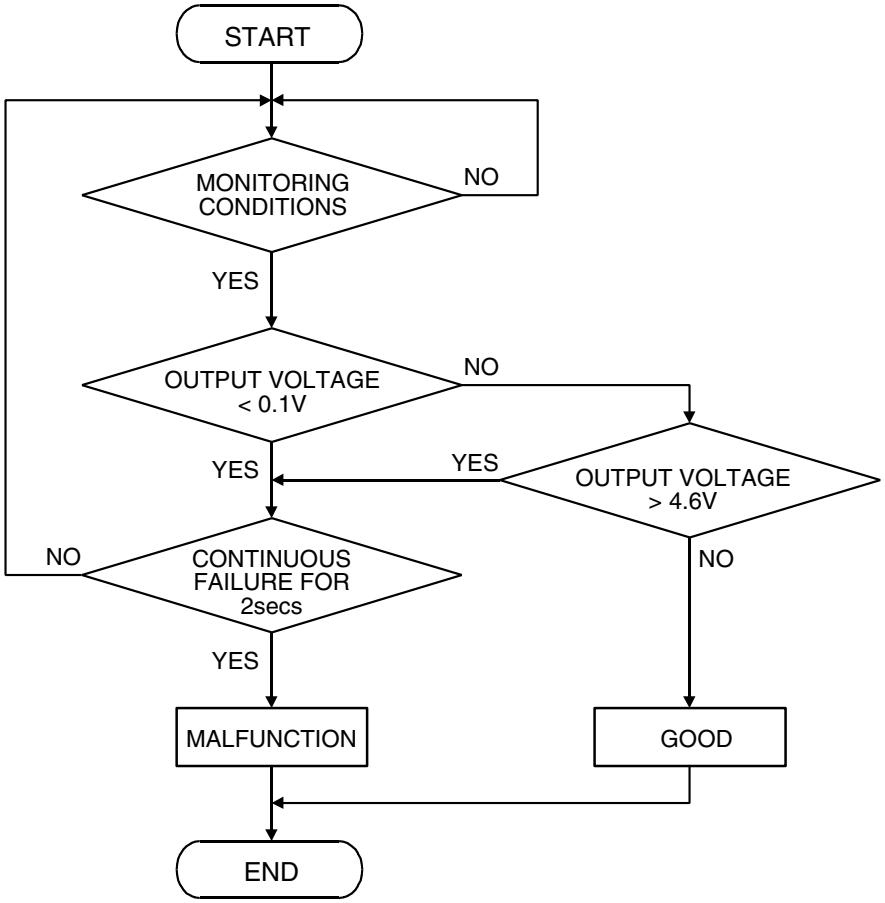
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK302030

Check Conditions

- 2 seconds or more have passed since the engine starting sequence was completed.

Judgement Criteria

- Sensor output voltage has continued to be 0.1 volt or lower for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

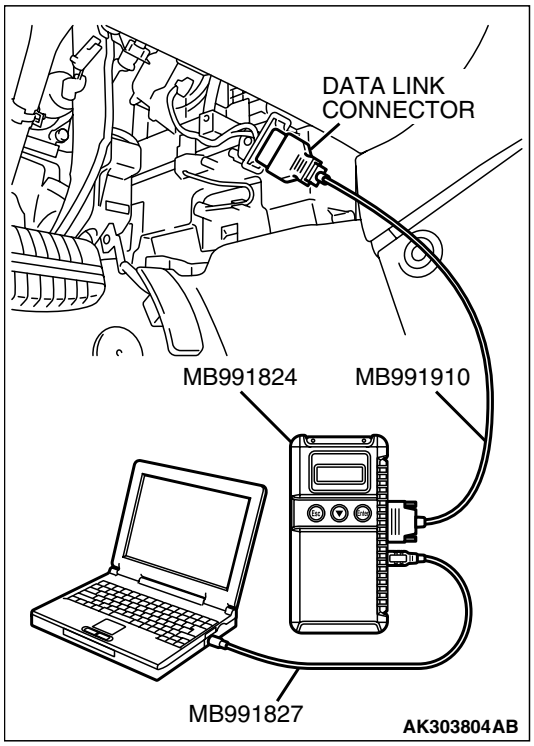
- Fuel tank temperature sensor failed.
- Shorted fuel tank temperature sensor circuit or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

TSB Revision



STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank 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.

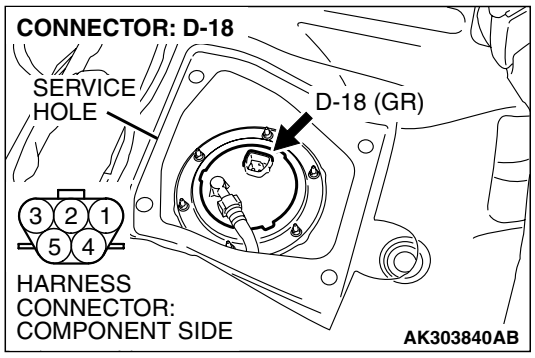
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 4A, Fuel Tank Temperature Sensor.
- Approximately the same as the ambient air temperature when the engine is cooled.

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

Q: Is the sensor operating properly?

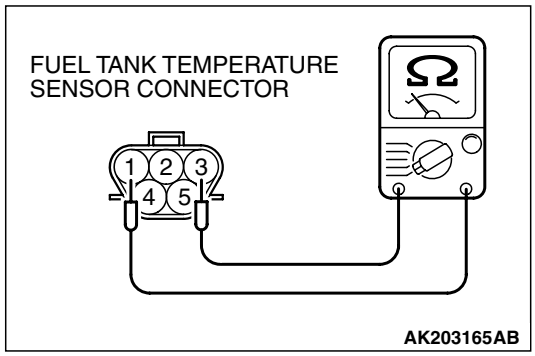
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Go to Step 2.



STEP 2. Check the fuel tank temperature sensor.

(1) Disconnect the fuel tank temperature sensor connector D-18.



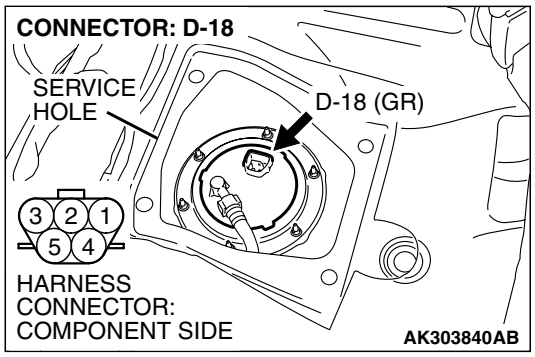
(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

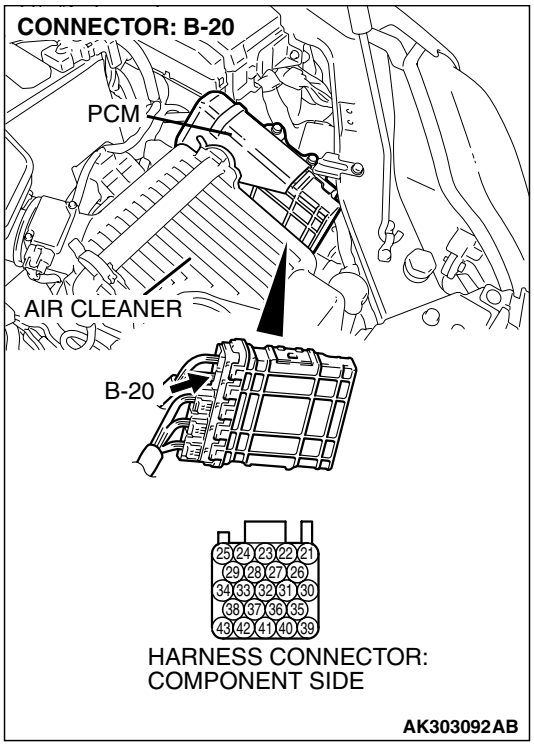
Standard value:
0.5 – 12.0 kΩ

Q: Is the measured resistance between 0.5 and 12.0 kΩ?

YES : Go to Step 3.

NO : Replace the fuel tank temperature sensor. Then go to Step 5.





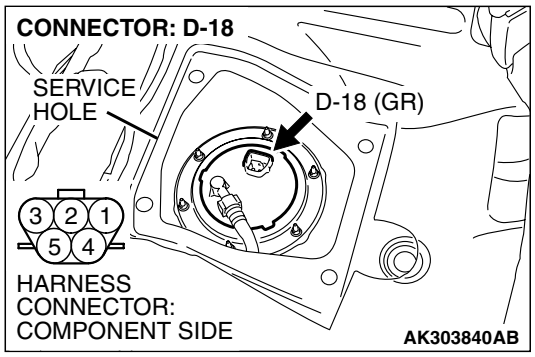
STEP 3. Check harness connector D-18 at the fuel tank temperature sensor and harness connector B-20 at PCM for damage.

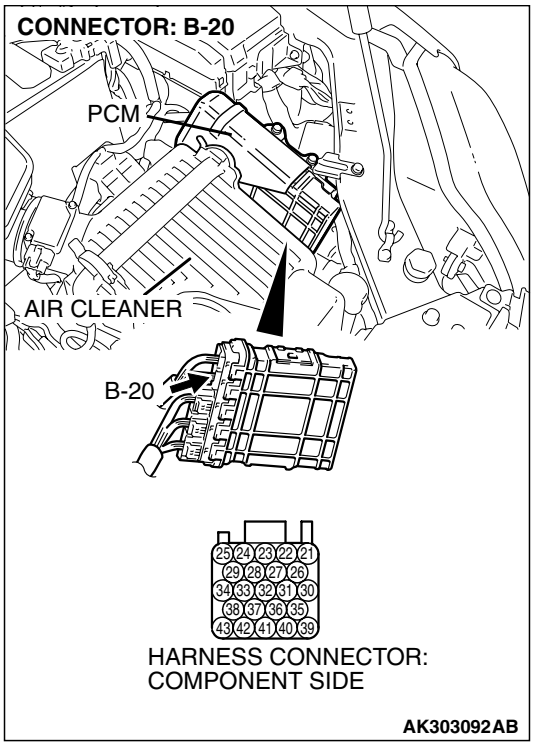
Q: Is the harness connector in good condition?

YES : Go to Step 4.

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

STEP 4. Check for short circuit to ground between fuel tank temperature sensor connector D-18 and PCM connector B-20.





NOTE: Check harness after checking intermediate connector C-25. If the intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 5.

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 5.
NO : Repair it. Then go to Step 5.

STEP 5. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

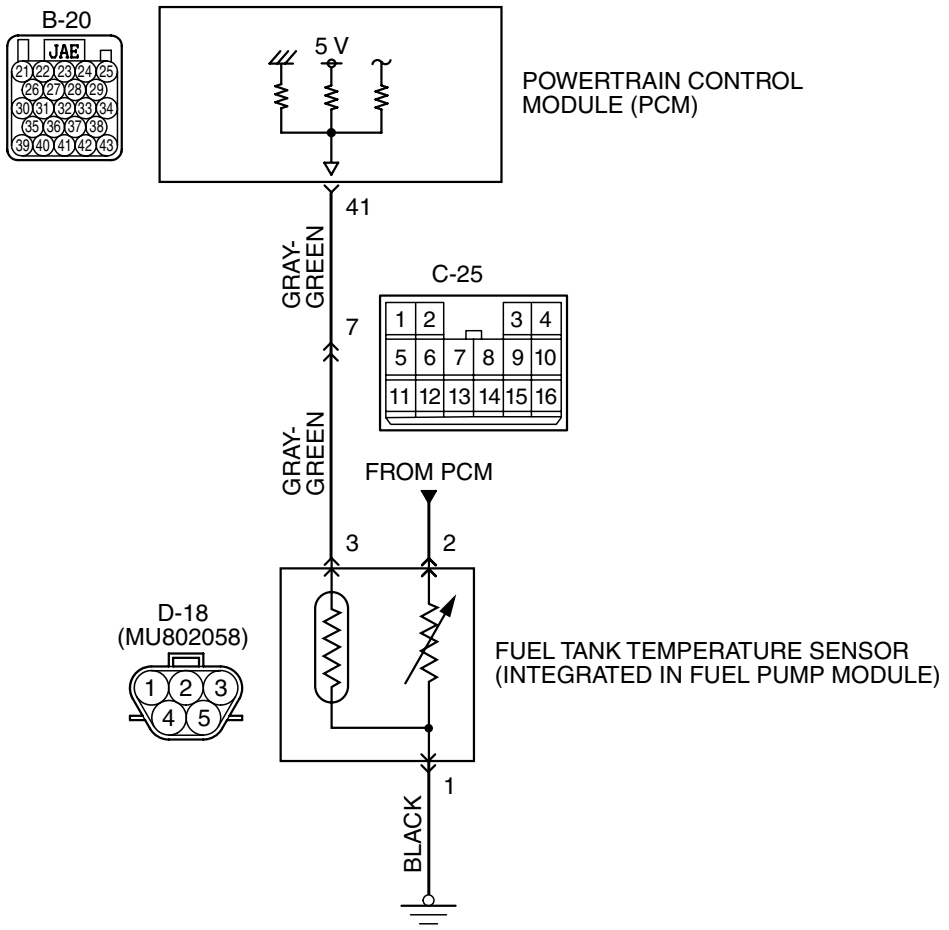
Q: Is DTC P0182 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

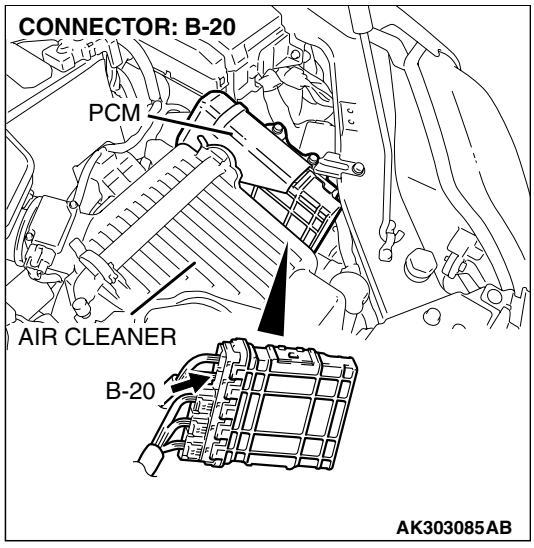
TSB Revision

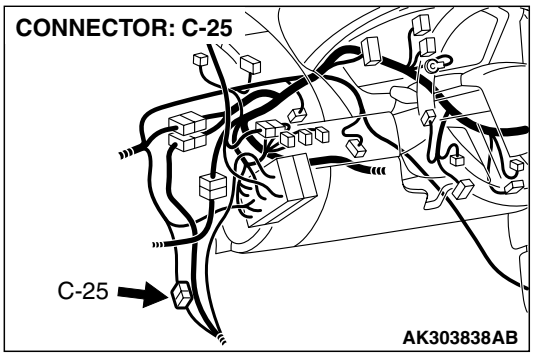
DTC P0183: Fuel Tank Temperature Sensor Circuit High Input

Fuel Tank Temperature Sensor Circuit

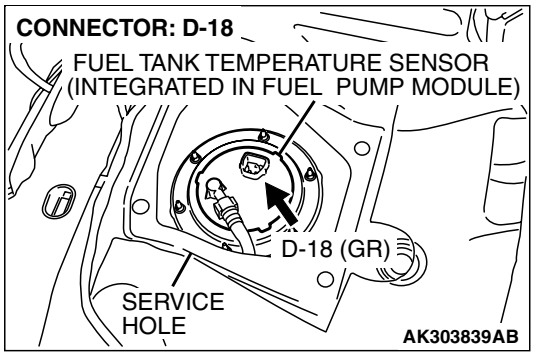


AK400883





TSB Revision



CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the PCM (terminal No. 41) via the resistor in the PCM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The PCM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature sensor output voltage is out of specified range.

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)

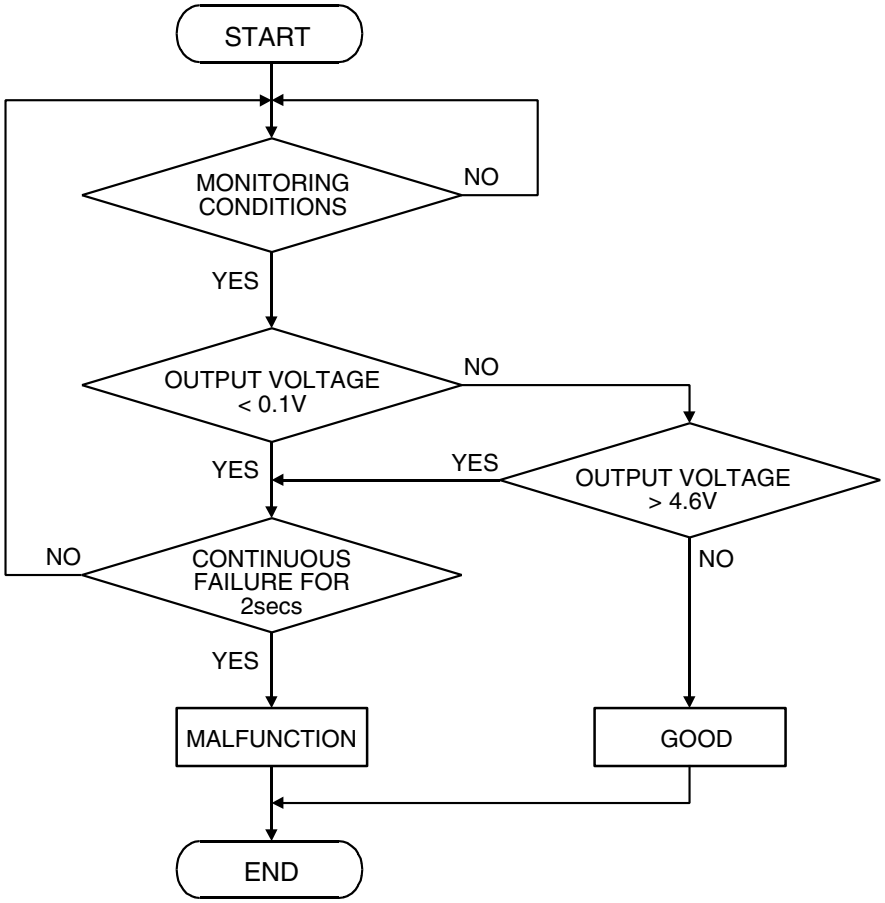
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK302030

Check Conditions

- 2 seconds or more have passed since the engine starting sequence was completed.

Judgement Criteria

- Sensor output voltage has continued to be 4.6 volts or higher for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

- Fuel tank temperature sensor failed.
- Open fuel tank temperature sensor circuit, harness damage, or connector damage.
- PCM failed.

DIAGNOSIS

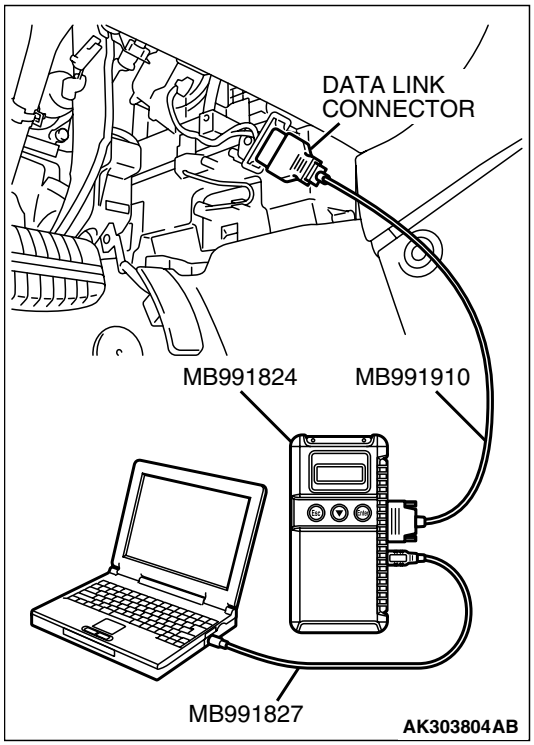
Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank 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.



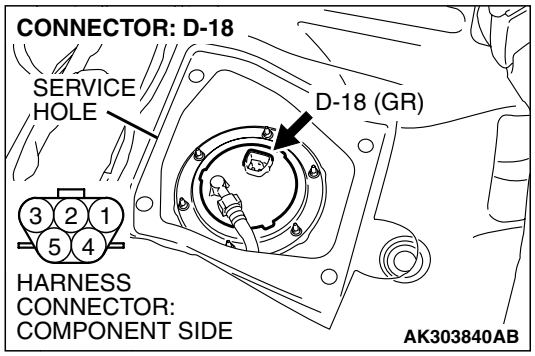
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 4A, Fuel Tank Temperature Sensor.
  - Approximately the same as the ambient air temperature when the engine is cooled.
(4) Turn the 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 Malfunctions P.00-14.

NO : Go to Step 2.

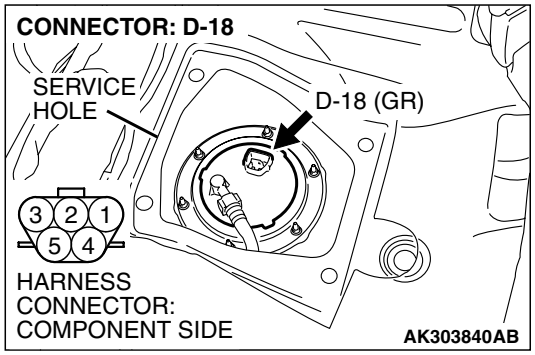
STEP 2. Check harness connector D-18 at the fuel tank temperature sensor for damage.



Q: Is the harness connector in good condition?

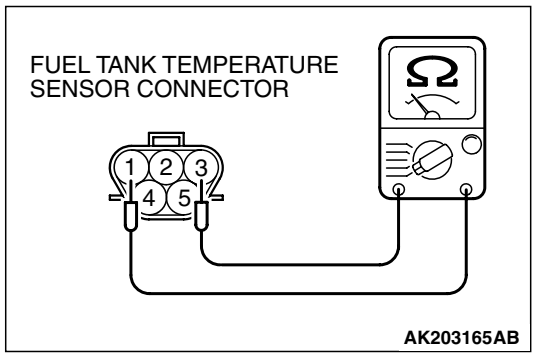
YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.



STEP 3. Check the fuel tank temperature sensor.

(1) Disconnect the fuel tank temperature sensor connector D-18.



(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

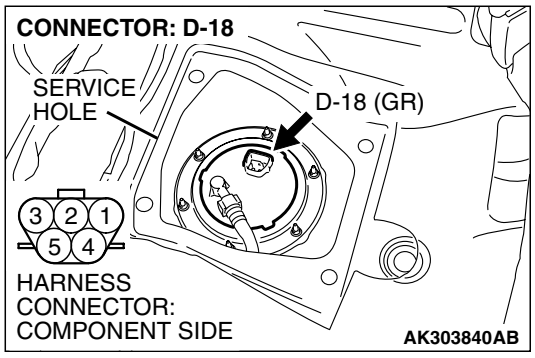
Standard value:
0.5 – 12.0 kΩ

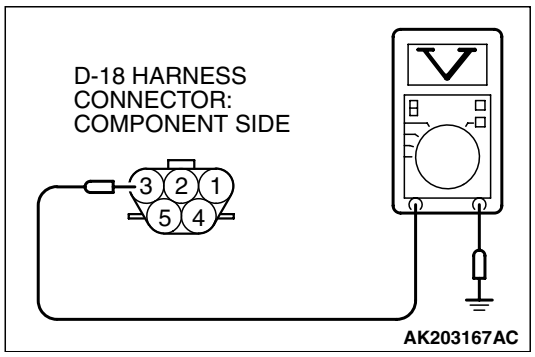
Q: Is the measured resistance between 0.5 and 12.0 kΩ?

YES : Go to Step 4.
NO : Replace the fuel tank temperature sensor. Then go to Step 11.

STEP 4. Check the sensor supply voltage at fuel tank temperature sensor harness side connector D-18.

(1) Disconnect the connector D-18 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



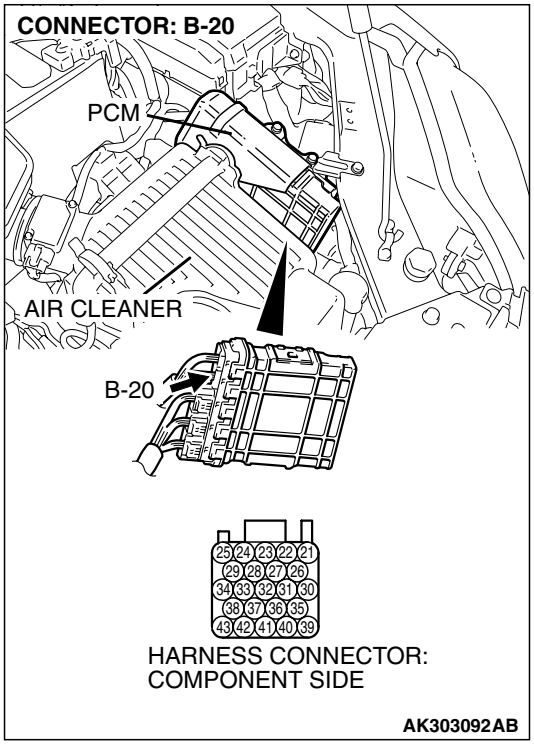


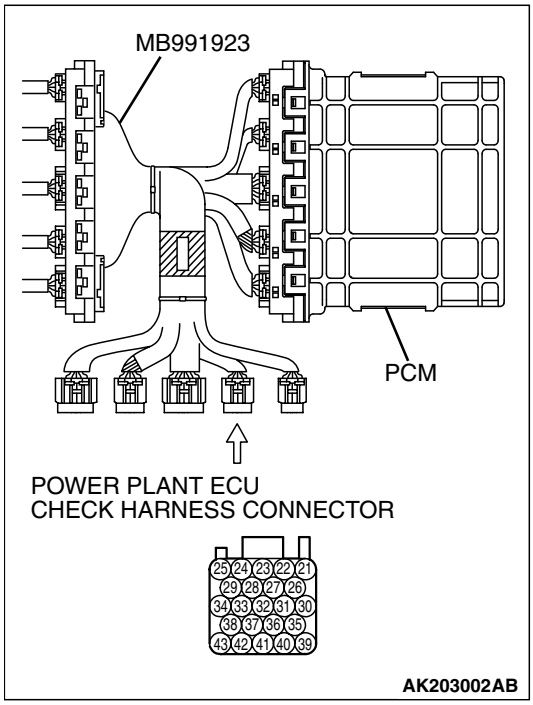
(3) Measure the voltage between terminal No. 3 and ground.
- Voltage should be between 4.5 and 4.9 volts.

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

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

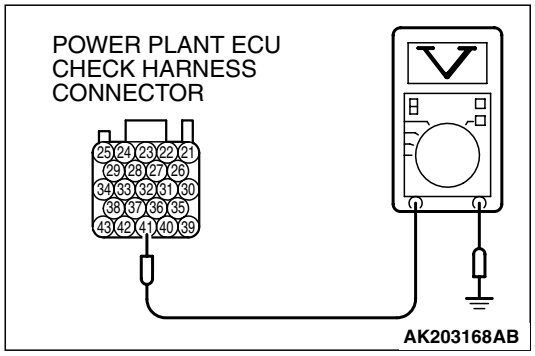
YES : Go to Step 8.
NO : Go to Step 5.





STEP 5. Check the sensor supply voltage at PCM connector B-20 by using power plant ECU check harness special tool MB991923.

(1) Disconnect the all PCM connectors and connect power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Disconnect the fuel tank temperature sensor connector D-18.
(3) Turn the ignition switch to the "ON" position.

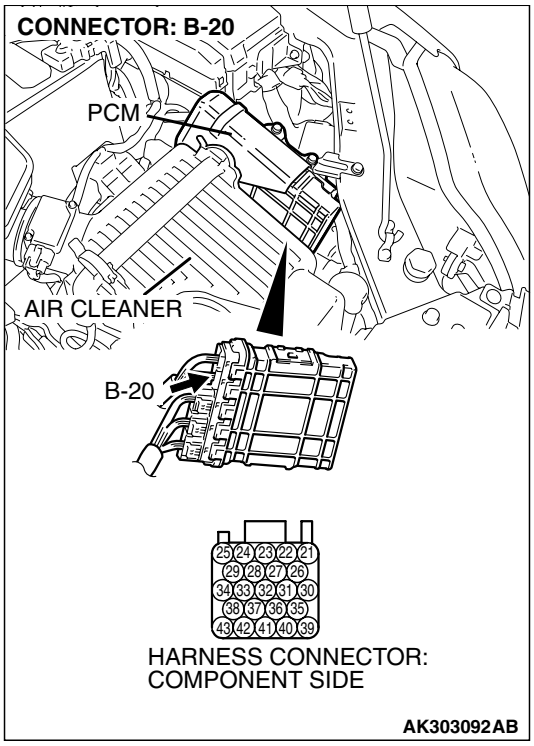


(4) Measure the voltage between terminal No. 41 and ground.
- Voltage should be between 4.5 and 4.9 volts.

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

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

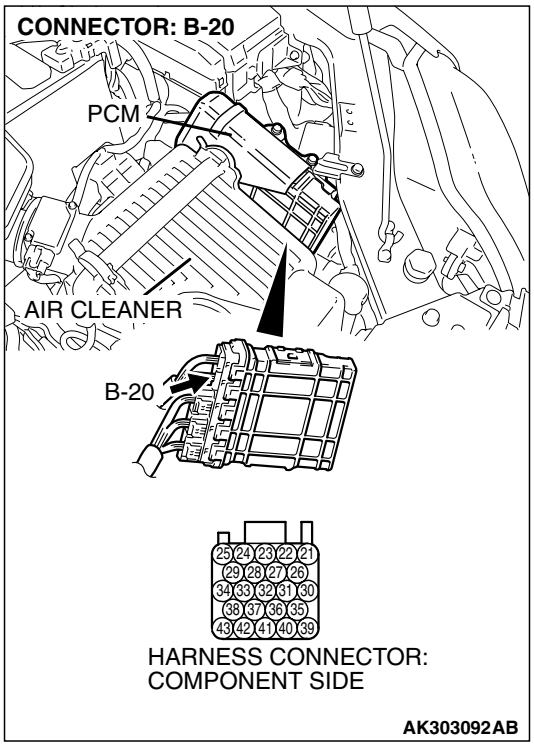
YES : Go to Step 6.
NO : Go to Step 7.



STEP 6. Check harness connector B-20 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Check harness connector C-25 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the intermediate connector is in good condition, repair the harness wire between fuel tank temperature sensor connector D-18 and PCM connector B-20 because of open circuit. Then go to Step 11.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

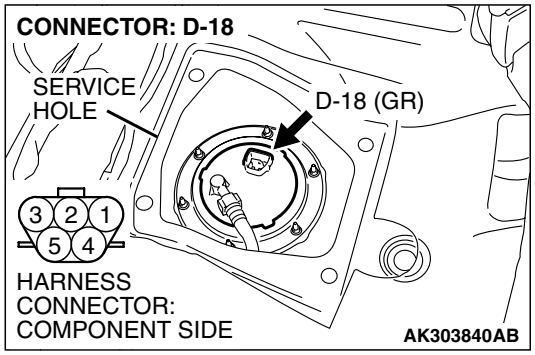


STEP 7. Check harness connector B-20 at PCM for damage.

Q: Is the harness connector in good condition?

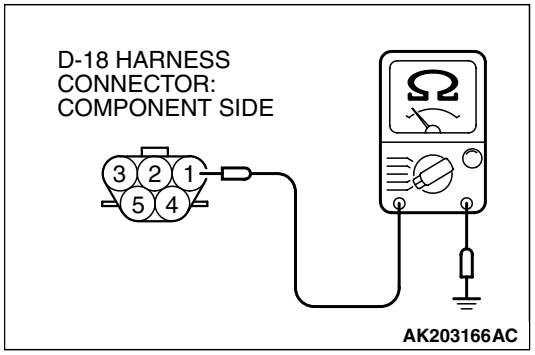
YES : Replace the PCM. Then go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.



STEP 8. Check the continuity at fuel tank temperature sensor harness side connector D-18.

(1) Disconnect the connector D-18 and measure at the harness side.



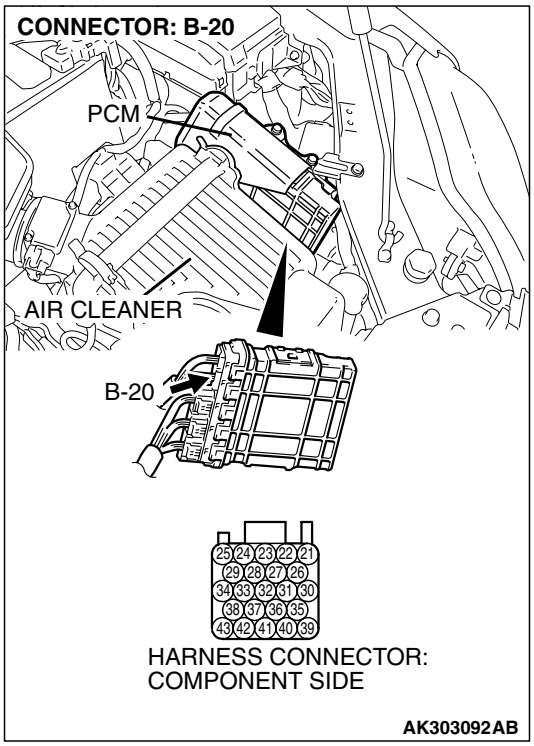
(2) Check for the continuity between terminal No. 1 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 9.

NO : Repair harness wire between fuel tank temperature sensor connector D-18 (terminal No. 1) and ground because of open circuit or harness damage. Then go to Step 11.



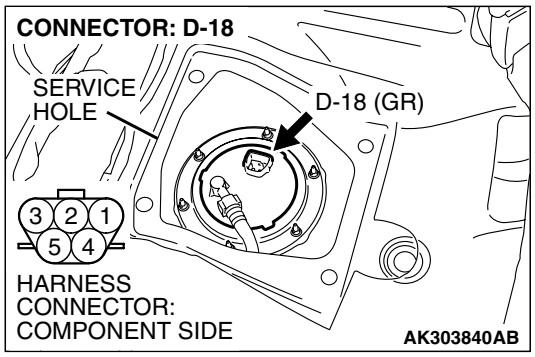
STEP 9. Check harness connector B-20 at PCM for damage.

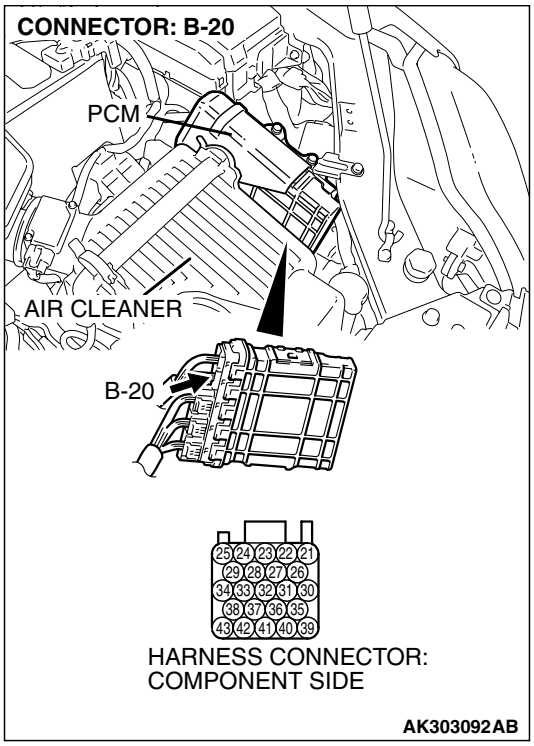
Q: Is the harness connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

STEP 10. Check for open circuit and harness damage between fuel tank temperature sensor connector D-18 and PCM connector B-20.





NOTE: Check harness after checking intermediate connector C-25. If the intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 11.
NO : Repair it. Then go to Step 11.

STEP 11. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0183 set?

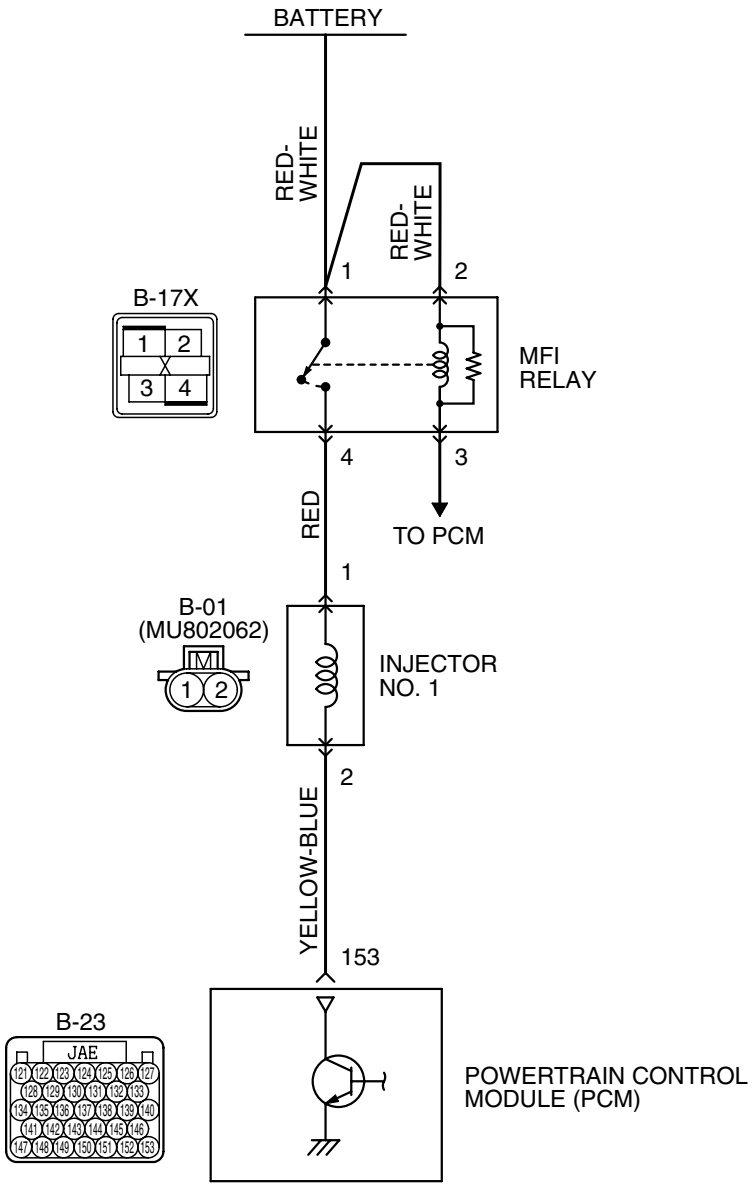
YES : Retry the troubleshooting.
NO : The inspection is complete.

TSB Revision

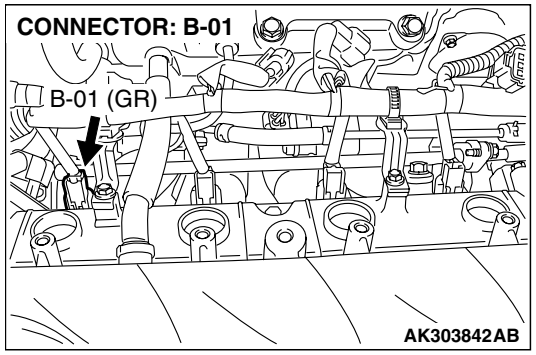
DTC P0201: Injector Circuit-Cylinder 1

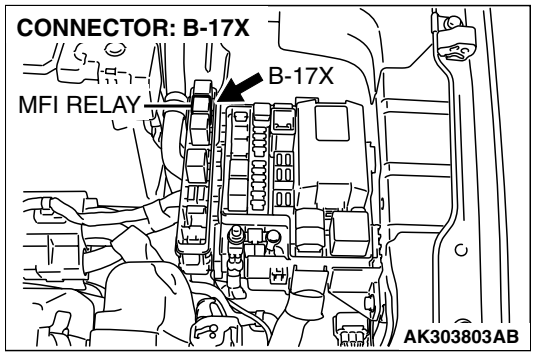
⚠ CAUTION
If DTC P0201 has been set, TCL related DTC U1120 is also set. After P0201 has been diagnosed, don't forget to erase DTC U1120.

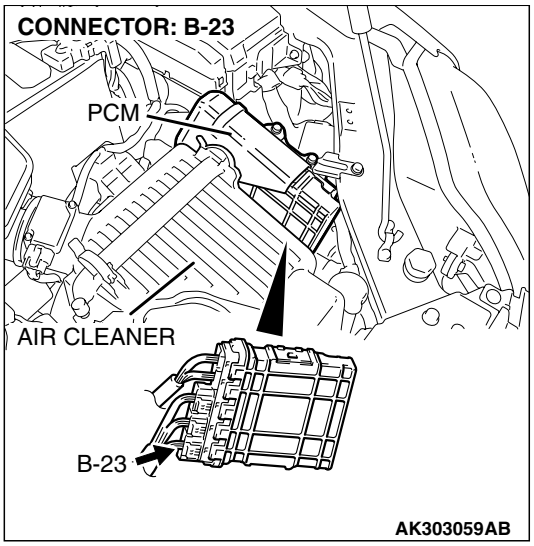
Injector Circuit-Cylinder 1



AK400884







CIRCUIT OPERATION

- The injector power is supplied from the MFI relay (terminal No. 4).
- The PCM controls the injector by turning the power transistor in the PCM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the PCM.
- A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off.
- The PCM checks this surge voltage.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after injector is operated.

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)

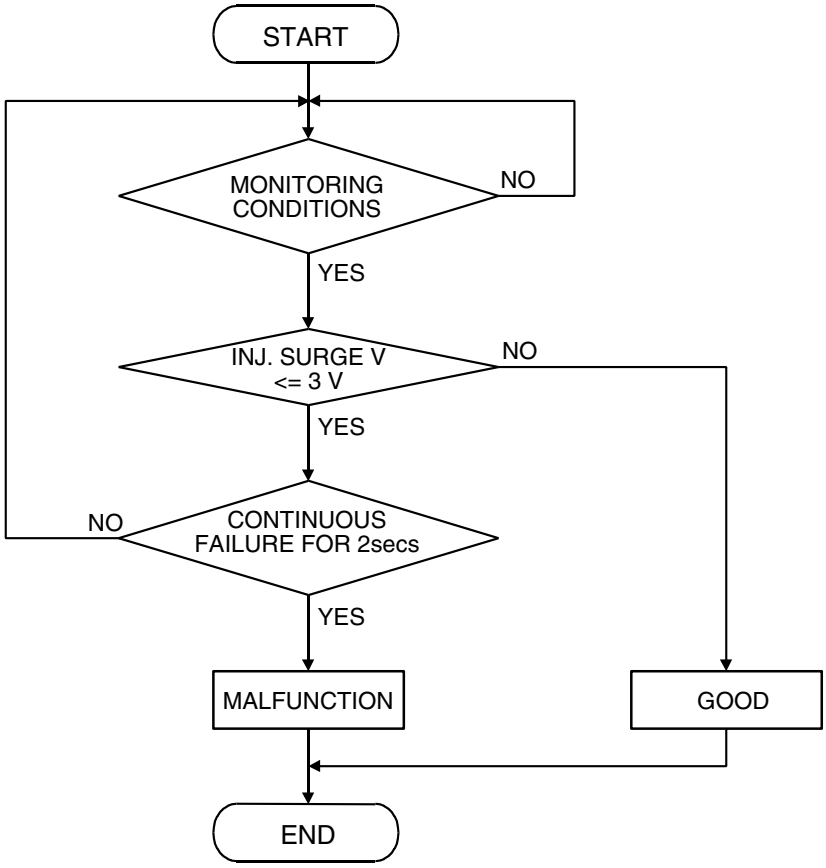
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted low>

Logic Flow Chart



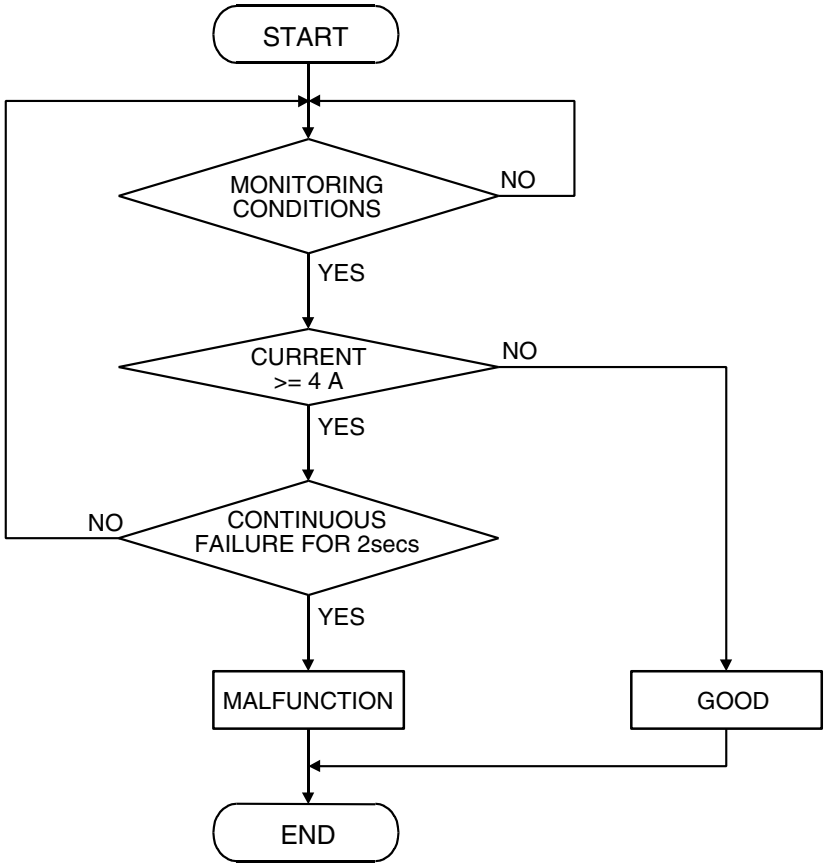
AK401614

Check Conditions
- Engine is running.

Judgment Criteria
- The supply voltage is 3 volts or less without the injector driving.

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted high>

Logic Flow Chart



AK401592

Check Conditions

- Engine is running.

Judgement Criteria

- The coil current is 4 ampere or more with the injector driving.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

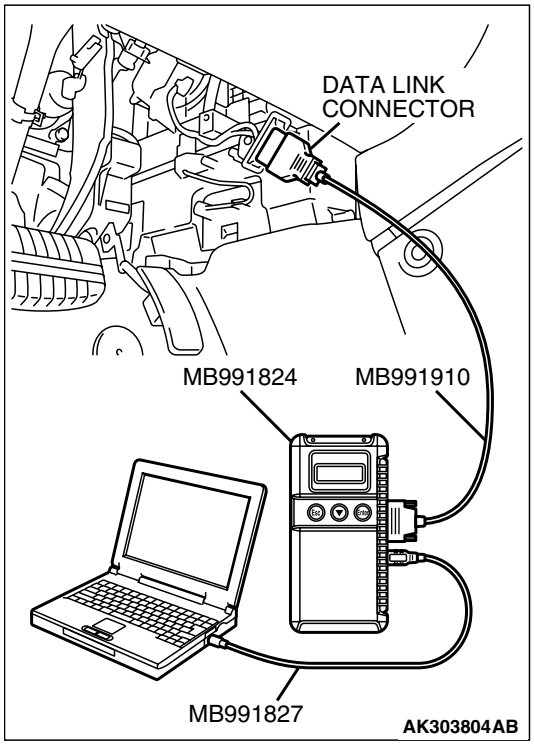
- No.1 cylinder injector failed.
- Open or shorted No. 1 cylinder injector circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check actuator test item 01: No. 1 Injector.



⚠ 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.

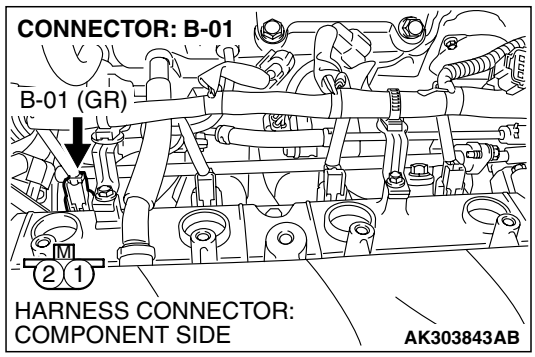
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 01 No. 1 injector.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - The idle should become slightly rougher.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator 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.00-14.

NO : Go to Step 2.

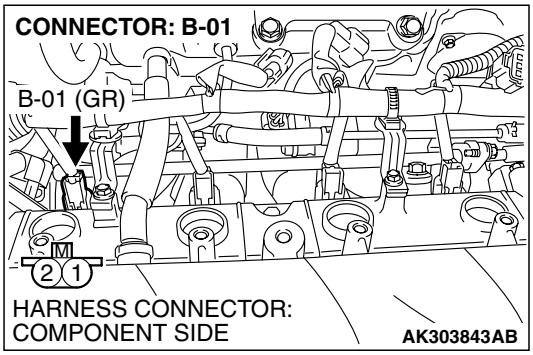
STEP 2. Check harness connector B-01 at No. 1 cylinder injector for damage.



Q: Is the harness connector in good condition?

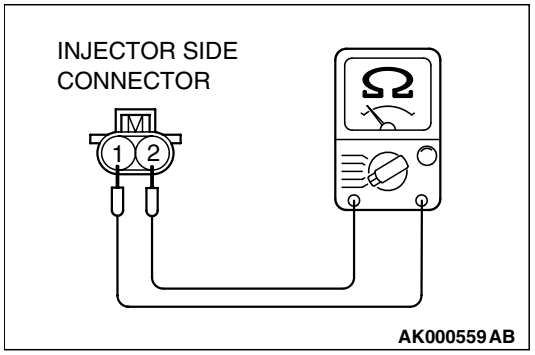
YES : Go to Step 3.

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



STEP 3. Check the No. 1 cylinder injector.

(1) Disconnect the No. 1 cylinder injector connector B-01.



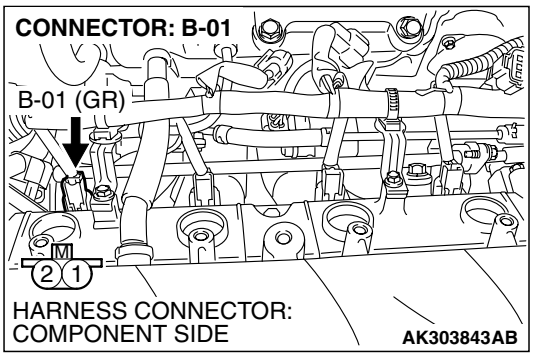
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 4.

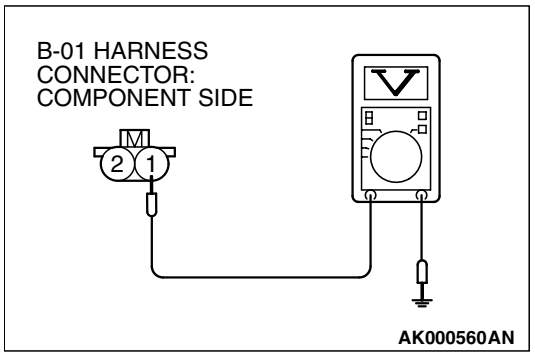
NO : Replace the No. 1 cylinder injector. Then go to Step 10.



STEP 4. Measure the power supply voltage at No. 1 cylinder injector connector.

(1) Disconnect connector B-01 and measure at the harness side.

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



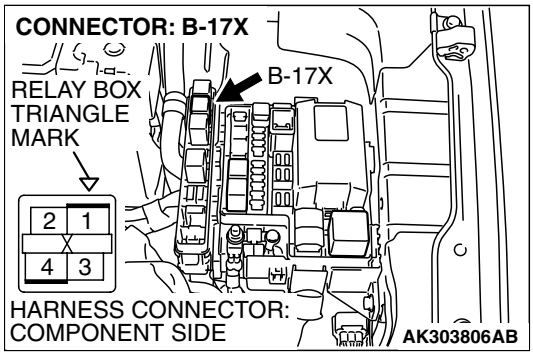
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.

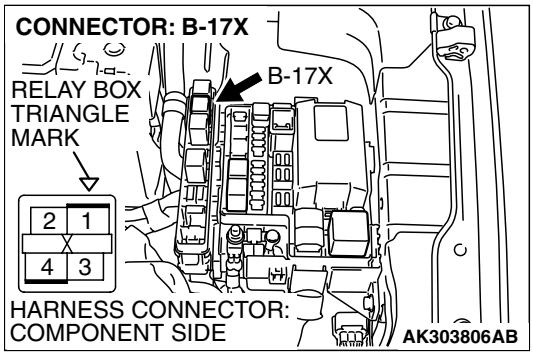


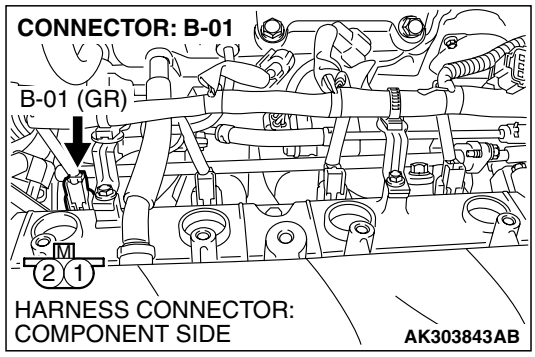
STEP 5. Check harness connector B-17X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and No. 1 cylinder injector connector B-01 (terminal No. 1). Then go to Step 10.

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



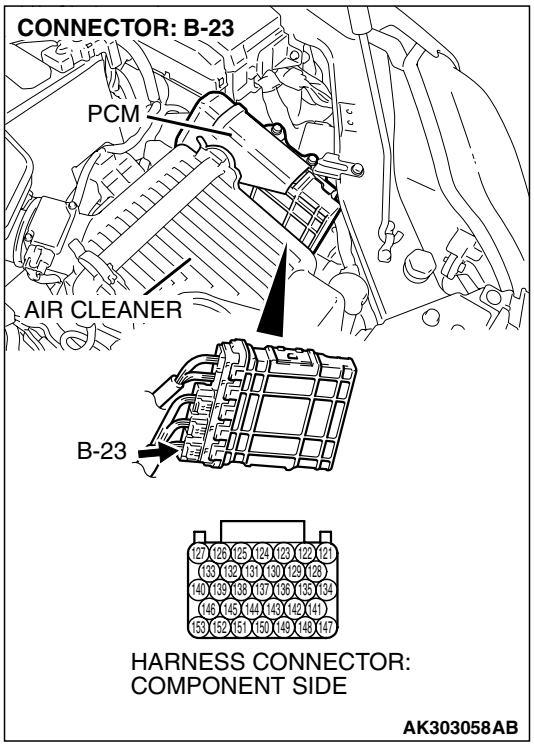


STEP 6. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and No. 1 cylinder injector connector B-01 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 10.

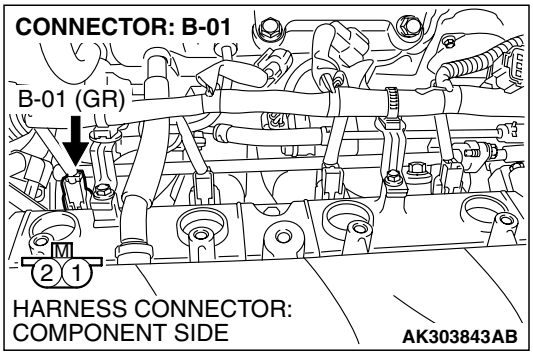


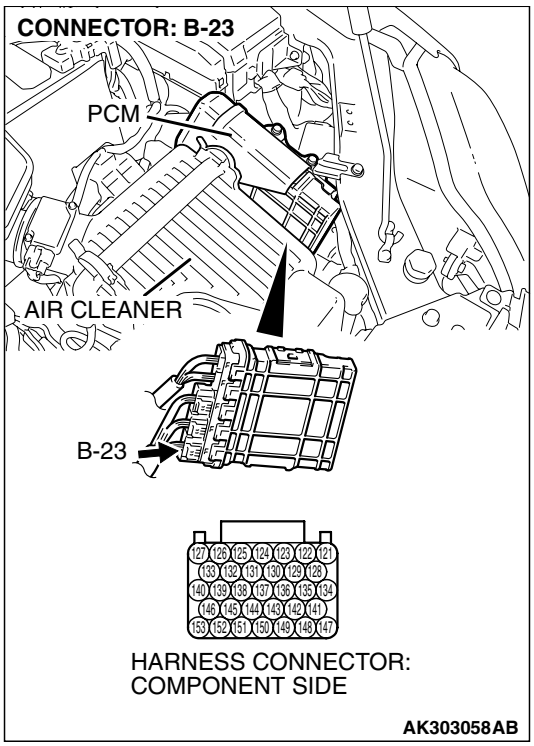
STEP 7. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

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



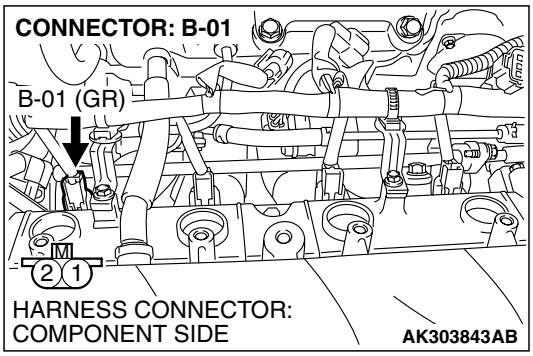


STEP 8. Check for open circuit and short circuit to ground and harness damage between No. 1 cylinder injector connector B-01 (terminal No. 2) and PCM connector B-23 (terminal No. 153).

Q: Is the harness wire in good condition?

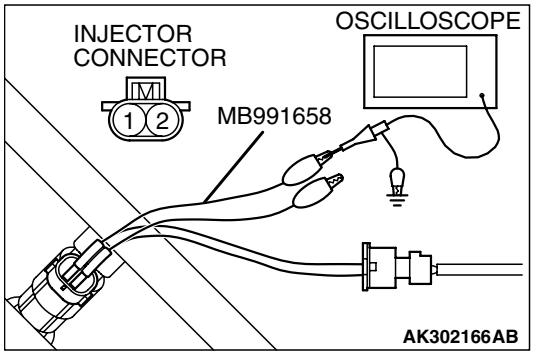
YES : Go to Step 9.

NO : Repair it. Then go to Step 10.



STEP 9. Using the oscilloscope, check the No. 1 cylinder injector.

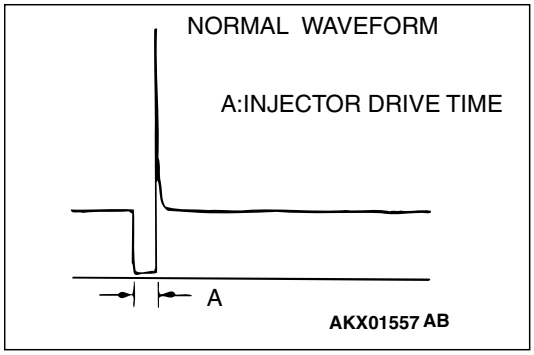
(1) Disconnect the No. 1 cylinder injector connector B-01 and connect the test harness special tool MB991658 between the separated connectors. (All terminals should be connected.)



(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 153.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-14.

NO : Replace the PCM. Then go to Step 10.

STEP 10. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0201 set?

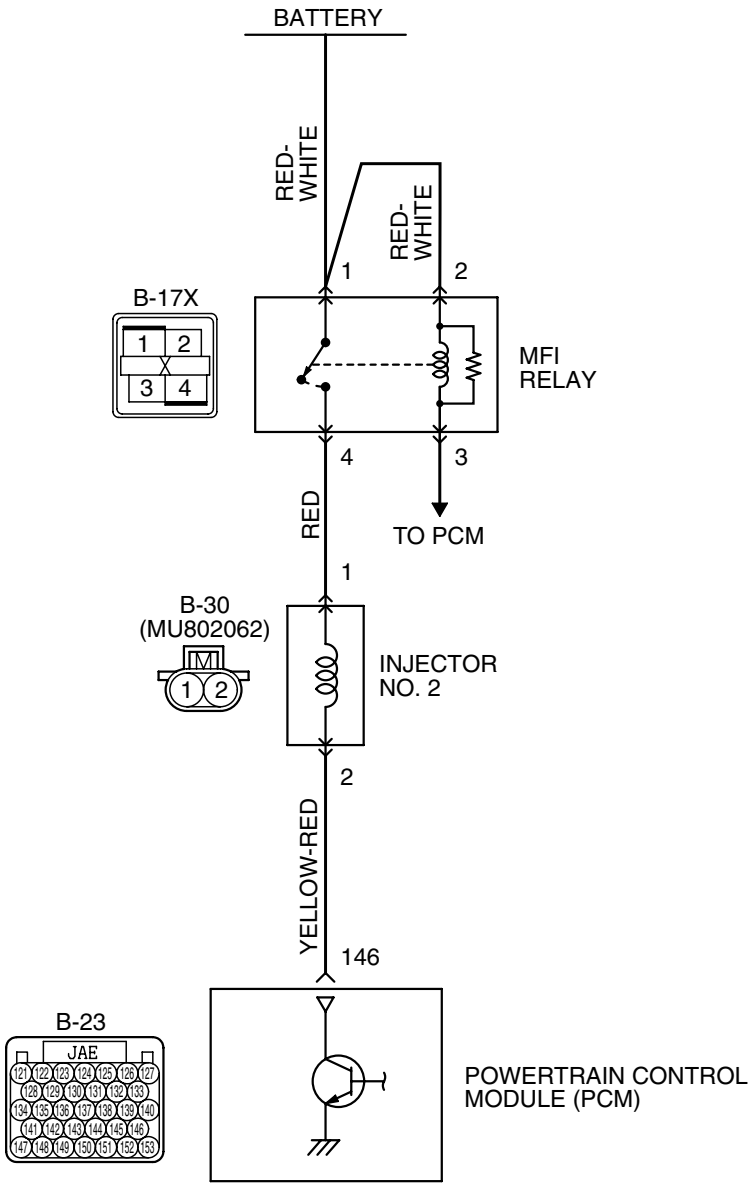
YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0202: Injector Circuit-Cylinder 2

⚠ CAUTION
If DTC P0202 has been set, TCL related DTC U1120 is also set. After P0202 has been diagnosed, don't forget to erase DTC U1120.

Injector Circuit-Cylinder 2



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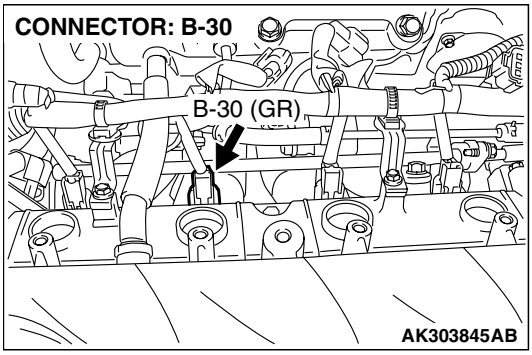
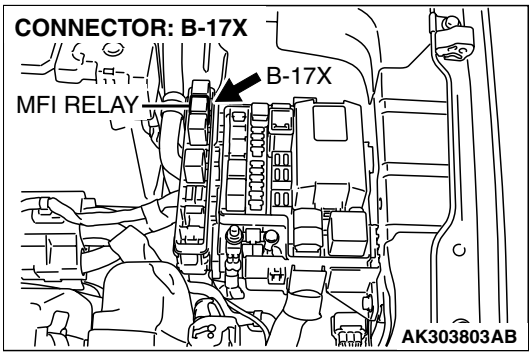
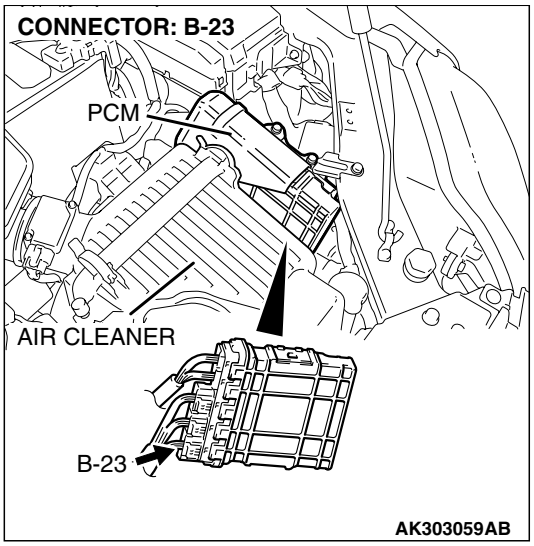






CIRCUIT OPERATION

- The injector power is supplied from the MFI relay (terminal No. 4).
- The PCM controls the injector by turning the power transistor in the PCM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the PCM.
- A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off.
- The PCM checks this surge voltage.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after injector is operated.

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)

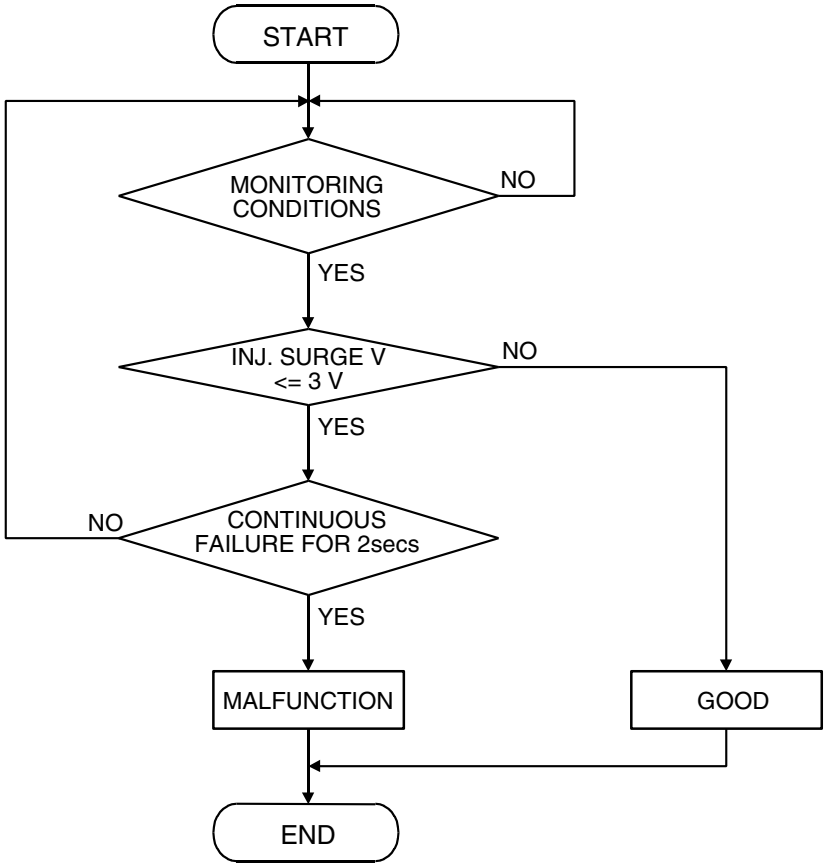
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted low>

Logic Flow Chart



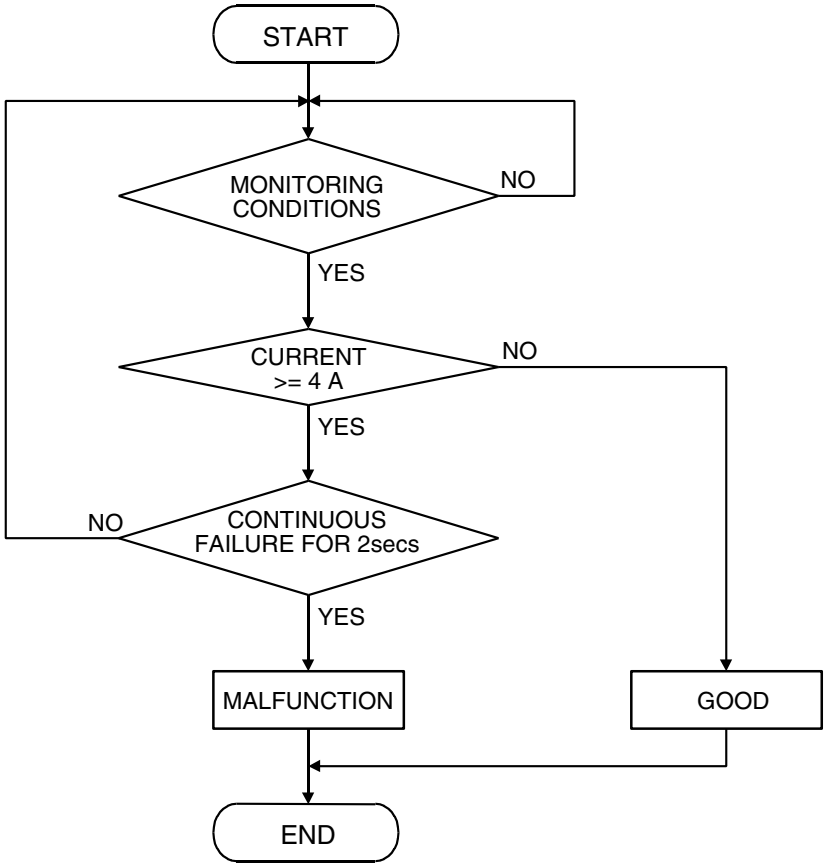
AK401614

Check Conditions
- Engine is running.

Judgment Criteria
- The supply voltage is 3 volts or less without the injector driving.

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted high>

Logic Flow Chart



AK401592

Check Conditions
- Engine is running.

Judgement Criteria
- The coil current is 4 ampere or more with the injector driving.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

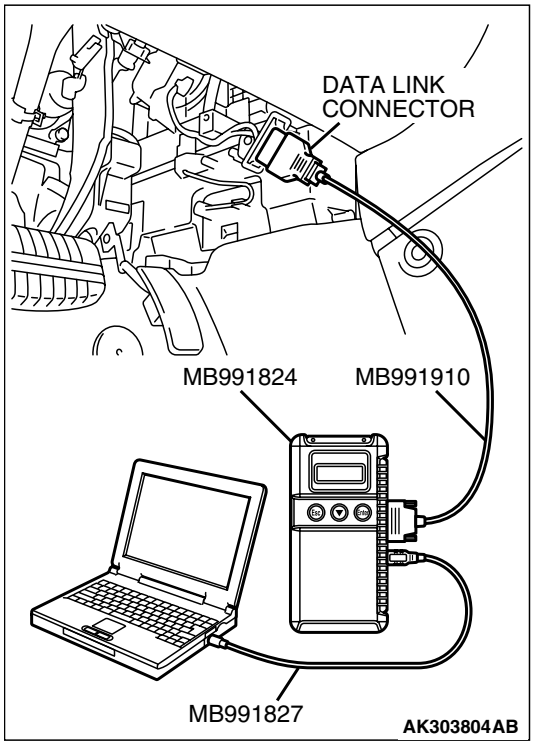
- No.2 cylinder injector failed.
- Open or shorted No.2 cylinder injector circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check actuator test item 02: No. 2 Injector.



⚠ 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.

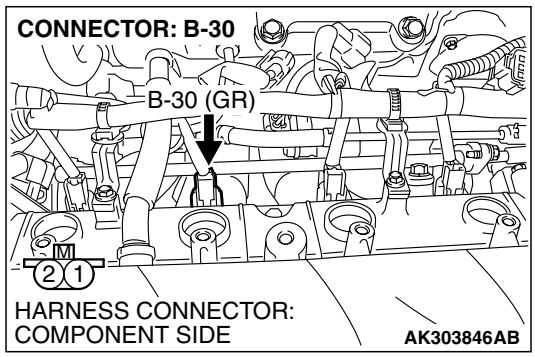
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 02 No. 2 injector.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - The idle should become slightly rougher.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator 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.00-14.

NO : Go to Step 2.

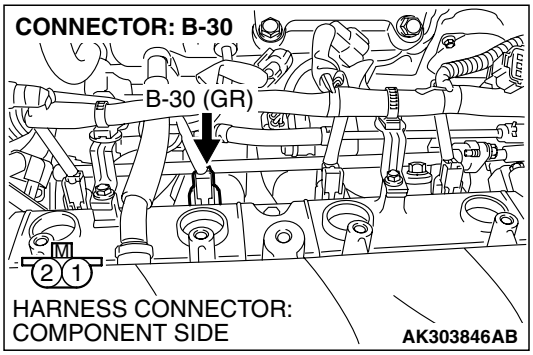
STEP 2. Check harness connector B-30 at No. 2 cylinder injector for damage.



Q: Is the harness connector in good condition?

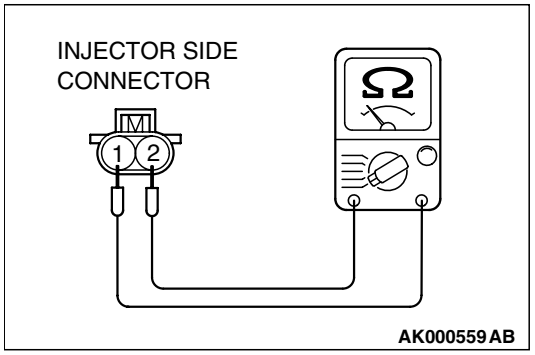
YES : Go to Step 3.

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



STEP 3. Check the No. 2 cylinder injector.

(1) Disconnect the No. 2 cylinder injector connector B-30.



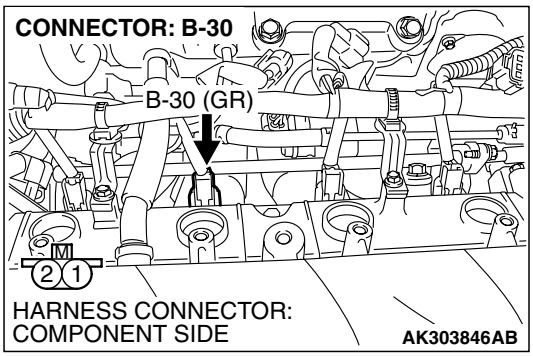
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 4.

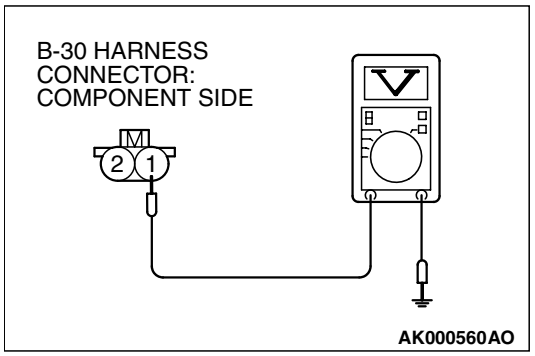
NO : Replace the No. 2 cylinder injector. Then go to Step 10.



STEP 4. Measure the power supply voltage at No. 2 cylinder injector connector.

(1) Disconnect connector B-30 and measure at the harness side.

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



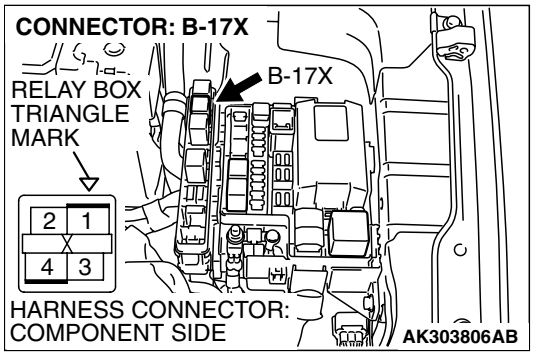
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.

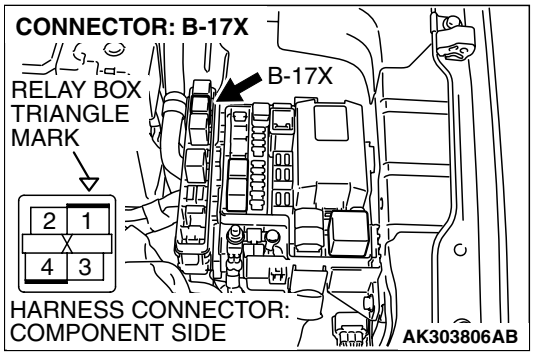


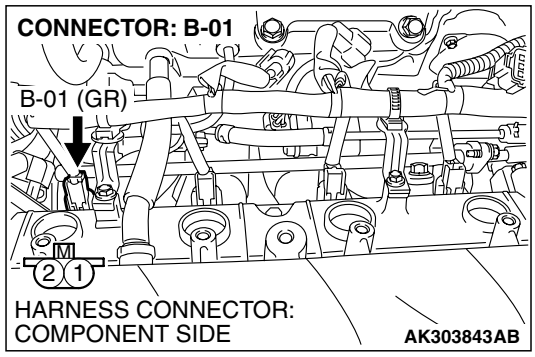
STEP 5. Check harness connector B-17X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and No. 2 cylinder injector connector B-30 (terminal No. 1). Then go to Step 10.

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



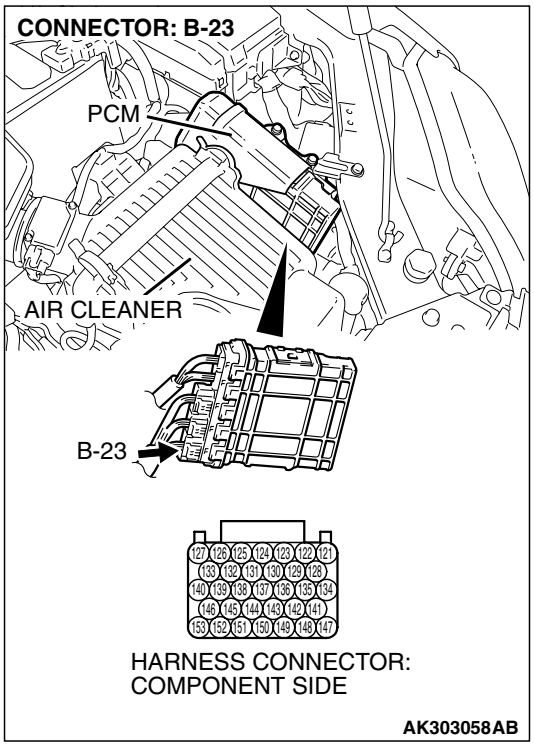


STEP 6. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and No. 2 cylinder injector connector B-30 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 10.

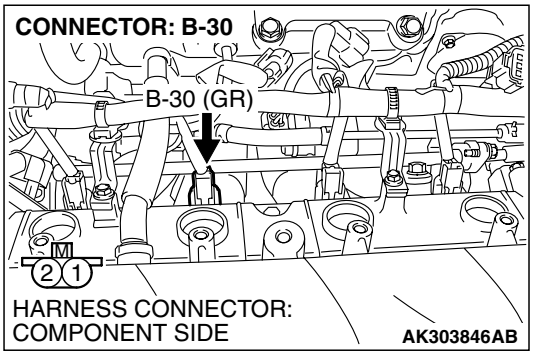


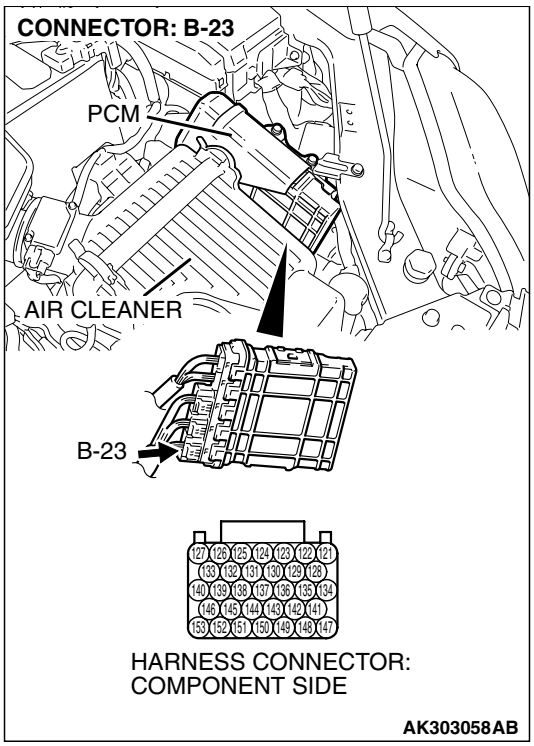
STEP 7. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

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



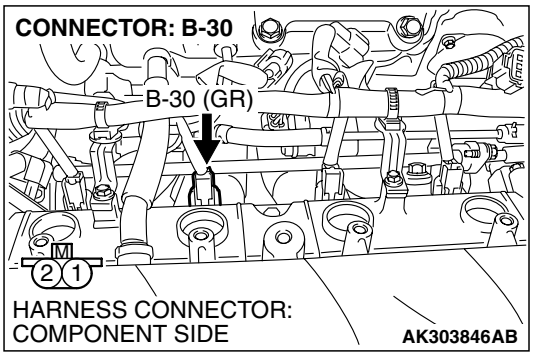


STEP 8. Check for open circuit and short circuit to ground and harness damage between No. 2 cylinder injector connector B-30 (terminal No. 2) and PCM connector B-23 (terminal No. 146).

Q: Is the harness wire in good condition?

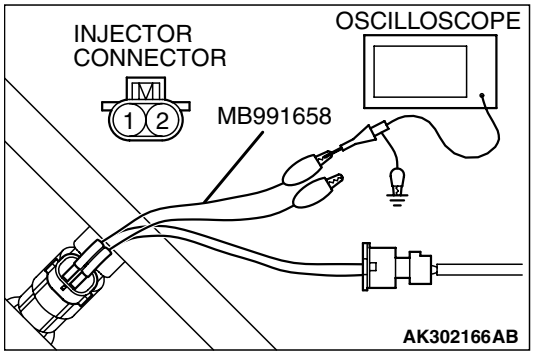
YES : Go to Step 9.

NO : Repair it. Then go to Step 10.



STEP 9. Using the oscilloscope, check the No. 2 cylinder injector.

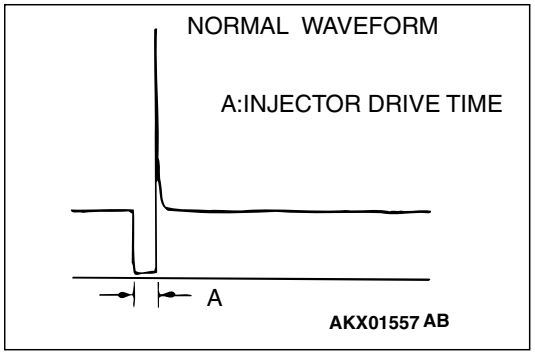
(1) Disconnect the No. 2 cylinder injector connector B-30 and connect the test harness special tool MB991658 between the separated connectors. (All terminals should be connected.)



(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 146.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-14.

NO : Replace the PCM. Then go to Step 10.

STEP 10. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0202 set?

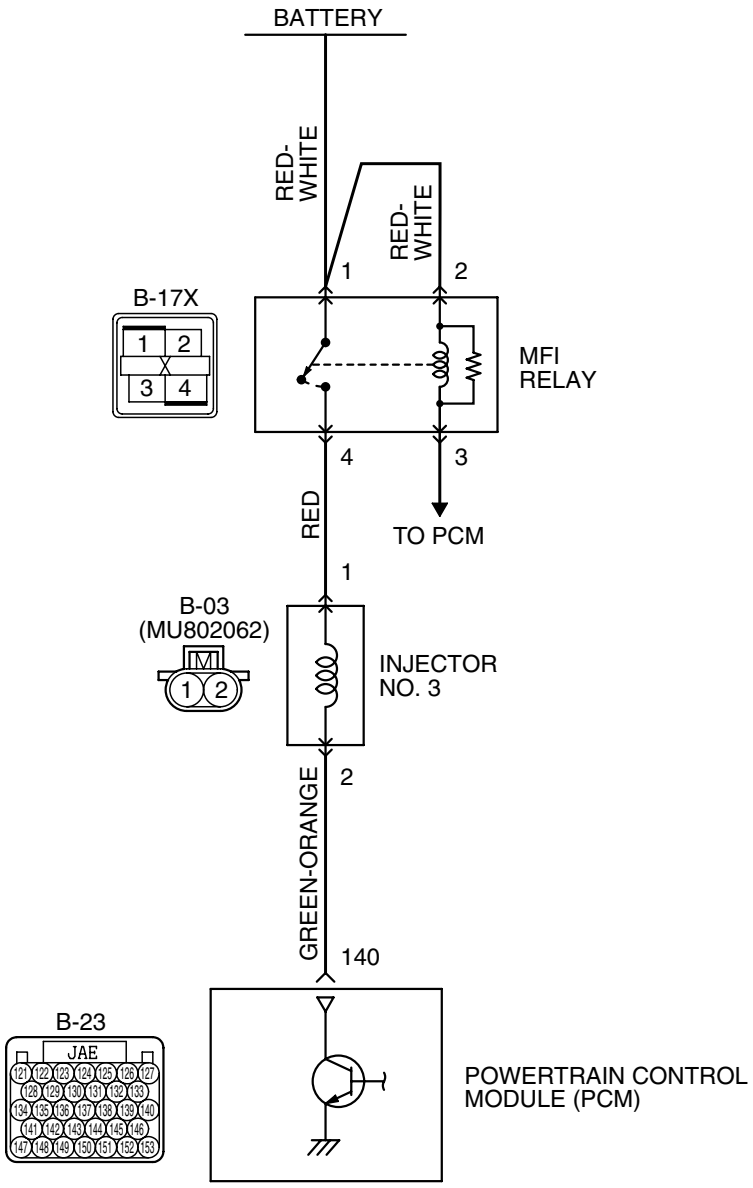
YES : Retry the troubleshooting.

NO : The inspection is complete.

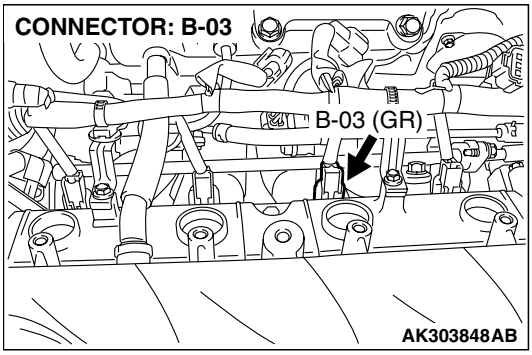
DTC P0203: Injector Circuit-Cylinder 3

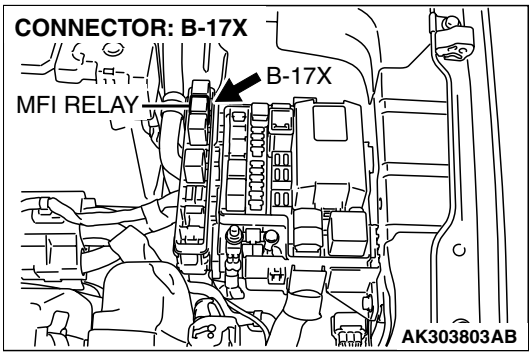
⚠ CAUTION
If DTC P0203 has been set, TCL related DTC U1120 is also set. After P0203 has been diagnosed, don't forget to erase DTC U1120.

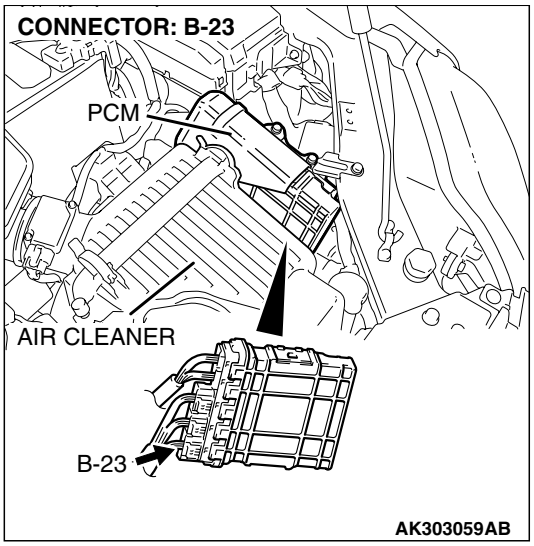
Injector Circuit-Cylinder 3



AK400886







CIRCUIT OPERATION

- The injector power is supplied from the MFI relay (terminal No. 4).
- The PCM controls the injector by turning the power transistor in the PCM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the PCM.
- A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off.
- The PCM checks this surge voltage.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after injector is operated.

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)

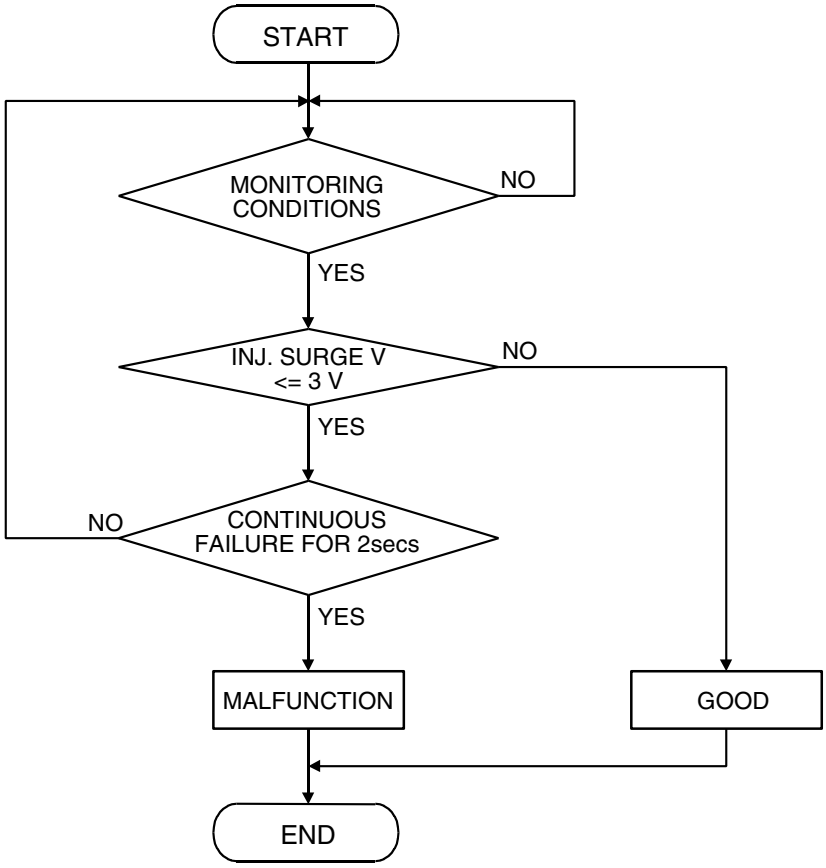
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted low>

Logic Flow Chart



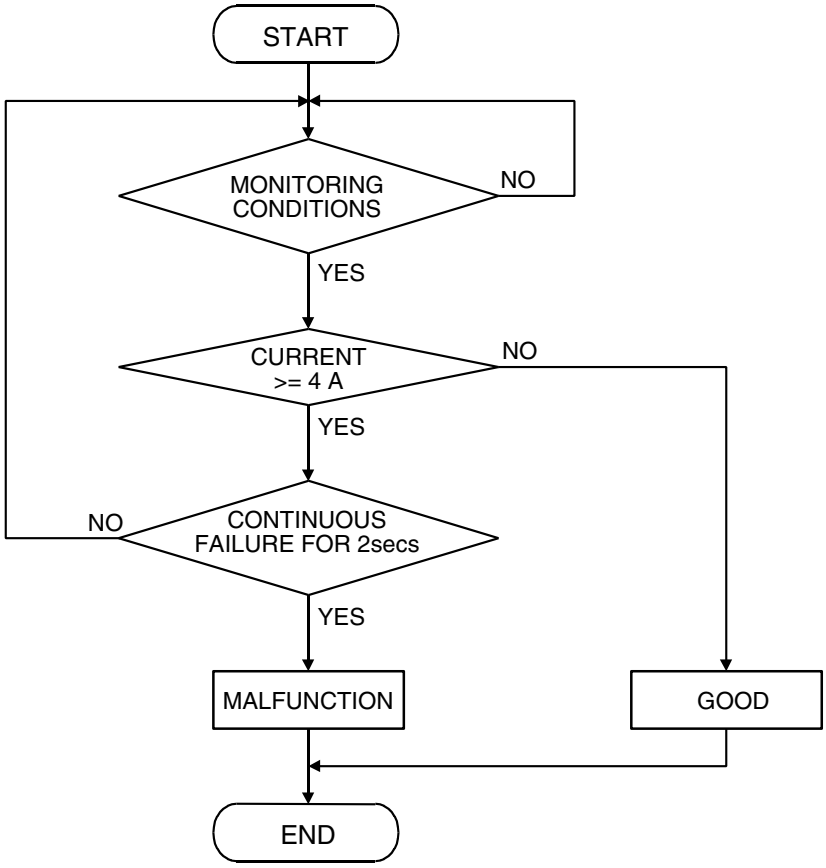
AK401614

Check Conditions
- Engine is running.

Judgment Criteria
- The supply voltage is 3 volts or less without the injector driving.

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted high>

Logic Flow Chart



AK401592

Check Conditions

- Engine is running.

Judgement Criteria

- The coil current is 4 ampere or more with the injector driving.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

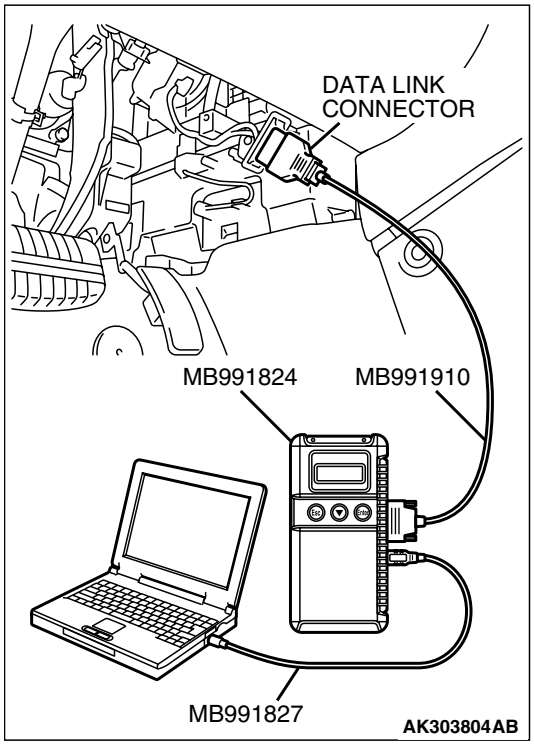
- No.3 cylinder injector failed.
- Open or shorted No.3 cylinder injector circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check actuator test item 03: No.3 Injector.



⚠ 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.

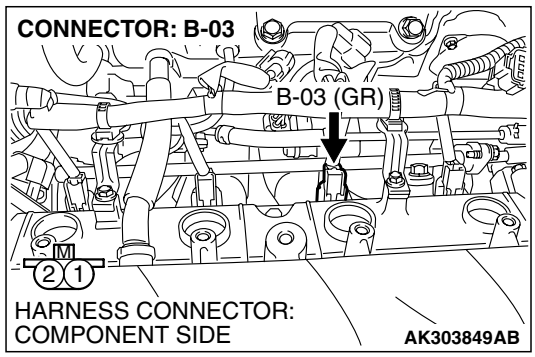
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 03 No. 3 injector.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - The idle should become slightly rougher.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator 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 Malfuncitons P.00-14.

NO : Go to Step 2.

STEP 2. Check harness connector B-03 at No. 3 cylinder injector for damage.



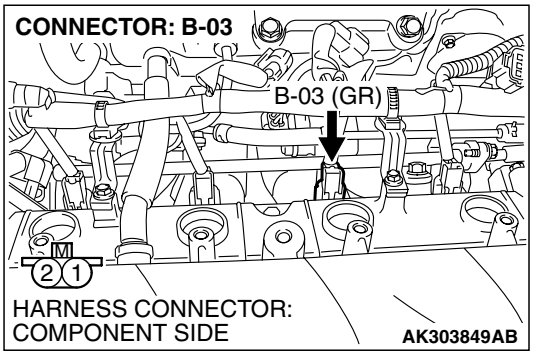
Q: Is the harness connector in good condition?

YES : Go to Step 3.

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

STEP 3. Check the No. 3 cylinder injector.

(1) Disconnect the No. 3 cylinder injector connector B-03.



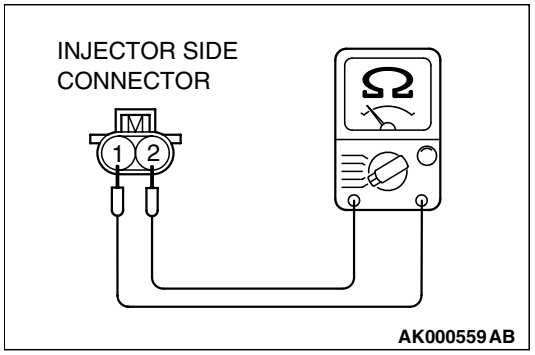
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 4.

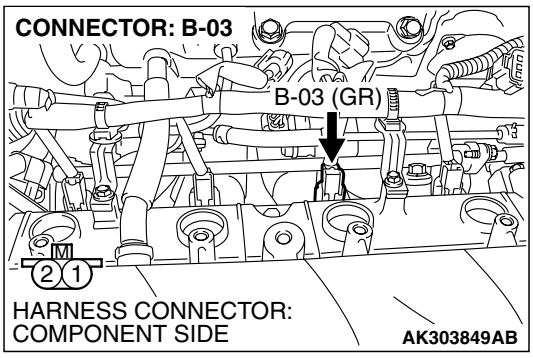
NO : Replace the No. 3 cylinder injector. Then go to Step 10.



STEP 4. Measure the power supply voltage at No. 3 cylinder injector connector.

(1) Disconnect connector B-03 and measure at the harness side.

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



(3) Measure the voltage between terminal No. 1 and ground.

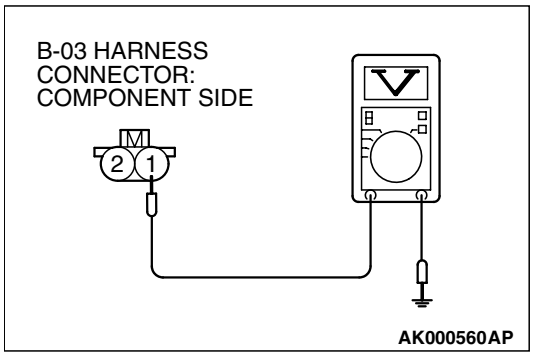
- Voltage should be battery positive voltage.

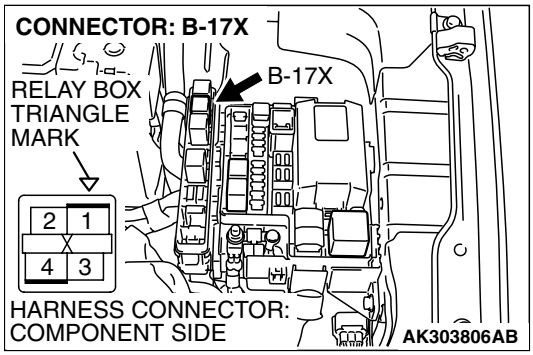
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 6.

NO : Go to Step 5.



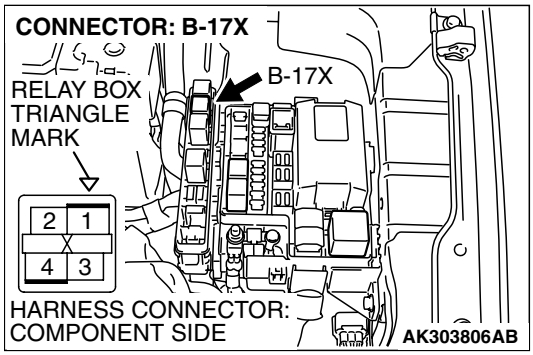


STEP 5. Check harness connector B-17X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and No. 3 cylinder injector connector B-03 (terminal No. 1). Then go to Step 10.

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

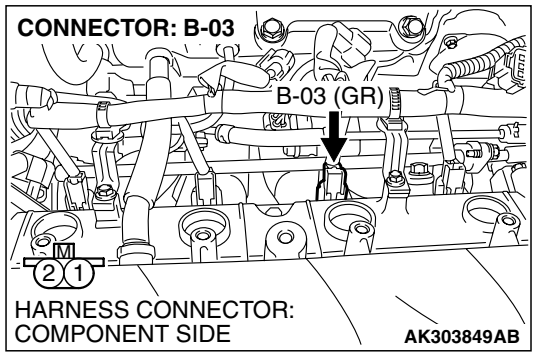


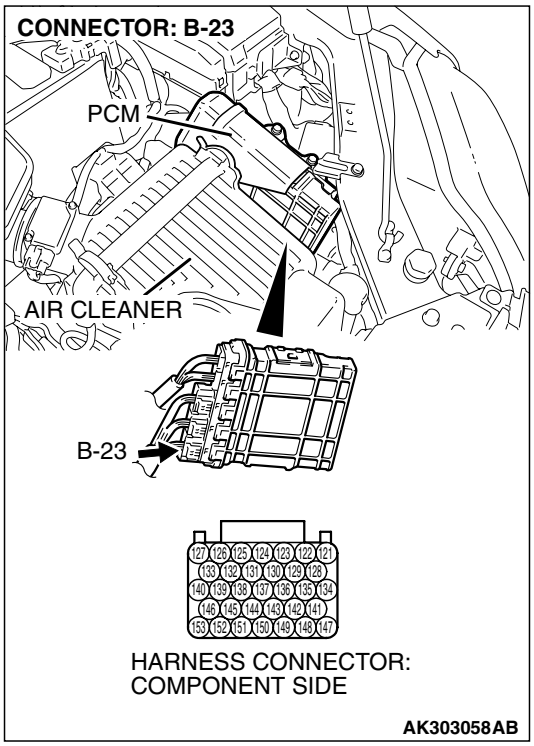
STEP 6. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and No. 3 cylinder injector connector B-03 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 10.



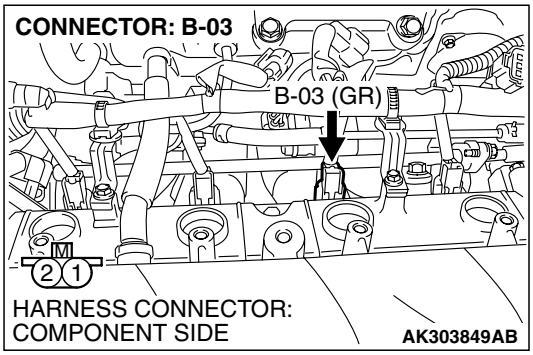


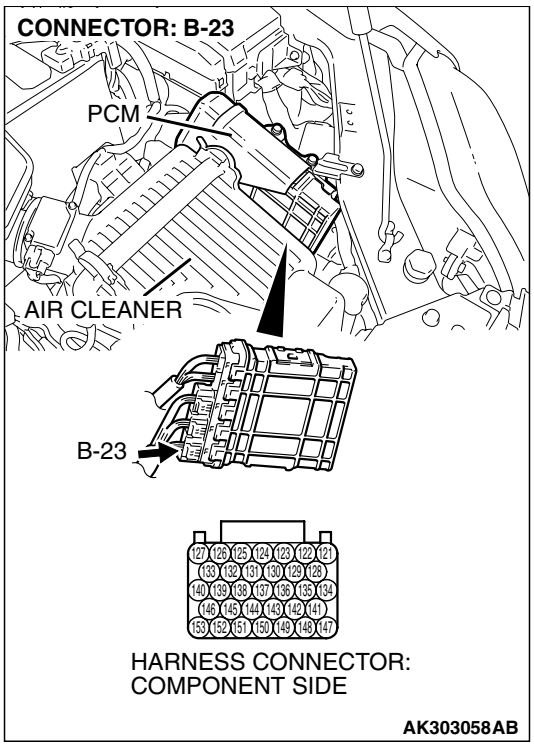
STEP 7. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

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





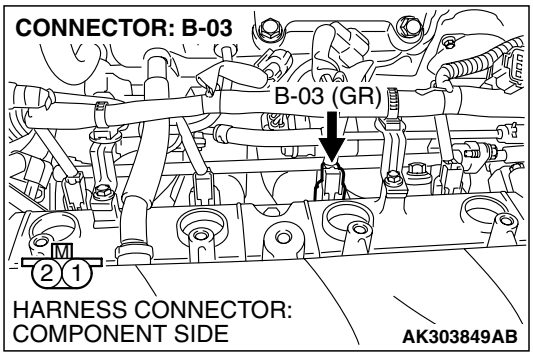
STEP 8. Check for open circuit and short circuit to ground and harness damage between No. 3 cylinder injector connector B-03 (terminal No. 2) and PCM connector B-23 (terminal No. 140).

Q: Is the harness wire in good condition?

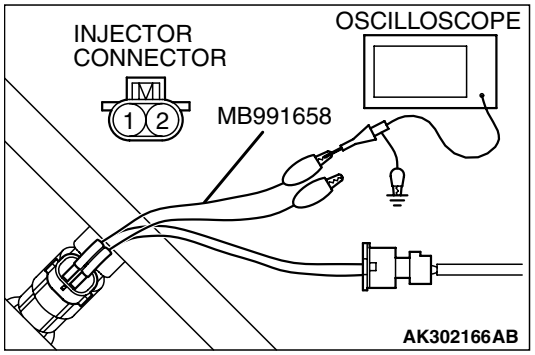
YES : Go to Step 9.

NO : Repair it. Then go to Step 10.

STEP 9. Using the oscilloscope, check the No. 3 cylinder injector.



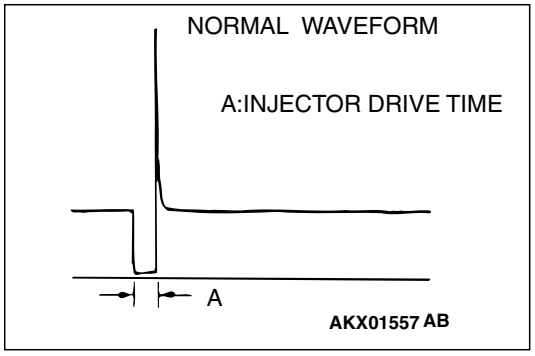
(1) Disconnect the injector No. 3 connector B-03 and connect the test harness special tool MB991658 between the separated connectors. (All terminals should be connected.)



(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 140.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-14.

NO : Replace the PCM. Then go to Step 10.

STEP 10. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0203 set?

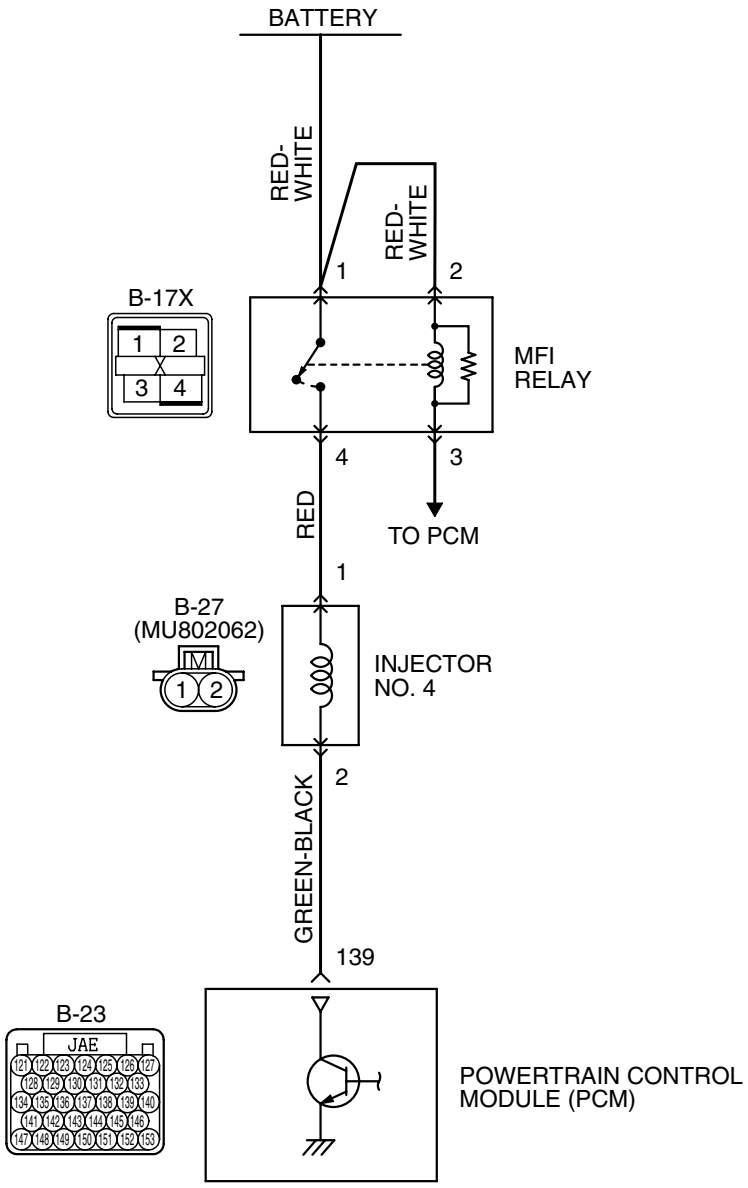
YES : Retry the troubleshooting.

NO : The inspection is complete.

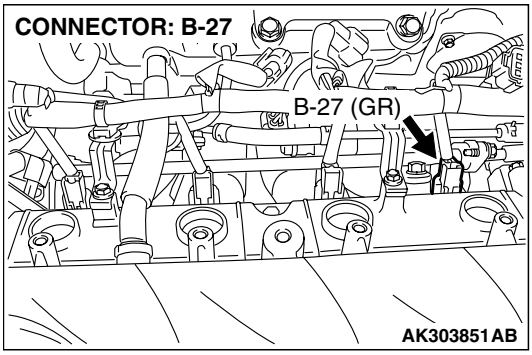
DTC P0204: Injector Circuit-Cylinder 4

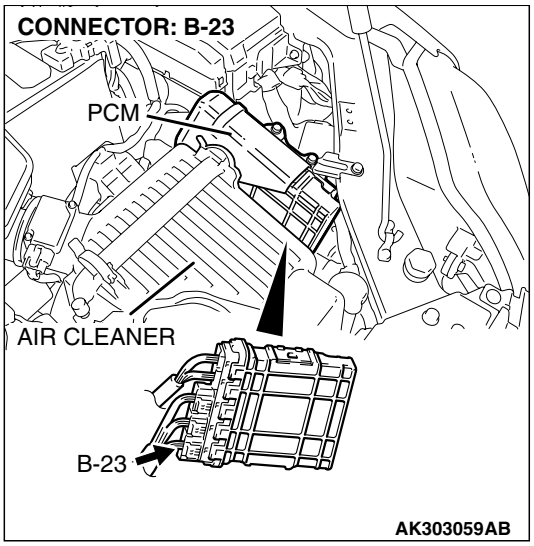
⚠ CAUTION
If DTC P0204 has been set, TCL related DTC U1120 is also set. After P0204 has been diagnosed, don't forget to erase DTC U1120.

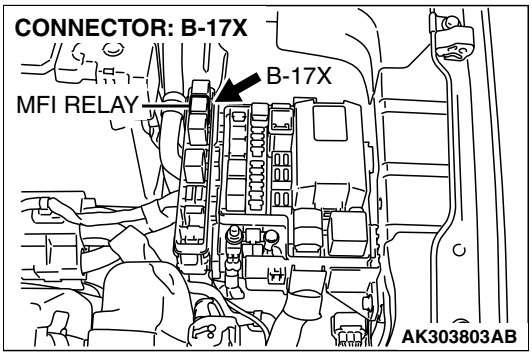
Injector Circuit-Cylinder 4



AK400887







CIRCUIT OPERATION

- The injector power is supplied from the MFI relay (terminal No. 4).
- The PCM controls the injector by turning the power transistor in the PCM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the PCM.
- A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off.
- The PCM checks this surge voltage.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after injector is operated.

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)

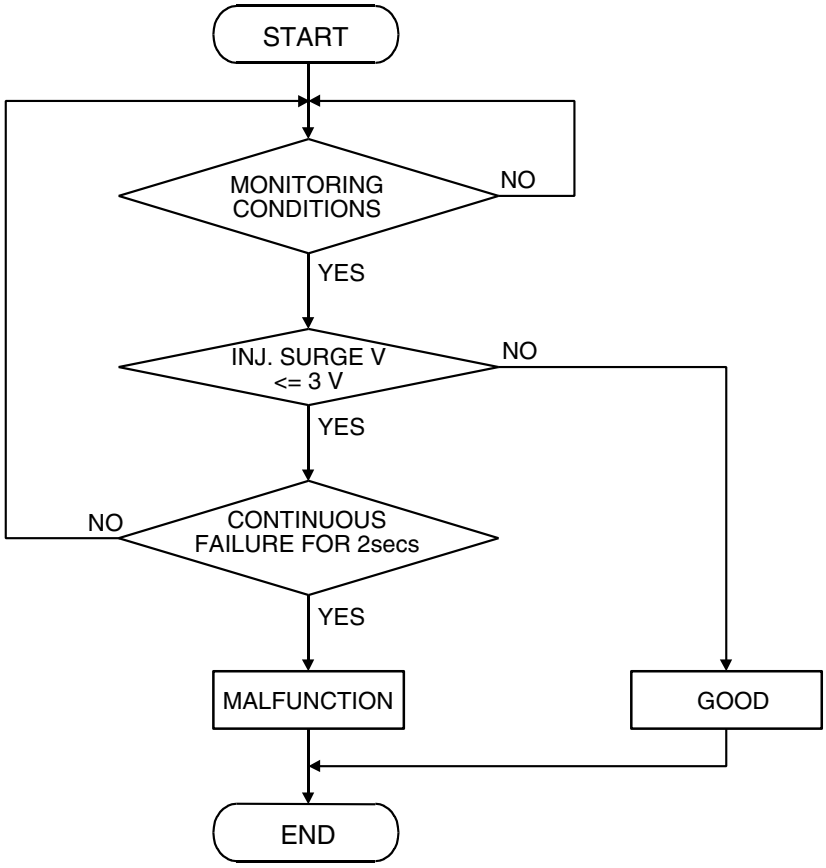
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted low>

Logic Flow Chart



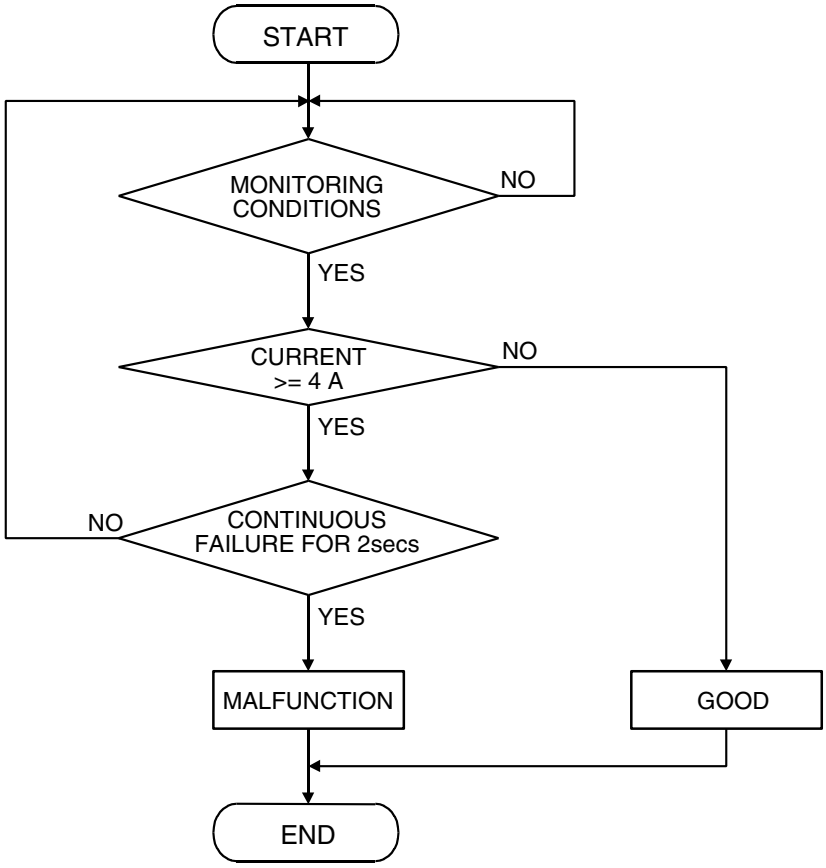
AK401614

Check Conditions
- Engine is running.

Judgment Criteria
- The supply voltage is 3 volts or less without the injector driving.

DTC SET CONDITIONS <Circuit continuity – open circuit and shorted high>

Logic Flow Chart



AK401592

Check Conditions

- Engine is running.

Judgement Criteria

- The coil current is 4 ampere or more with the injector driving.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

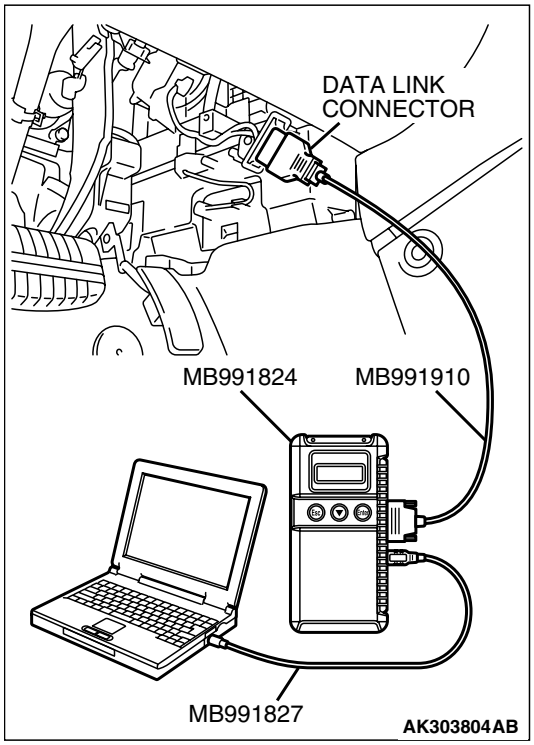
- No.4 cylinder injector failed.
- Open or shorted No.4 cylinder injector circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check actuator test item 04: No. 4 Injector.



⚠ 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.

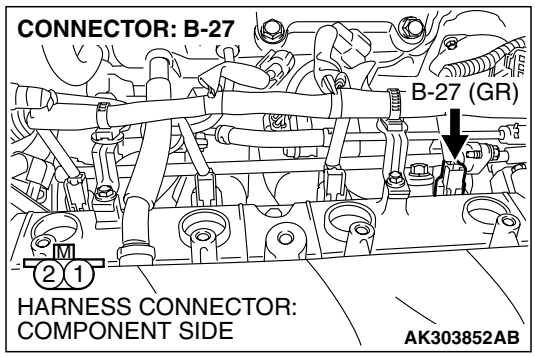
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 04 No. 4 injector.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
  - The idle should become slightly rougher.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator 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.00-14.

NO : Go to Step 2.

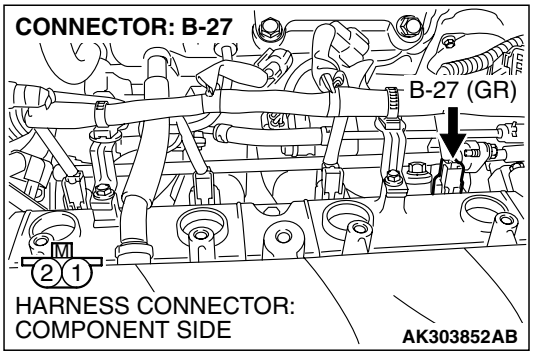
STEP 2. Check harness connector B-27 at No. 4 cylinder injector for damage.



Q: Is the harness connector in good condition?

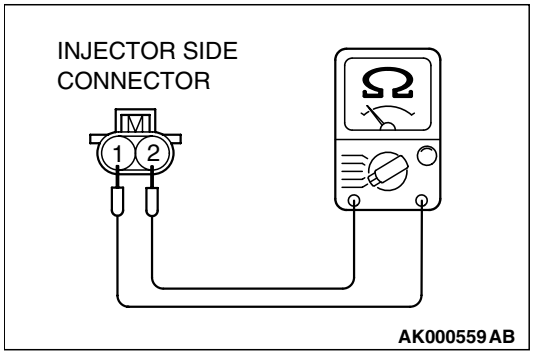
YES : Go to Step 3.

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



STEP 3. Check the No. 4 cylinder injector.

(1) Disconnect the No. 4 cylinder injector connector B-27.



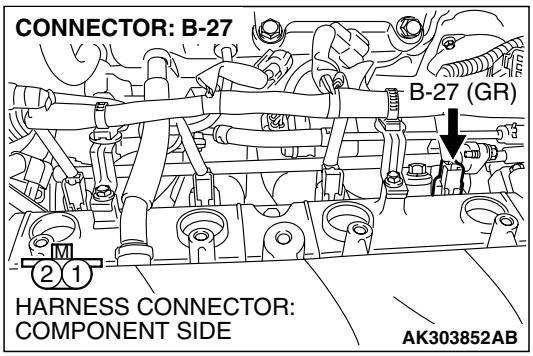
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?

YES : Go to Step 4.

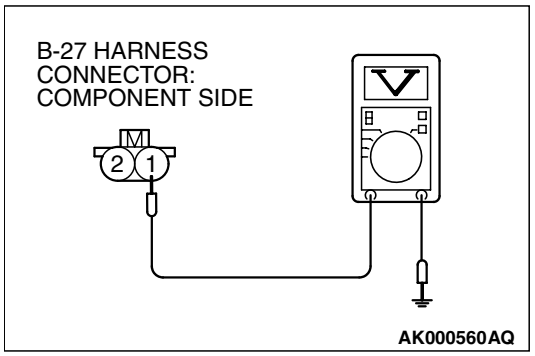
NO : Replace the No. 4 cylinder injector. Then go to Step 10.



STEP 4. Measure the power supply voltage at No. 4 cylinder injector connector.

(1) Disconnect connector B-27 and measure at the harness side.

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



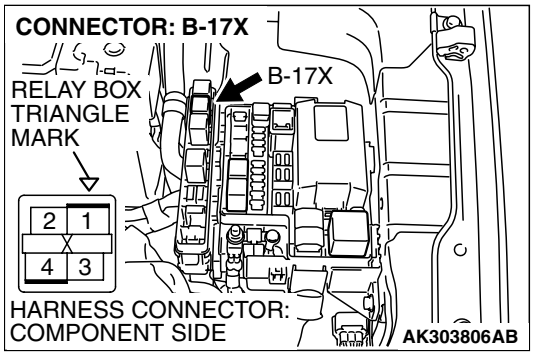
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.

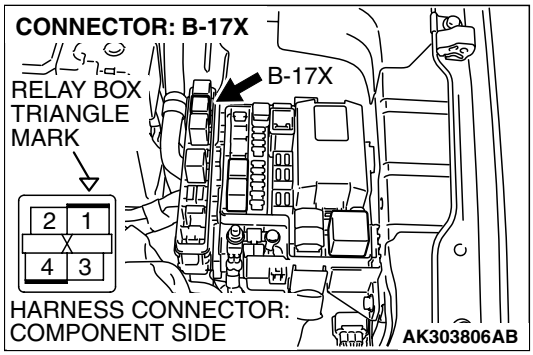


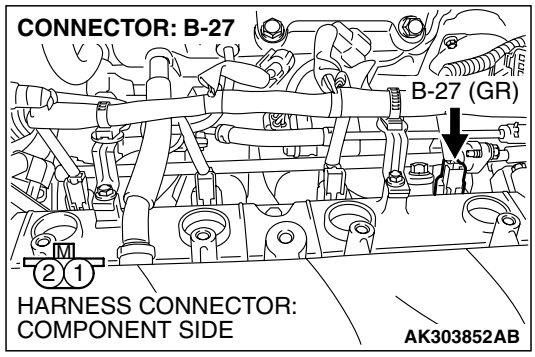
STEP 5. Check harness connector B-17X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and No. 4 cylinder injector connector B-27 (terminal No. 1). Then go to Step 10.

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



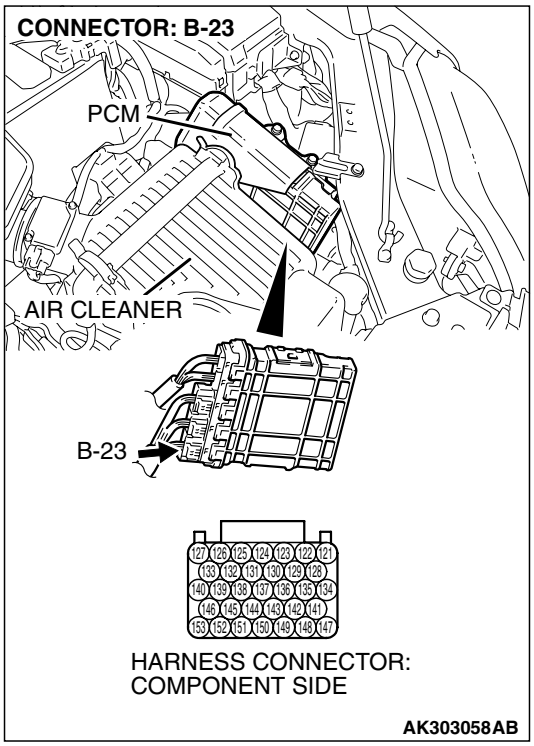


STEP 6. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and No. 4 cylinder injector connector B-27 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 10.

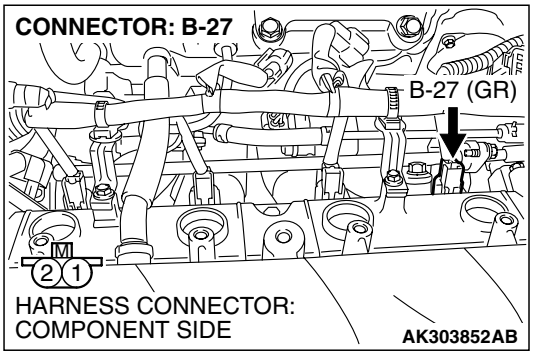


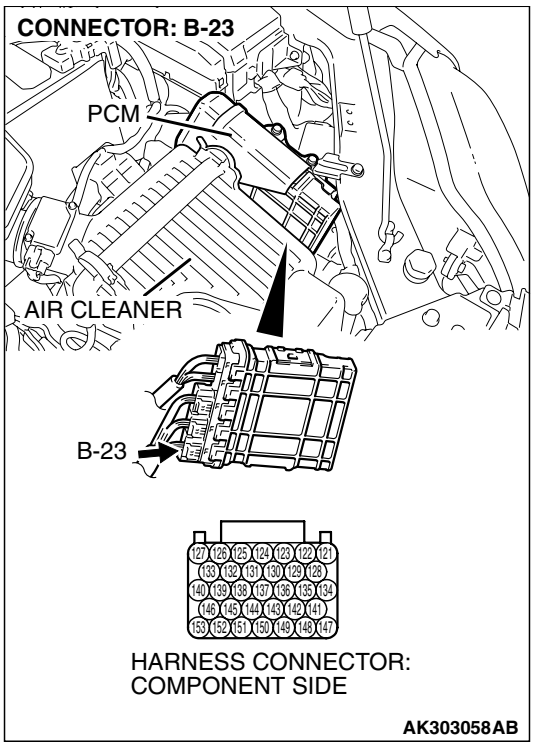
STEP 7. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

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



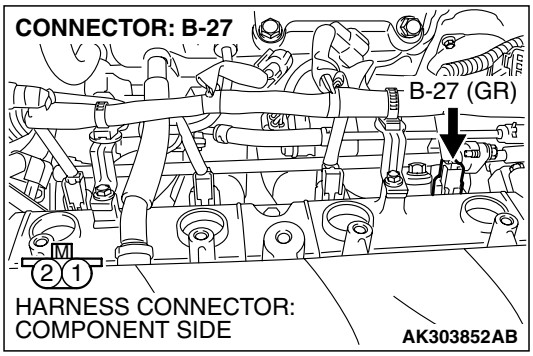


STEP 8. Check for open circuit and short circuit to ground and harness damage between No. 4 cylinder injector connector B-27 (terminal No. 2) and PCM connector B-23 (terminal No. 139).

Q: Is the harness wire in good condition?

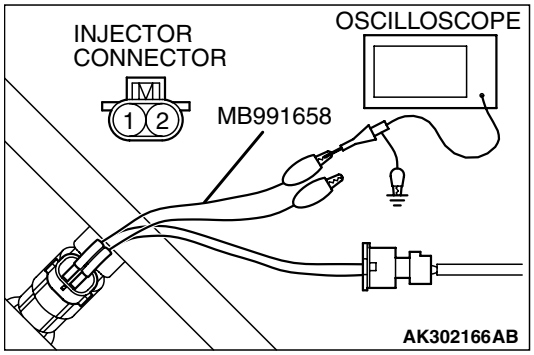
YES : Go to Step 9.

NO : Repair it. Then go to Step 10.



STEP 9. Using the oscilloscope, check the No. 4 cylinder injector.

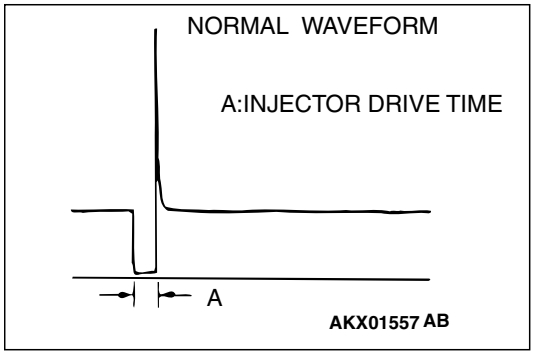
(1) Disconnect the No. 4 cylinder injector connector B-27 and connect the test harness special tool MB991658 between the separated connectors. (All terminals should be connected.)



(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 139.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-14.

NO : Replace the PCM. Then go to Step 10.

STEP 10. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0204 set?

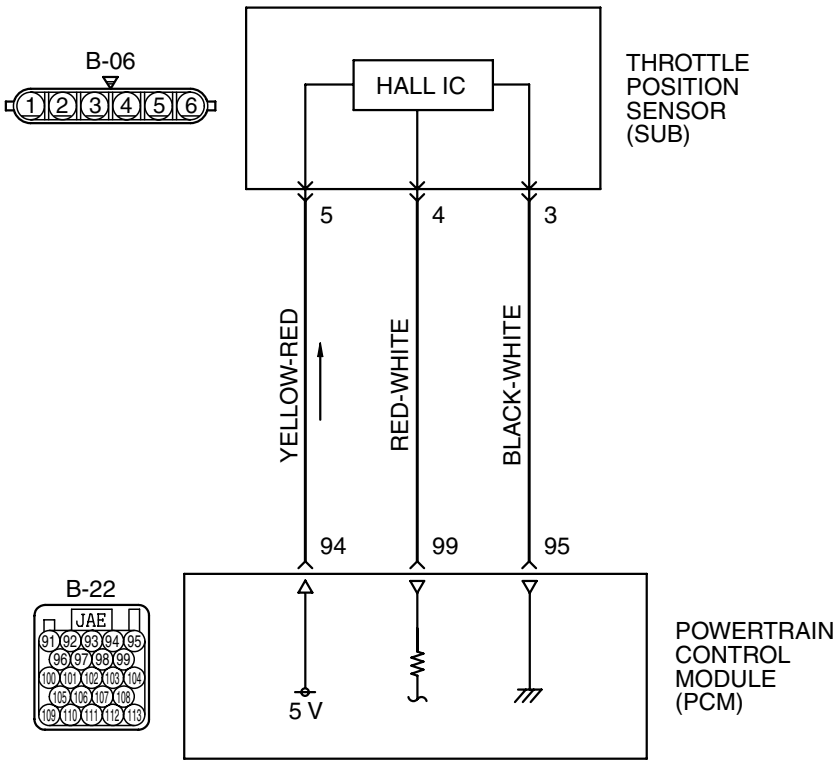
YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0222: Throttle Position Sensor (sub) Circuit Low Input

⚠ CAUTION
If DTC P0222 has been set, TCL related DTC U1120 is also set. After P0222 has been diagnosed, don't forget to erase DTC U1120.

Throttle Position Sensor (sub) Circuit



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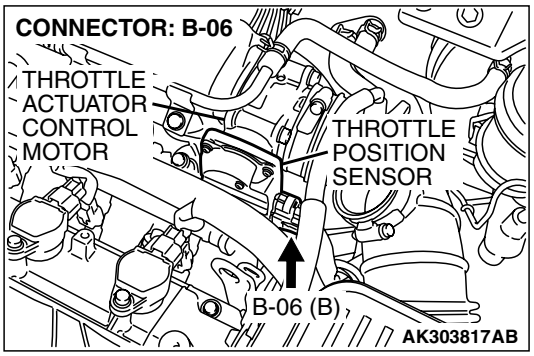
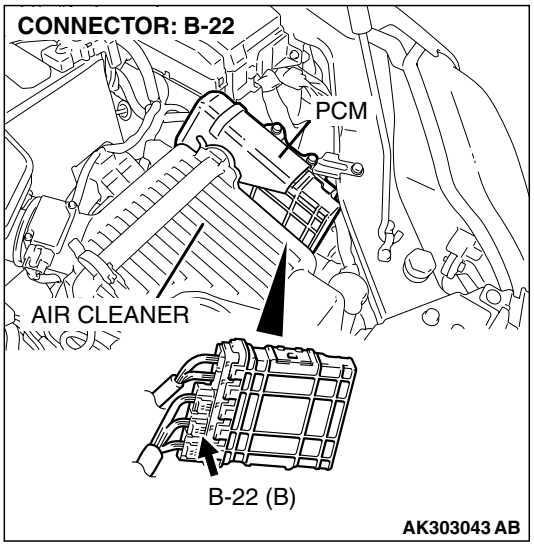




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the PCM (terminal No. 94).
  The ground terminal (terminal No. 3) is grounded with PCM (terminal No. 95).

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.
- The PCM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor (sub) output voltage is out of specified range.

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)

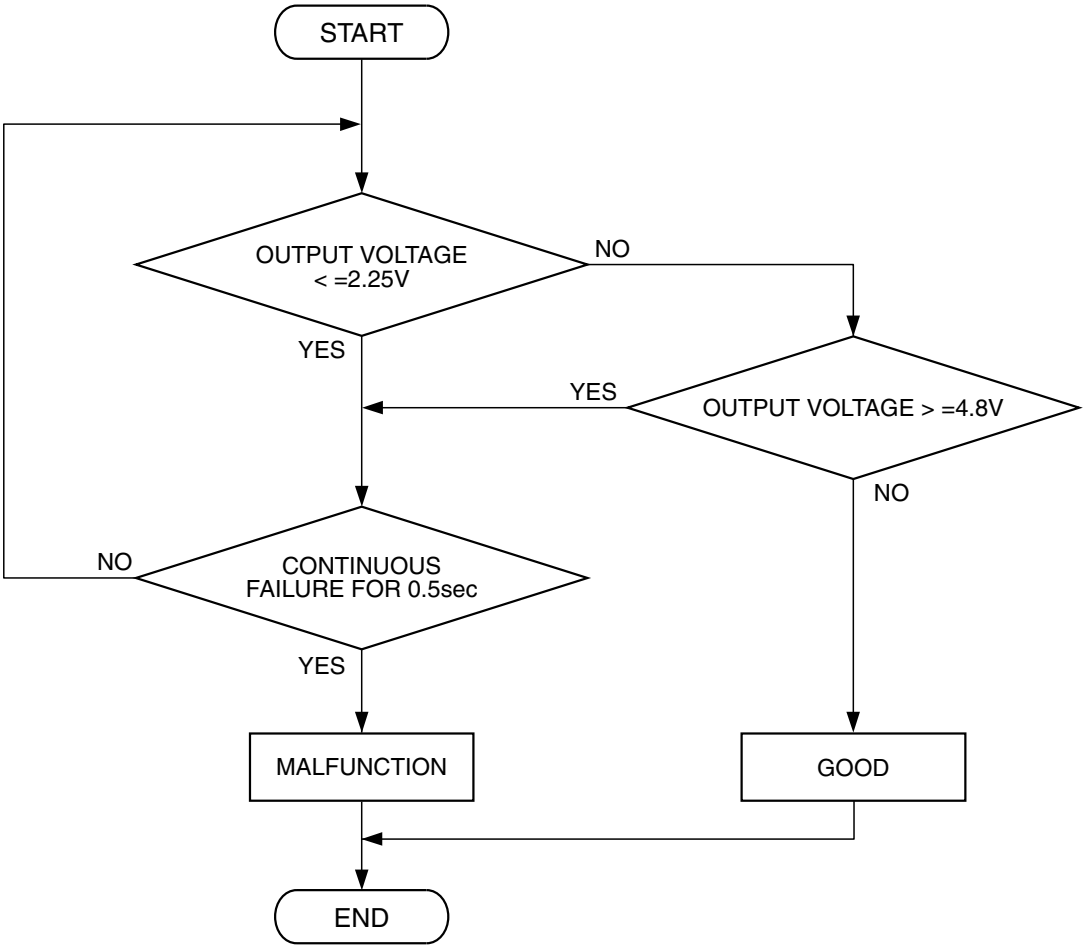
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302032

Check Conditions
- Ignition switch is "ON" position.

Judgement Criteria
- Throttle position sensor (sub) output voltage should be 2.25 volts or less for 0.5 second.

OBD-II DRIVE CYCLE PATTERN
None.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle position sensor failed.
- Open or shorted throttle position sensor (sub) circuit, harness damage, or connector damage.
- PCM failed.

TSB Revision

DIAGNOSIS

Required Special Tools:

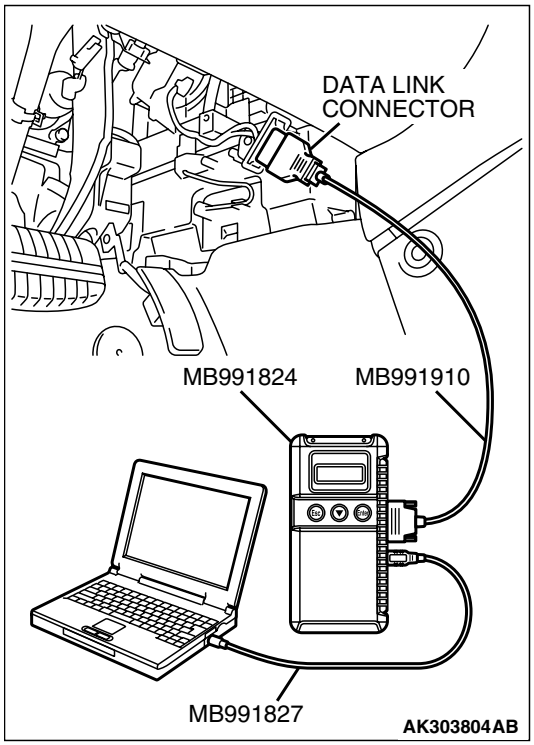
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness

STEP 1. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).

⚠ 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) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 14, Throttle Position Sensor (sub).
  - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
  - Output voltage should be 4.0 volts or more when the throttle valve is fully open with your finger.
(7) 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 Malfunctions P.00-14.

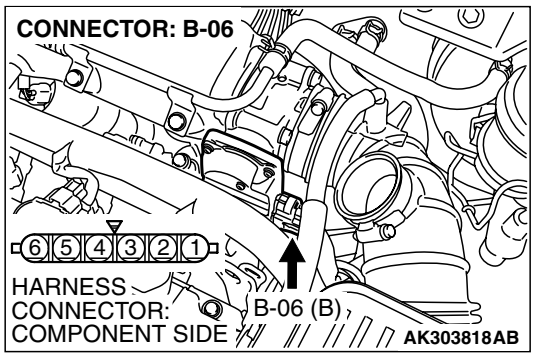
NO : Go to Step 2.

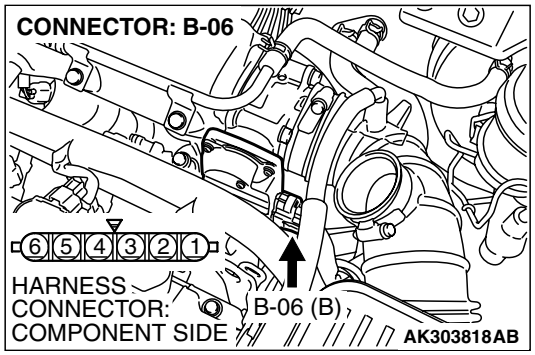
STEP 2. Check harness connector B-06 at throttle position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.





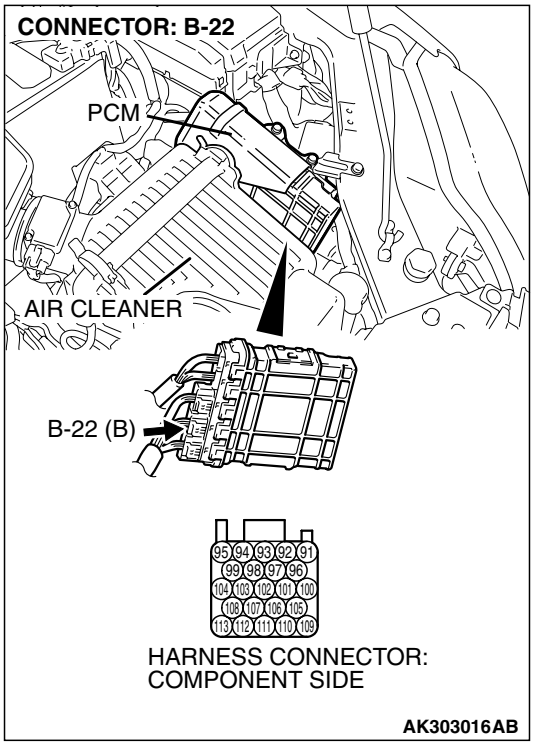
STEP 3. Measure the sensor supply voltage at throttle position sensor harness side connector B-06.

(1) Disconnect the connector B-06 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 5 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

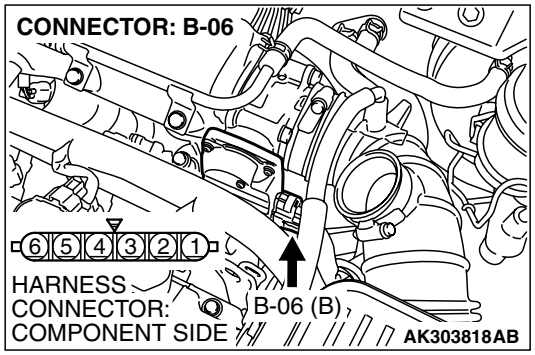
YES : Go to Step 7.
NO : Go to Step 4.

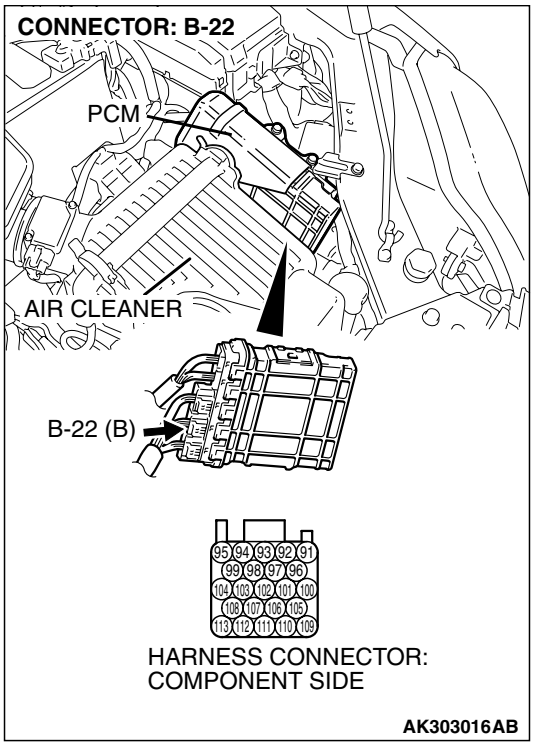


STEP 4. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.



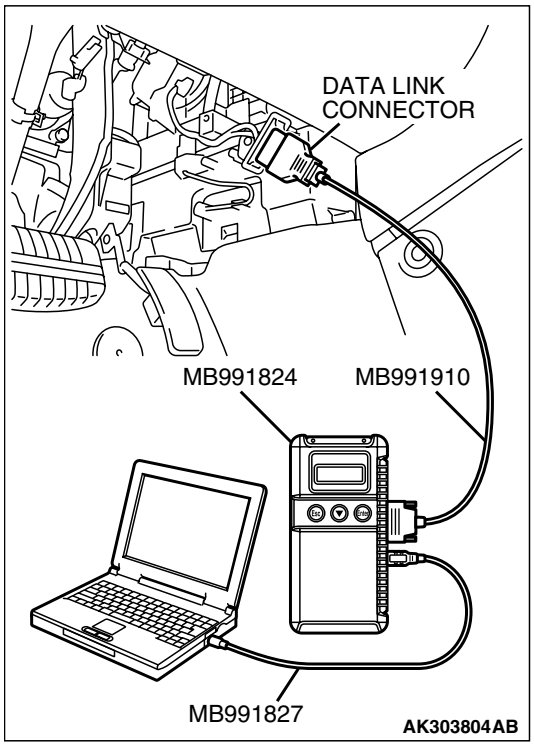


STEP 5. Check for open circuit and short circuit to ground between throttle position sensor connector B-06 (terminal No. 5) and PCM connector B-22 (terminal No. 94).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 11.



STEP 6. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).

⚠ 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.

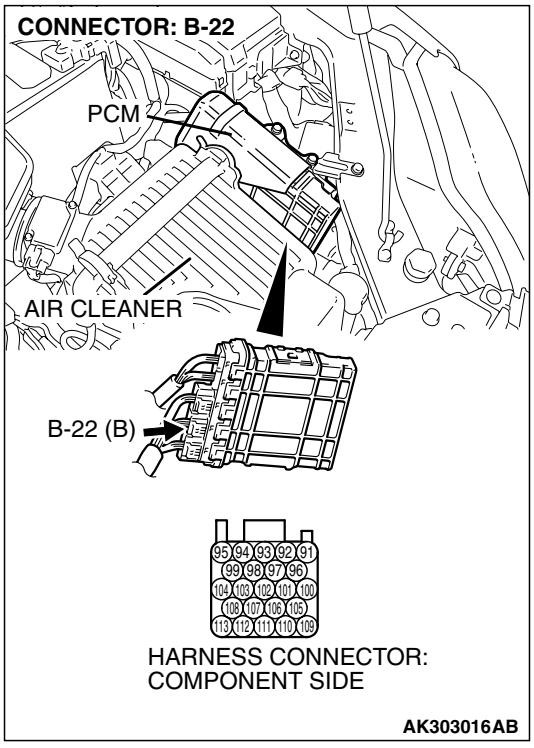
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 14, Throttle Position Sensor (sub).
- Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
- Output voltage should be 4.0 volts or more when the throttle valve is fully open with your finger.

(7) 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 Malfunctions P.00-14.

NO : Replace the PCM. Then go to Step 11.

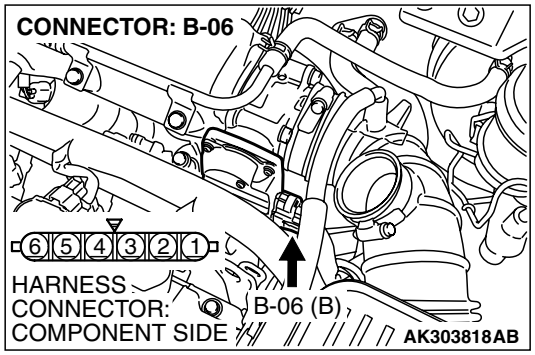


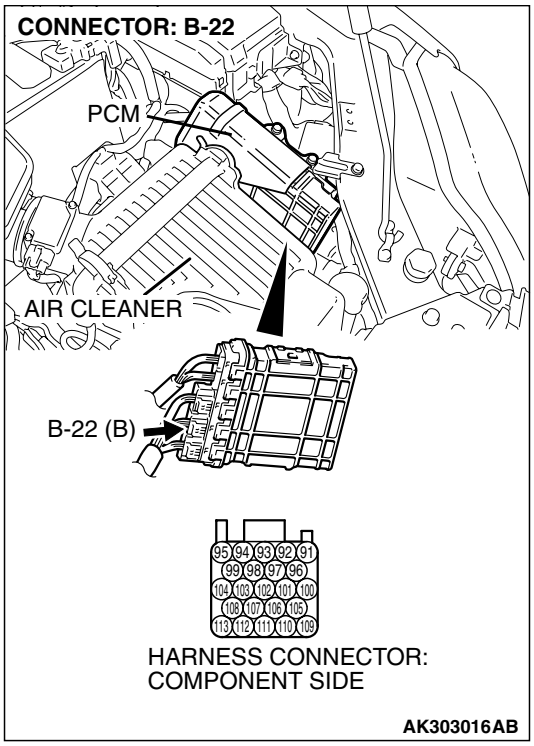
STEP 7. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.





STEP 8. Check for harness damage between throttle position sensor connector B-06 (terminal No. 5) and PCM connector B-22 (terminal No. 94).

Q: Is the harness wire in good condition?

YES : Go to Step 9.

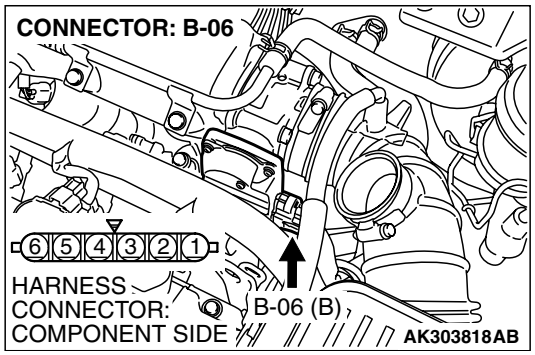
NO : Repair it. Then go to Step 11.

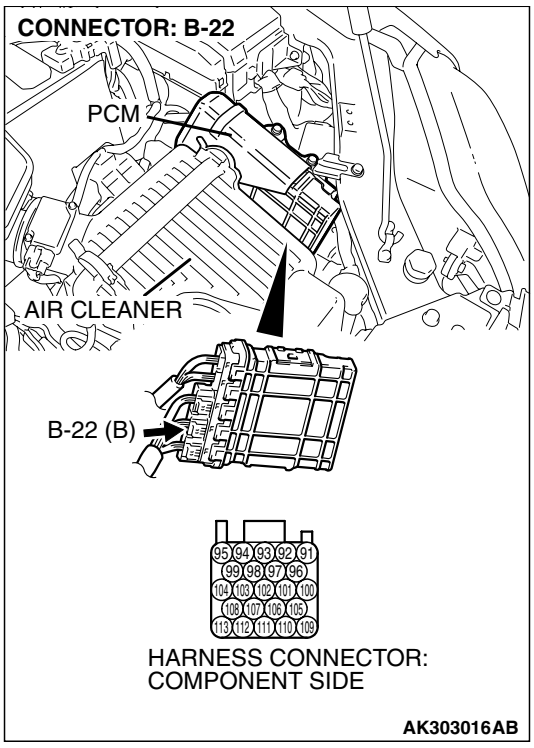
STEP 9. Check for open circuit, short circuit to ground and harness damage between throttle position sensor connector B-06 (terminal No. 4) and PCM connector B-22 (terminal No. 99).

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair it. Then go to Step 11.





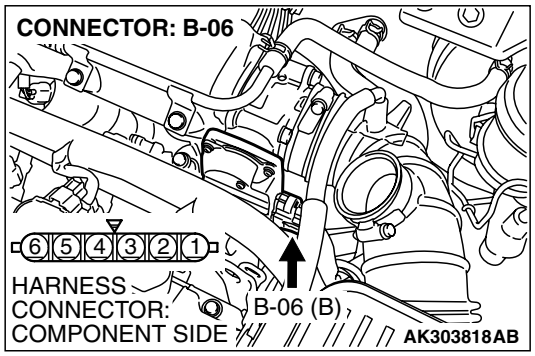
STEP 10. Replace the throttle body assembly.

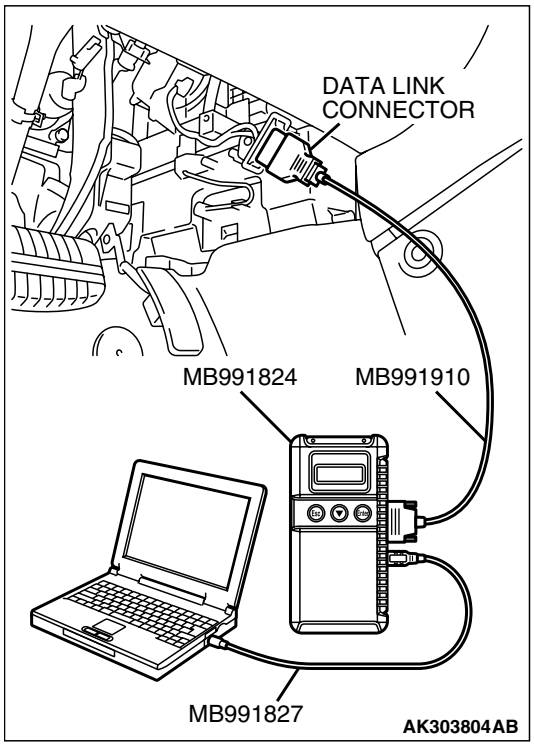
(1) Replace the throttle body assembly.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0222 set?

YES : Replace the PCM. Then go to Step 11.

NO : The inspection is complete.





STEP 11. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

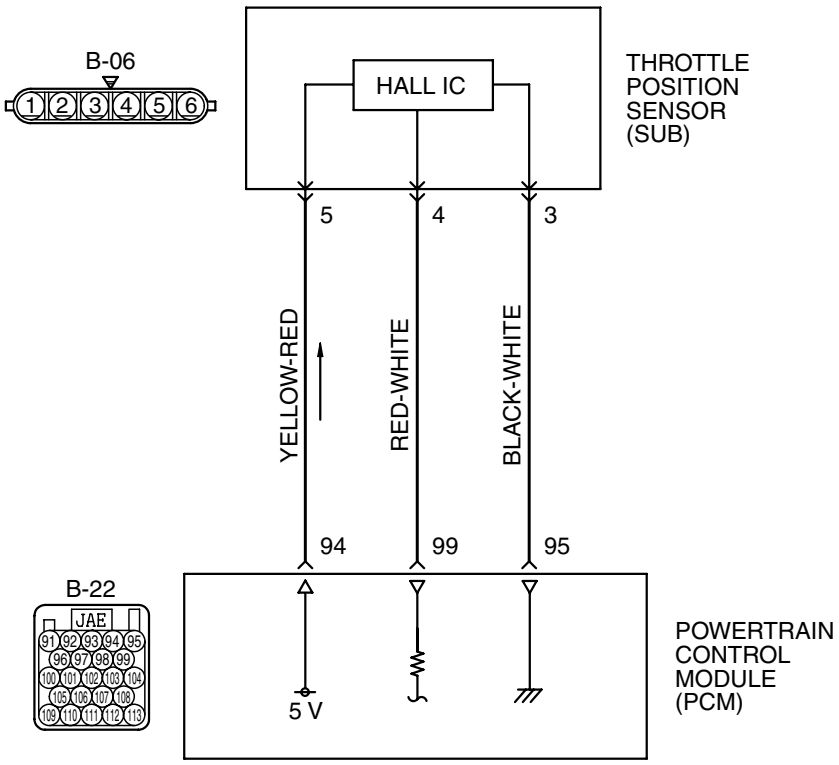
Q: Is DTC P0222 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0223: Throttle Position Sensor (sub) Circuit High Input

⚠ CAUTION
If DTC P0223 has been set, TCL related DTC U1120 is also set. After P0223 has been diagnosed, don't forget to erase DTC U1120.

Throttle Position Sensor (sub) Circuit



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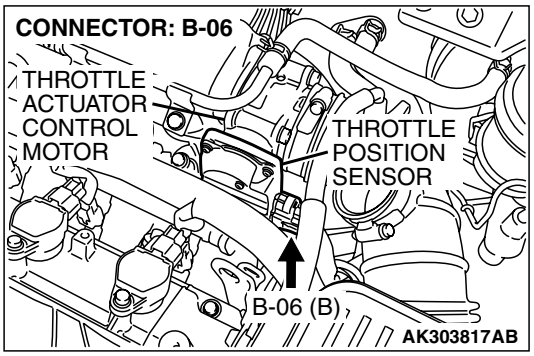
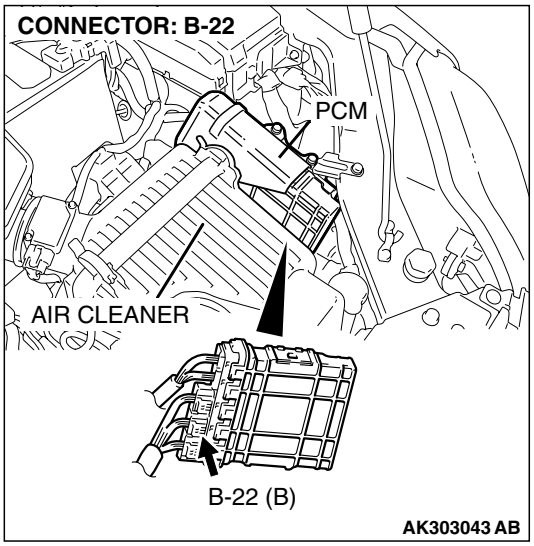




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the PCM (terminal No. 94).
  The ground terminal (terminal No. 3) is grounded with PCM (terminal No. 95).

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.
- The PCM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor (sub) output voltage is out of specified range.

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)

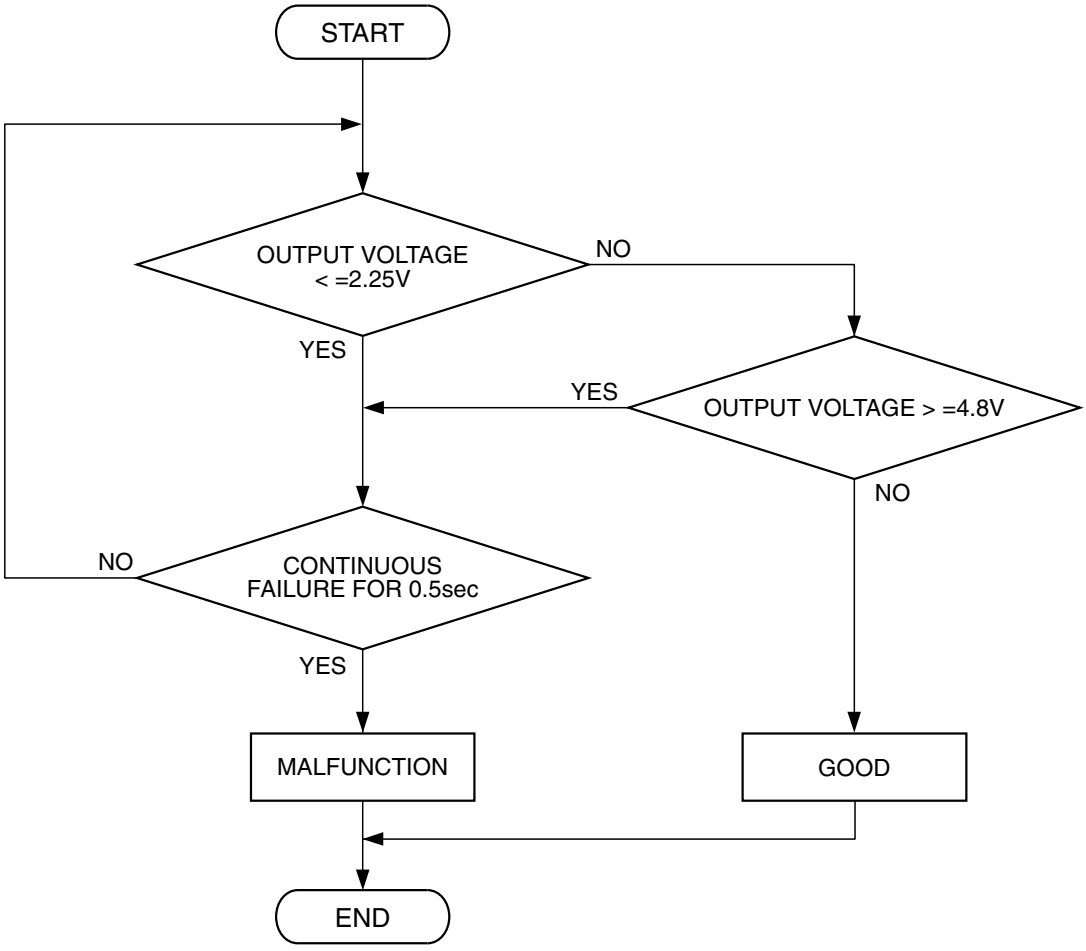
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302032

Check Conditions
- Ignition switch is "ON" position.

Judgement Criteria
- Throttle position sensor (sub) output voltage should be 4.8 volts or more for 0.5 second.

OBD-II DRIVE CYCLE PATTERN
None.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle position sensor failed.
- Open throttle position sensor (sub) circuit, harness damage, or connector damage.
- PCM failed.

TSB Revision

DIAGNOSIS

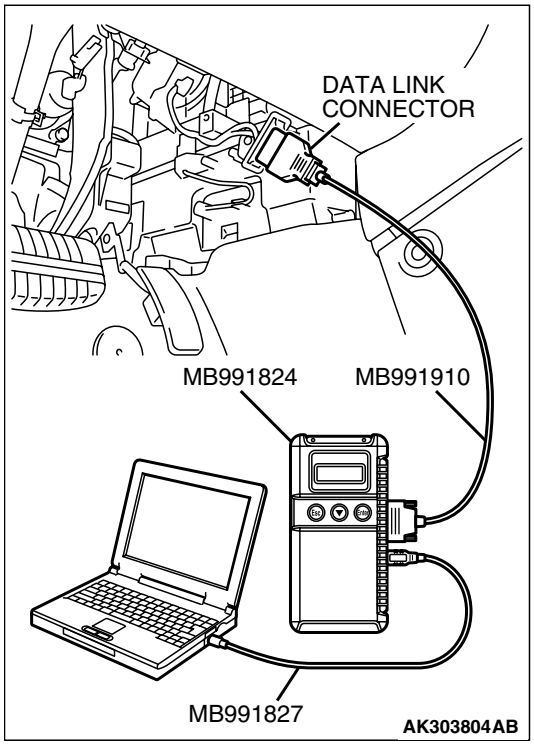
Required Special Tools:

- MB991958: Scan tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness

STEP 1. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).

⚠ 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.



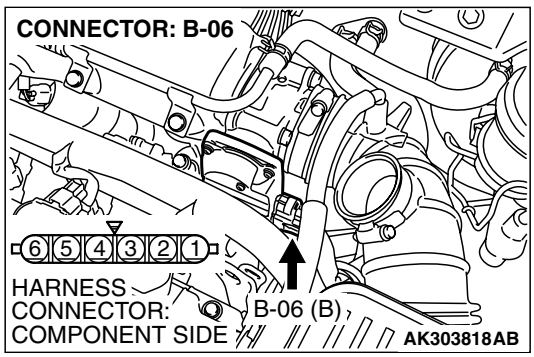
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 14, Throttle Position Sensor (sub).
  - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
  - Output voltage should be 4.0 volts or more when the throttle valve is fully open with your finger.
(7) 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 Malfunctions P.00-14.

NO : Go to Step 2.

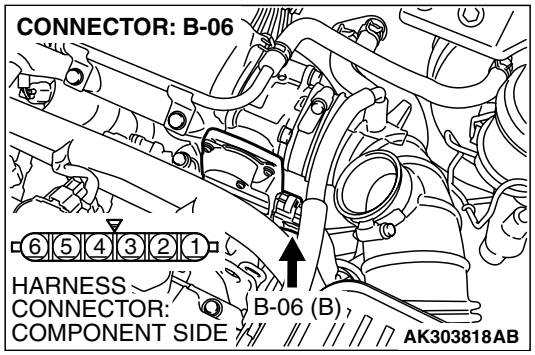
STEP 2. Check harness connector B-06 at throttle position sensor for damage.



Q: Is the harness connector in good condition?

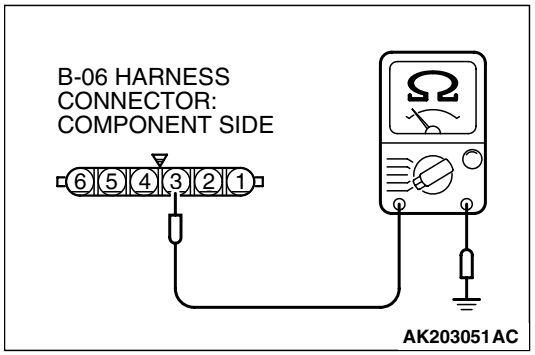
YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.



STEP 3. Check the continuity at throttle position sensor harness side connector B-06.

(1) Disconnect the connector B-06 and measure at the harness side.



(2) Measure the continuity between terminal No. 3 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 7.

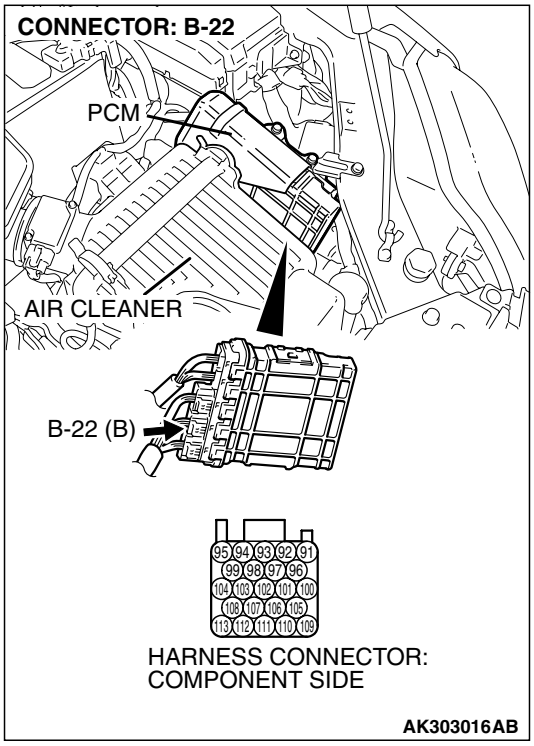
NO : Go to Step 4.

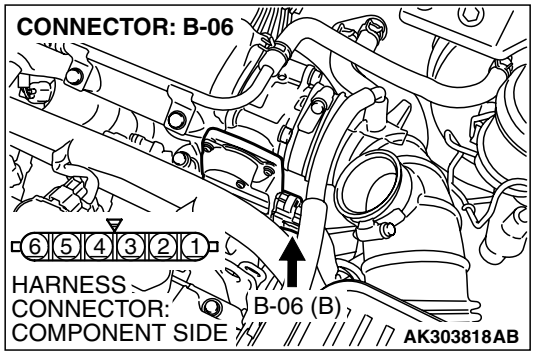
STEP 4. Check harness connector B-22 at PCM for damage.

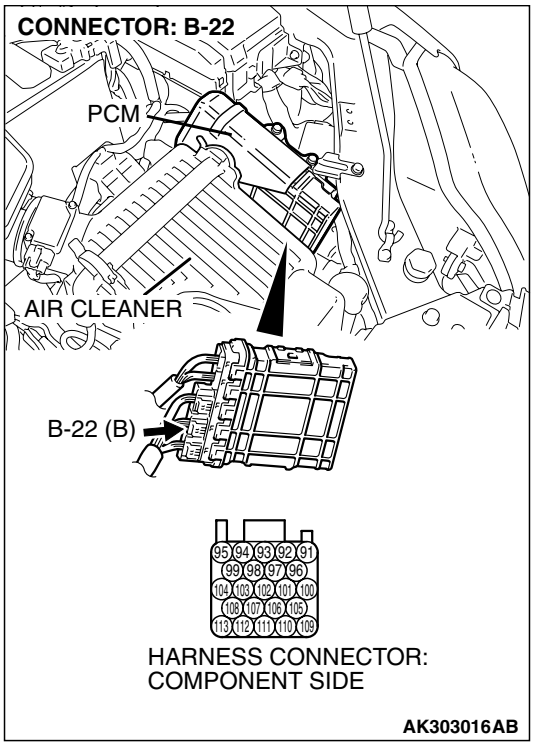
Q: Is the harness connector in good condition?

YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.





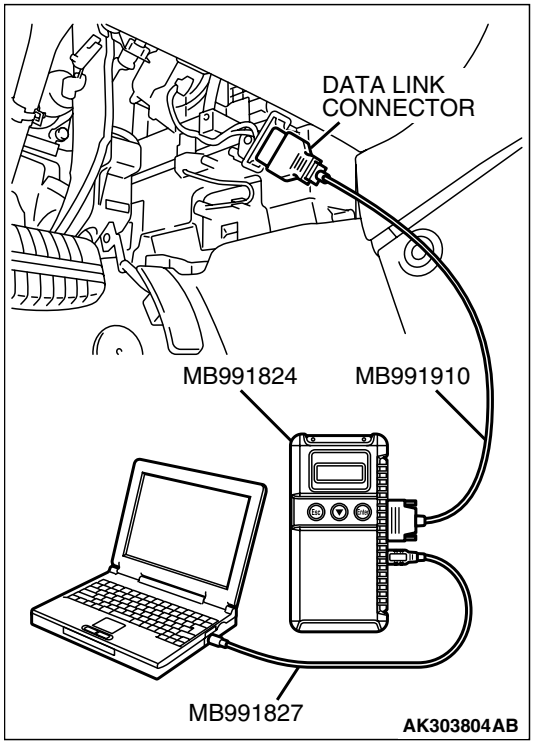


STEP 5. Check for open circuit and harness damage between throttle position sensor connector B-06 (terminal No. 3) and PCM connector B-22 (terminal No. 95).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 8.



STEP 6. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).

⚠ 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

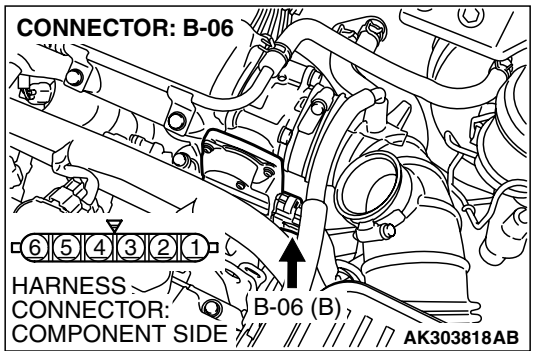
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 14, Throttle Position Sensor (sub).
- Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
- Output voltage should be 4.0 volts or more when the throttle valve is fully open with your finger.

(7) 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 Malfunctions P.00-14.

NO : Replace the PCM. Then go to Step 8.



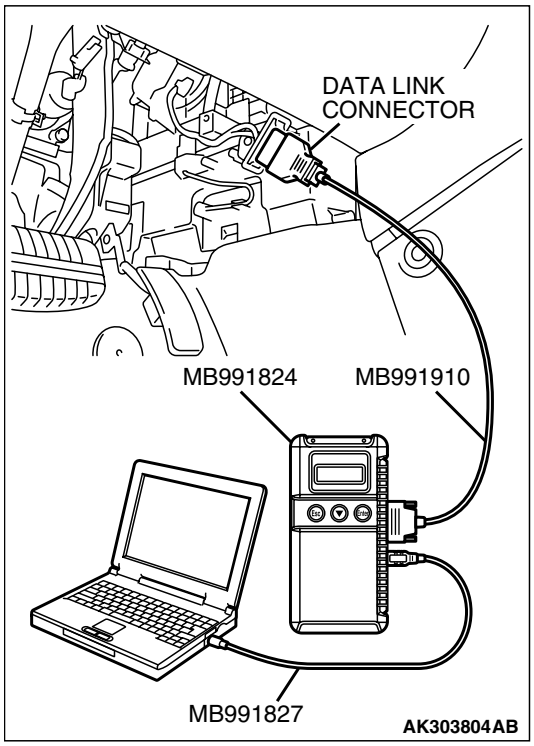
STEP 7. Replace the throttle body assembly.

(1) Replace the throttle body assembly.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0223 set?

YES : Replace the PCM. Then go to Step 8.

NO : The inspection is complete.



STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is DTC P0223 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0300: Random/Multiple Cylinder Misfire Detected

⚠ CAUTION
If DTC P0300 has been set, TCL related DTC U1120 is also set. After P0300 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The PCM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

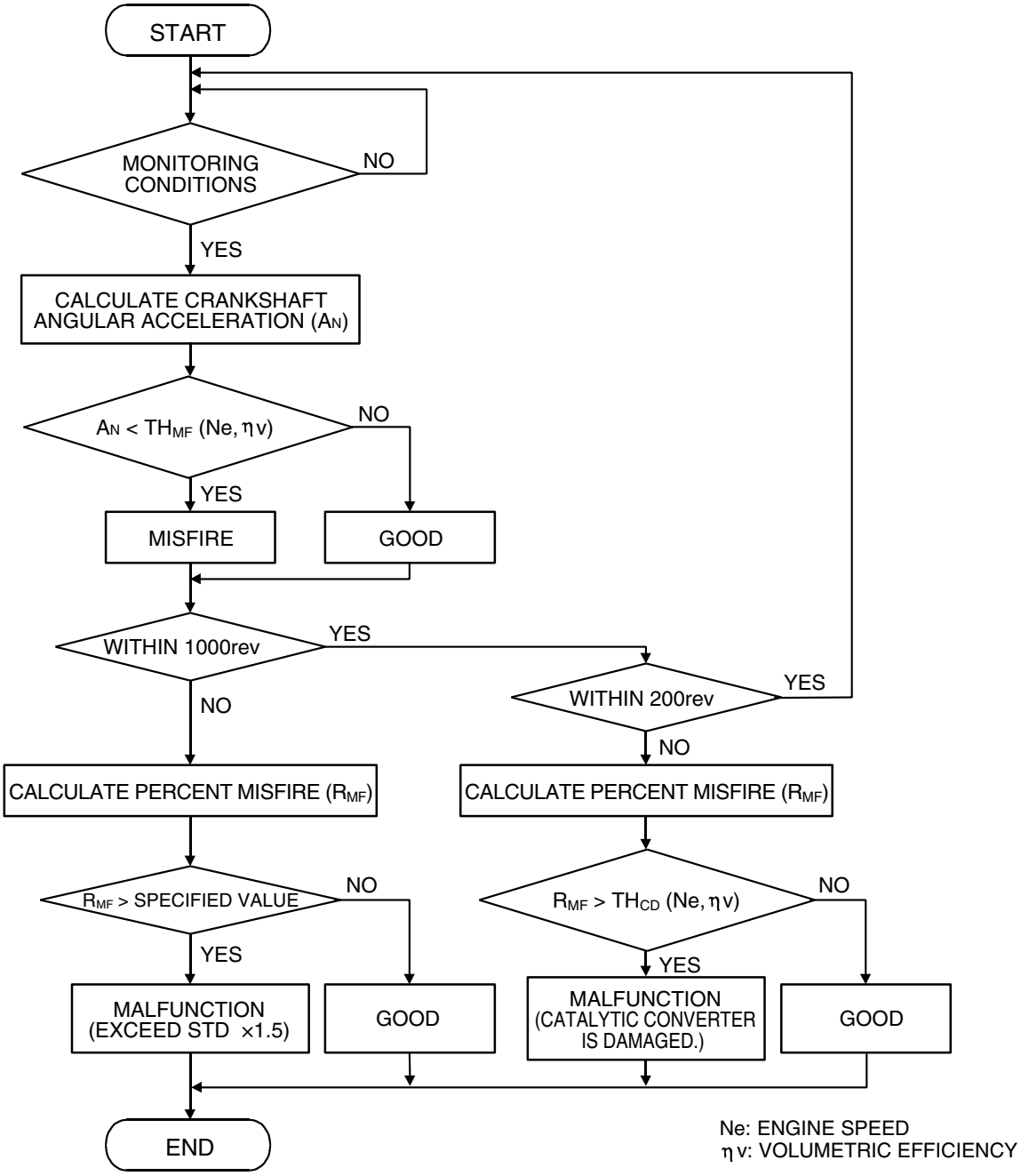
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is between 500 and 6,500 r/min.
- Engine coolant temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Volumetric efficiency is between 30 and 55 percent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.6 V/10 ms to +0.6 V/10 ms.

TSB Revision

Judgement Criteria (change in the angular acceleration of the crankshaft is used for misfire detection)

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 950°C (1742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <Federal>

or

- Misfire has occurred in 10 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <California>

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

- Ignition system related part(s) failed.
- Poor crankshaft position sensor.
- Incorrect air/fuel ratio.
- Low compression pressure.
- Skipping of timing belt teeth.
- EGR system and EGR valve failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, check data list item 22: Crankshaft Position Sensor.

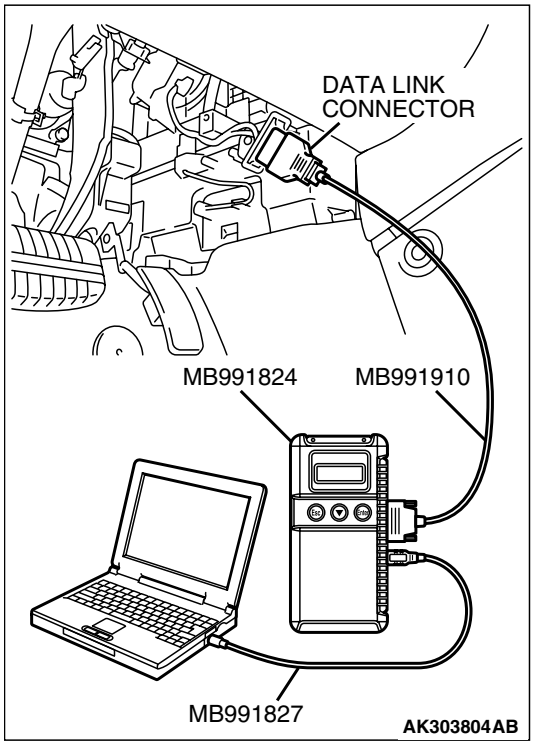
⚠ CAUTION

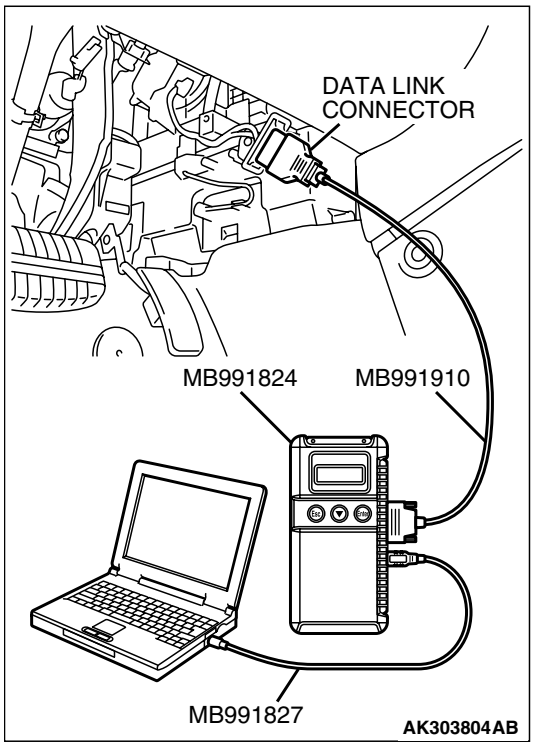
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 22, Crankshaft Position Sensor.
(4) Check the waveform of the crankshaft position sensor while keeping the engine speed constant.
  - The pulse width should be constant.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 2.
NO : Refer to, DTC P0335 – Crankshaft Position Sensor Circuit P.13A-548.





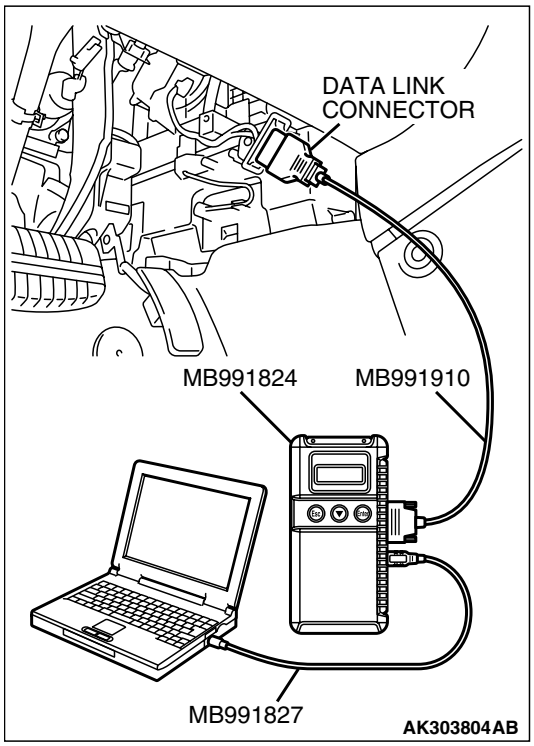
STEP 2. Using scan tool MB991958, check data list item 81: Cylinder 1,4 Long-Term Fuel Trim.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 81, Cylinder 1, 4 Long-Term Fuel Trim.
- The fuel trim should be between –12.5 and +12.5 percent when the load is 2,500 r/min (during closed loop) after the engine is warmed.

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

Q: Is the specification normal?

YES : Go to Step 3.
NO : Refer to DTC P0171 – System too Lean (cylinder 1, 4) P.13A-406, DTC P0172 – System too Rich (cylinder 1, 4) P.13A-415.



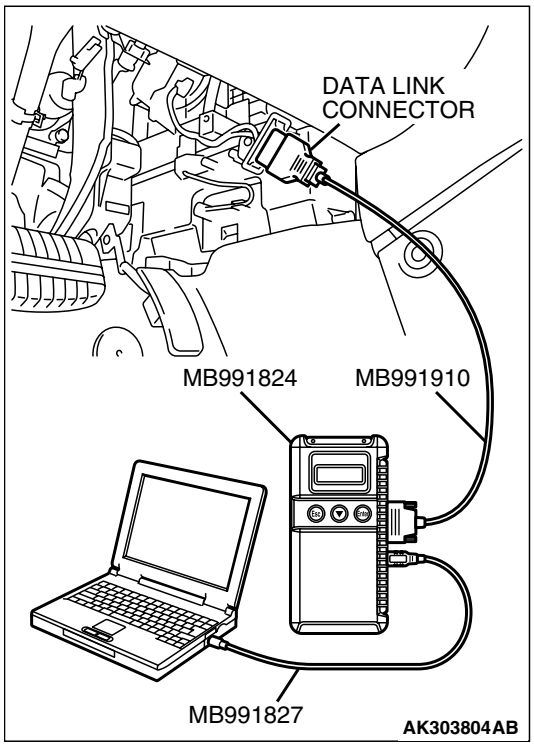
STEP 3. Using scan tool MB991958, check data list item 83: Cylinder 2, 3 Long-Term Fuel Trim.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 83, Cylinder 2, 3 Long-Term Fuel Trim.
- The fuel trim should be between –12.5 and +12.5 percent when the load is 2,500 r/min (during closed loop) after the engine is warmed.

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

Q: Is the specification normal?

YES : Go to Step 4.
NO : Refer to DTC P0174 – System too Lean (cylinder 2, 3) P.13A-421, DTC P0175 – System too Rich (cylinder 2, 3) P.13A-430.



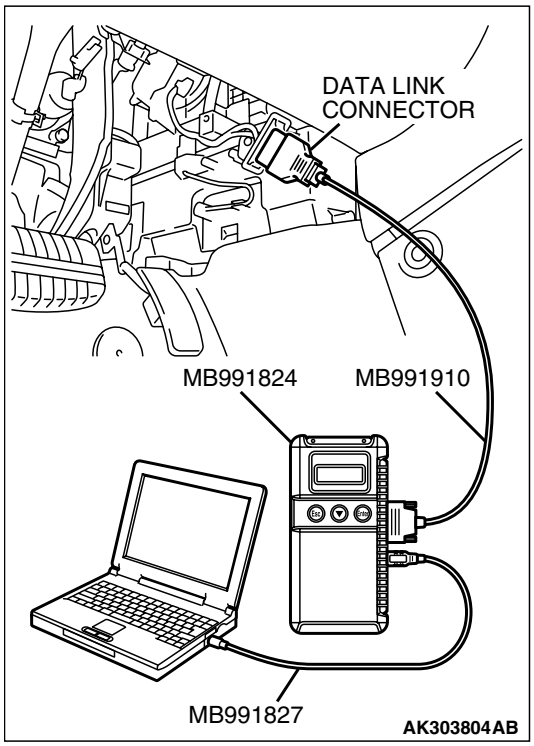
STEP 4. Using scan tool MB991958, check data list item 82: Cylinder 1, 4 Short-Term Fuel Trim.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 82, Cylinder 1, 4 Short-Term Fuel Trim.
- The fuel trim should be between –10 and +10 percent <Federal> or –10 and +7.0 percent < California> when the load is 2,500 r/min (during closed loop) after the engine is warmed.

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

Q: Is the specification normal?

YES : Go to Step 5.
NO : Refer to DTC P0171 – System too Lean (cylinder 1, 4) P.13A-406, DTC P0172 – System too Rich (cylinder 1, 4) P.13A-415.



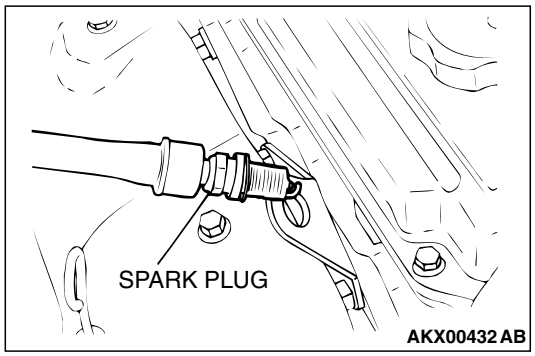
STEP 5. Using scan tool MB991958, check data list item 84: Cylinder 2, 3 Short-Term Fuel Trim.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 84, Cylinder 2, 3 Short-Term Fuel Trim.
- The fuel trim should be between –10 and +10 percent <Federal> or –10 and +7.0 percent < California> when the load is 2,500 r/min (during closed loop) after the engine is warmed.

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

Q: Is the specification normal?

YES : Go to Step 6.
NO : Refer to DTC P0174 – System too Lean (cylinder 2, 3) P.13A-421, DTC P0175 – System too Rich (cylinder 2, 3) P.13A-430.

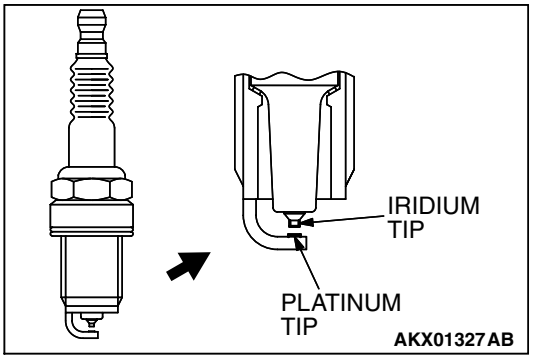


STEP 6. Check the each ignition coil spark.

(1) Remove the spark plug and connect to the ignition coil.
(2) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 8.
NO : Go to Step 7.



STEP 7. Check the spark plugs.

⚠ CAUTION
Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium and platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

(1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)
Limit: 1.0 mm (0.039 inch)

Q: Is the plug gap at the standard value?

YES : Refer to INSPECTION PROCEDURE 31 – Ignition Circuit System P.13A-1073.
NO : Replace the faulty spark plug. Then go to Step 10.

STEP 8. Check the following items.

(1) Check the following items, and repair or replace the defective component.
a. Check for skipped timing belt teeth.
b. Check compression.
c. EGR valve failed.

Q: Are there any abnormalities?

YES : Repair or replace it. Then go to Step 10.
NO : Go to Step 9.

STEP 9. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0300 set?

YES : Replace the PCM. Then go to Step 10.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 10. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0300 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0301: Cylinder 1 Misfire Detected

⚠ CAUTION

If DTC P0301 has been set, TCL related DTC U1120 is also set. After P0301 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The PCM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

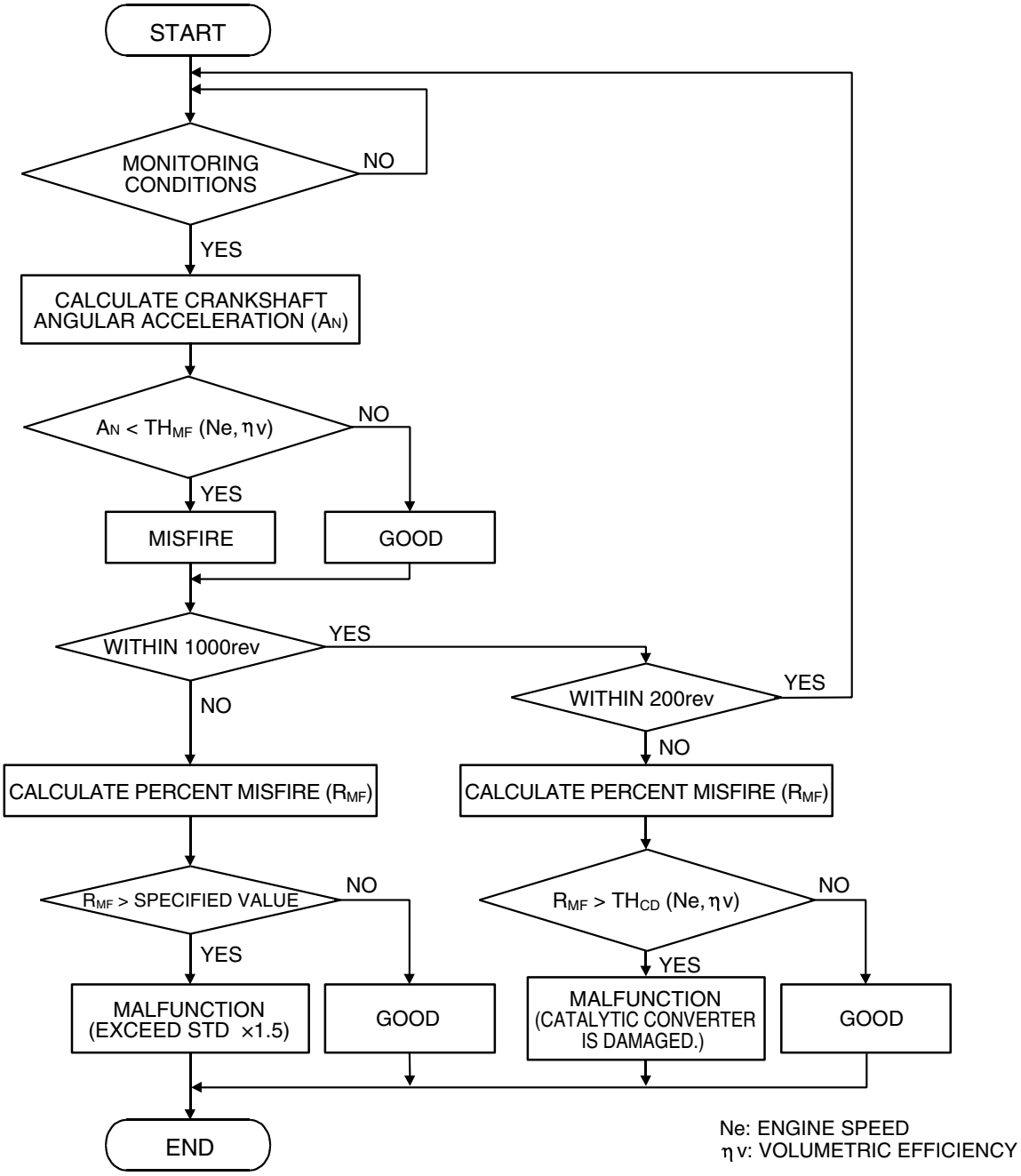
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is between 500 and 6,500 r/min.
- Engine coolant temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Volumetric efficiency is at between 30 and 55 percent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

TSB Revision

Judgement Criteria (change in the angular acceleration of the crankshaft is used for misfire detection)

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 950°C (1,742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <Federal>

or

- Misfire has occurred in 10 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <California>

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

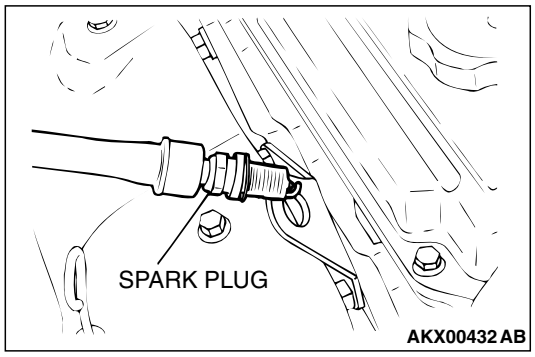
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Ignition system related part(s) failed.
- Low compression pressure.
- PCM failed.

DIAGNOSIS

STEP 1. Check the No. 1 cylinder ignition coil spark.

(1) Remove the No. 1 cylinder ignition coil.
(2) Remove the No. 1 cylinder spark plug and connect to the No. 1 cylinder ignition coil.
(3) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.



Q: Did it spark?

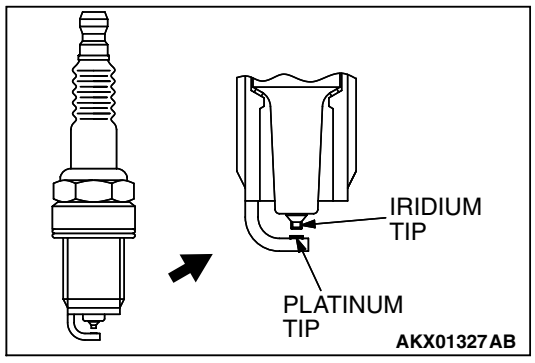
YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 1 cylinder spark plug.

⚠ CAUTION
Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium and platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

(1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)
Limit: 1.0 mm (0.039 inch)



Q: Is the plug gap at the standard value?

YES : Refer to, INSPECTION PROCEDURE 31 – Ignition Circuit System P.13A-1073.
NO : Replace the No. 1 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.
Refer to GROUP 11A, On-Vehicle Service – Compression Pressure Check P.11A-16.

Q: Are there any abnormalities?

YES : Repair or replace it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0301 set?

YES : Replace the PCM. Then go to Step 5.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 5. Test the OBD-II drive cycle.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0301 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0302: Cylinder 2 Misfire Detected

⚠ CAUTION
If DTC P0302 has been set, TCL related DTC U1120 is also set. After P0302 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The PCM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

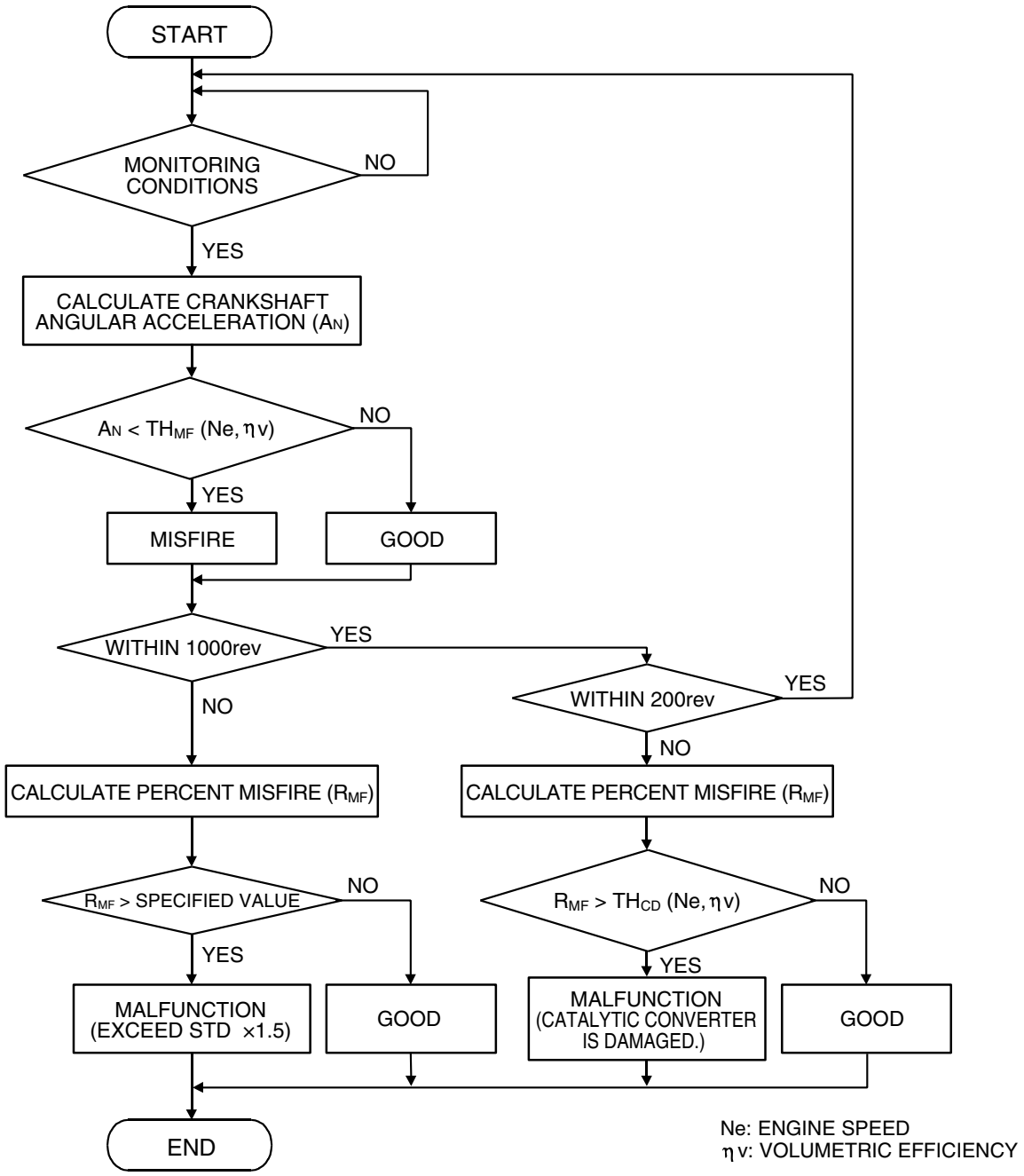
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is between 500 and 6,500 r/min.
- Engine coolant temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Volumetric efficiency is at between 30 and 55 percent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

TSB Revision

Judgement Criteria (change in the angular acceleration of the crankshaft is used for misfire detection)

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 950°C (1,742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <Federal>

or

- Misfire has occurred in 10 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <California>

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

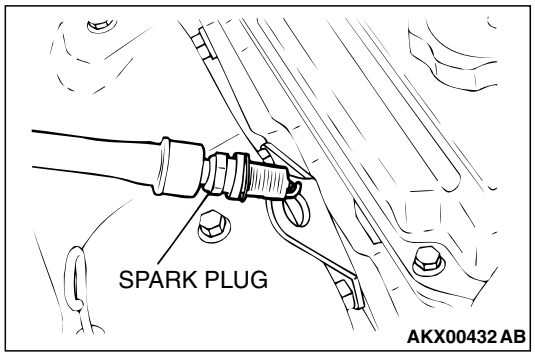
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Ignition system related part(s) failed.
- Low compression pressure.
- PCM failed.

DIAGNOSIS

STEP 1. Check the No. 2 cylinder ignition coil spark.

(1) Remove the No. 2 cylinder ignition coil.
(2) Remove the No. 2 cylinder spark plug and connect to the No. 2 cylinder ignition coil.
(3) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.



Q: Did it spark?

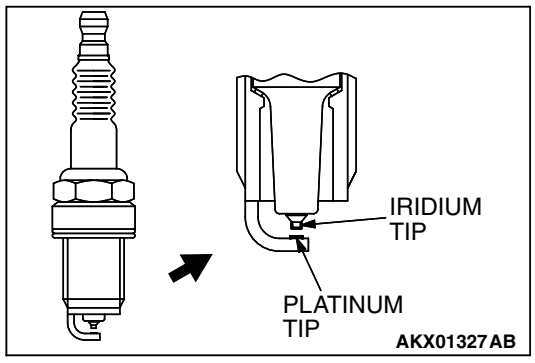
YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 2 cylinder spark plug.

⚠ CAUTION
Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium and platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

(1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)
Limit: 1.0 mm (0.039 inch)



Q: Is the plug gap at the standard value?

YES : Refer to, INSPECTION PROCEDURE 31 – Ignition Circuit System P.13A-1073.
NO : Replace the No. 2 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.
Refer to GROUP 11A, On-Vehicle Service – Compression Pressure Check P.11A-16.

Q: Are there any abnormalities?

YES : Repair or replace it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0302 set?

YES : Replace the PCM. Then go to Step 5.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 5. Test the OBD-II drive cycle.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0302 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0303: Cylinder 3 Misfire Detected

⚠ CAUTION
If DTC P0303 has been set, TCL related DTC U1120 is also set. After P0303 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The PCM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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

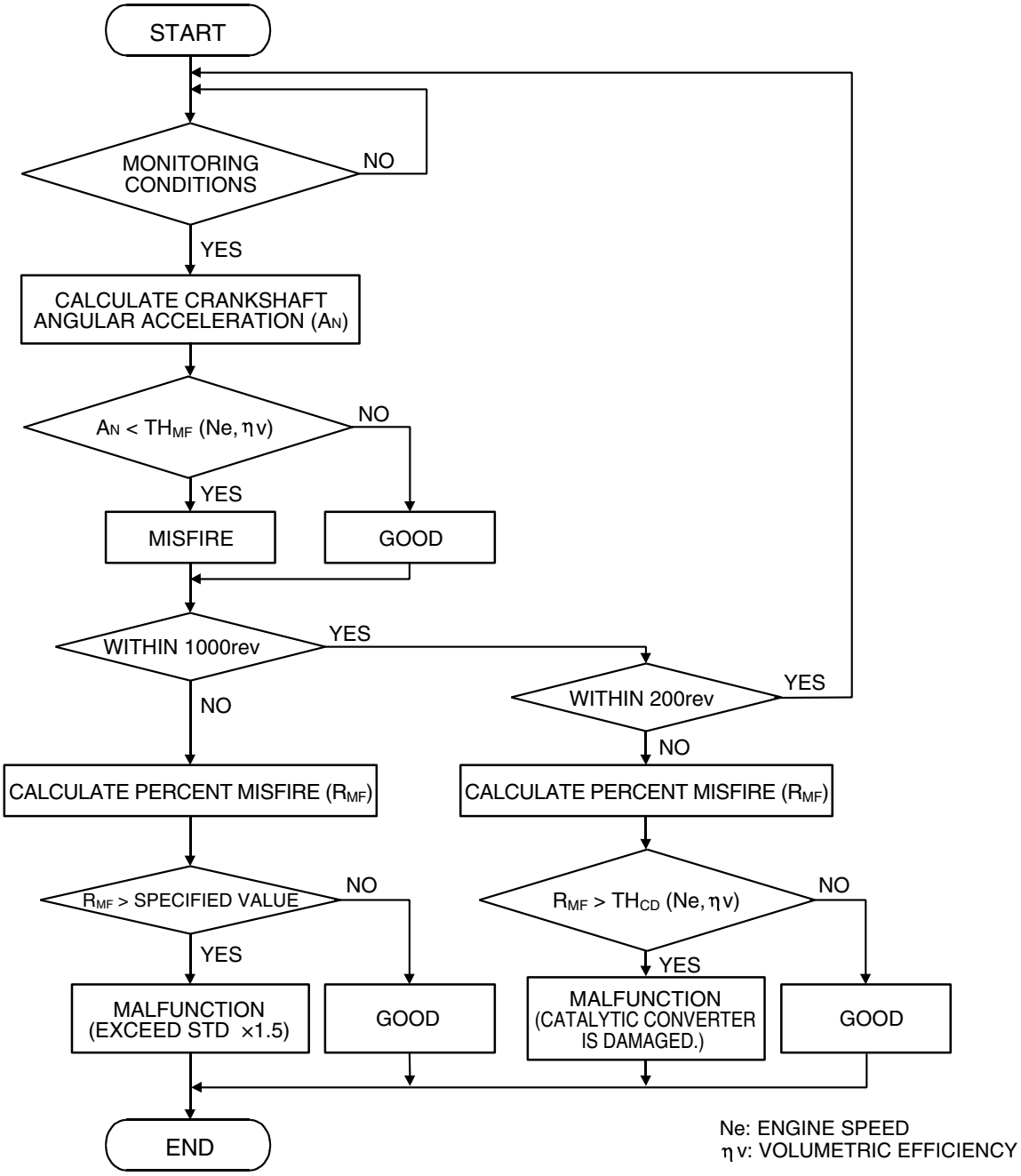
Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

TSB Revision

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is between 500 and 6,500 r/min.
- Engine coolant temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Volumetric efficiency is at between 30 and 55 percent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

TSB Revision

Judgement Criteria (change in the angular acceleration of the crankshaft is used for misfire detection)

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 950°C (1,742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <Federal>

or

- Misfire has occurred in 10 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <California>

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

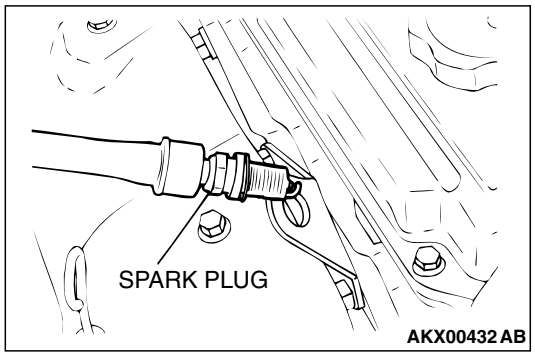
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Ignition system related part(s) failed.
- Low compression pressure.
- PCM failed.

DIAGNOSIS

STEP 1. Check the No. 3 cylinder ignition coil spark.

(1) Remove the No. 3 cylinder ignition coil.
(2) Remove the No. 3 cylinder spark plug and connect to the No. 3 cylinder ignition coil.
(3) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.



Q: Did it spark?

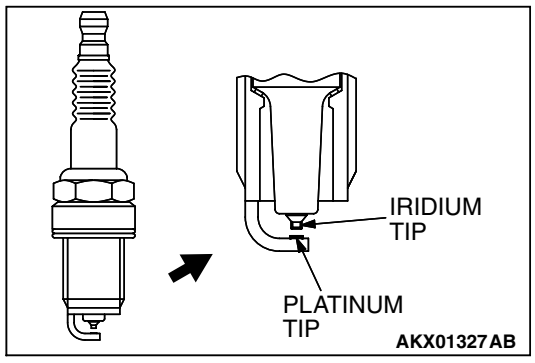
YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 3 cylinder spark plug.

⚠ CAUTION
Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium and platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

(1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)
Limit: 1.0 mm (0.039 inch)



Q: Is the plug gap at the standard value?

YES : Refer to, INSPECTION PROCEDURE 31 – Ignition Circuit System P.13A-1073.
NO : Replace the No. 3 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.
Refer to GROUP 11A, On-Vehicle Service – Compression Pressure Check P.11A-16.

Q: Are there any abnormalities?

YES : Repair or replace it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0303 set?

YES : Replace the PCM. Then go to Step 5.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 5. Test the OBD-II drive cycle.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0303 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0304: Cylinder 4 Misfire Detected

⚠ CAUTION
If DTC P0304 has been set, TCL related DTC U1120 is also set. After P0304 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The PCM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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

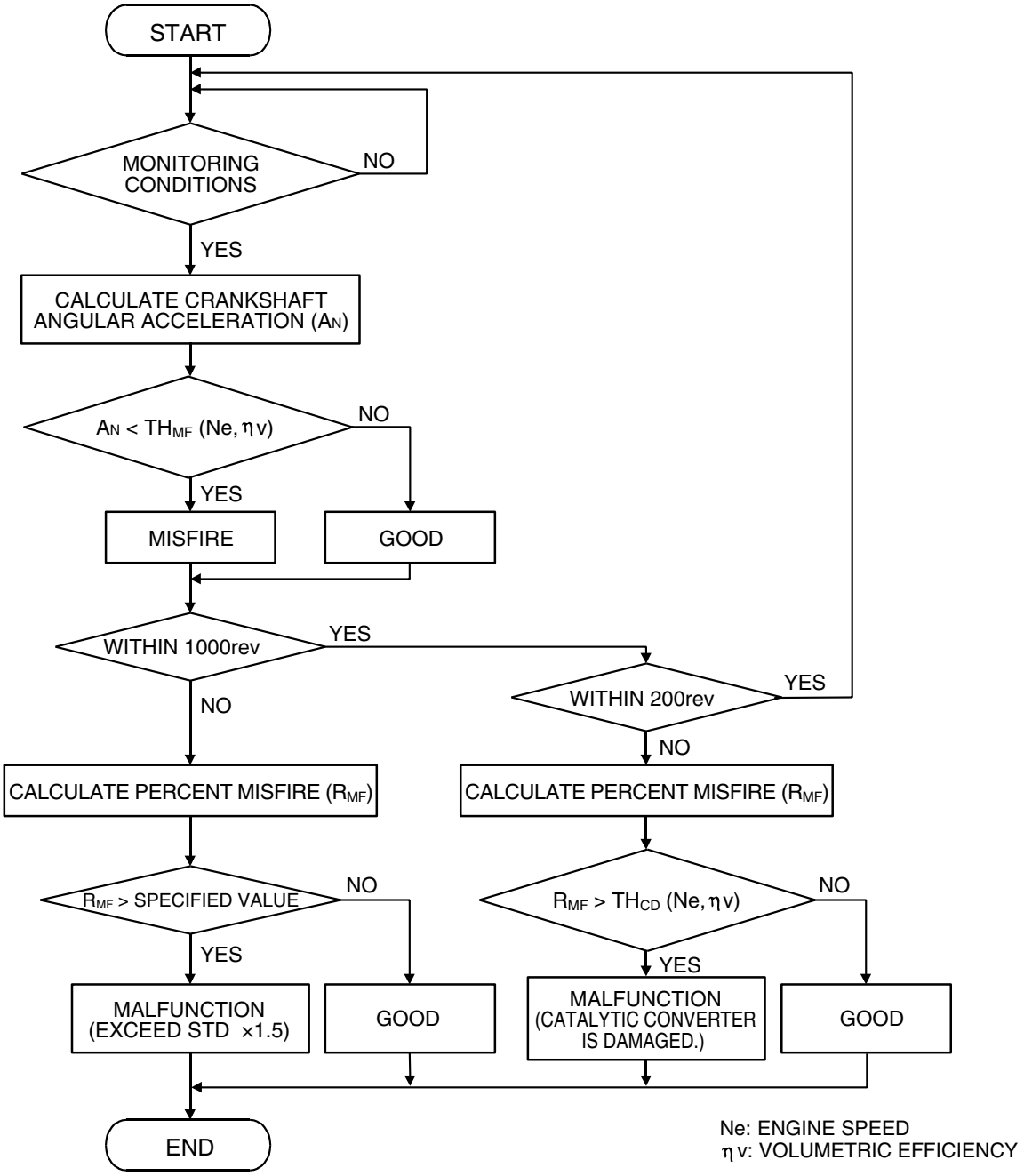
Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

TSB Revision

DTC SET CONDITIONS

Logic Flow Chart



AK302033

Check Conditions

- Engine speed is between 500 and 6,500 r/min.
- Engine coolant temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Volumetric efficiency is at between 30 and 55 percent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

TSB Revision

Judgement Criteria (change in the angular acceleration of the crankshaft is used for misfire detection)

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 950°C (1,742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <Federal>

or

- Misfire has occurred in 10 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard). <California>

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

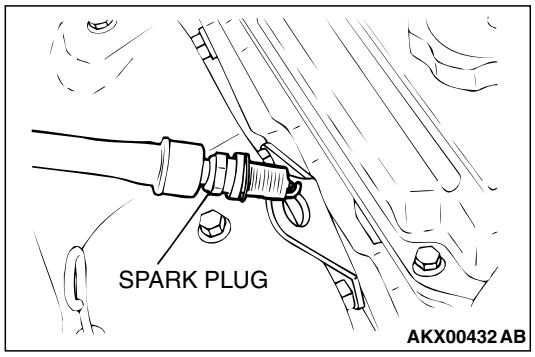
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Ignition system related part(s) failed.
- Low compression pressure.
- PCM failed.

DIAGNOSIS

STEP 1. Check the No. 4 cylinder ignition coil spark.

(1) Remove the No. 4 cylinder ignition coil.
(2) Remove the No. 4 cylinder spark plug and connect to the No. 4 cylinder ignition coil.
(3) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.



Q: Did it spark?

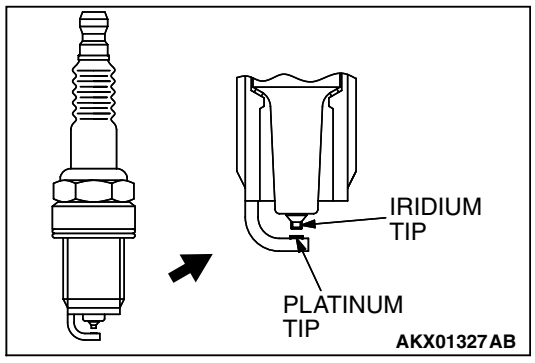
YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 4 cylinder spark plug.

⚠ CAUTION
Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium and platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

(1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)
Limit: 1.0 mm (0.039 inch)



Q: Is the plug gap at the standard value?

YES : Refer to, INSPECTION PROCEDURE 31 – Ignition Circuit System P.13A-1073.
NO : Replace the No. 4 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.
Refer to GROUP 11A, On-Vehicle Service – Compression Pressure Check P.11A-16.

Q: Are there any abnormalities?

YES : Repair or replace it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0304 set?

YES : Replace the PCM. Then go to Step 5.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 5. Test the OBD-II drive cycle.
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

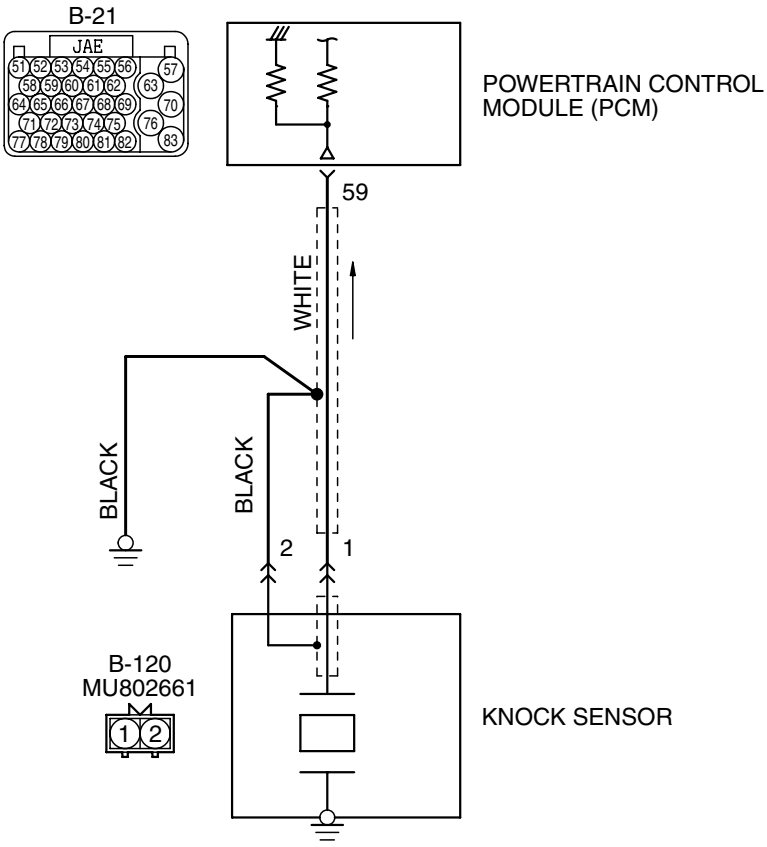
Q: Is DTC P0304 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0325: Knock Sensor Circuit

⚠ CAUTION
If DTC P0325 has been set, TCL related DTC U1120 is also set. After P0325 has been diagnosed, don't forget to erase DTC U1120.

Knock Sensor Circuit



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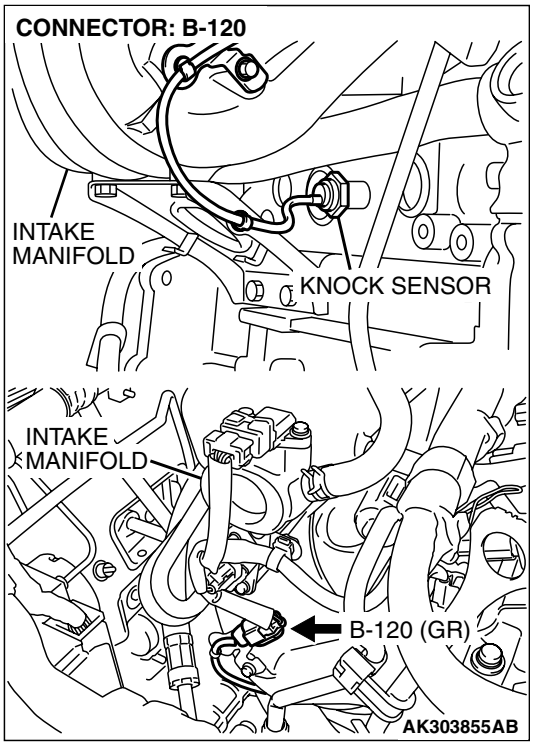
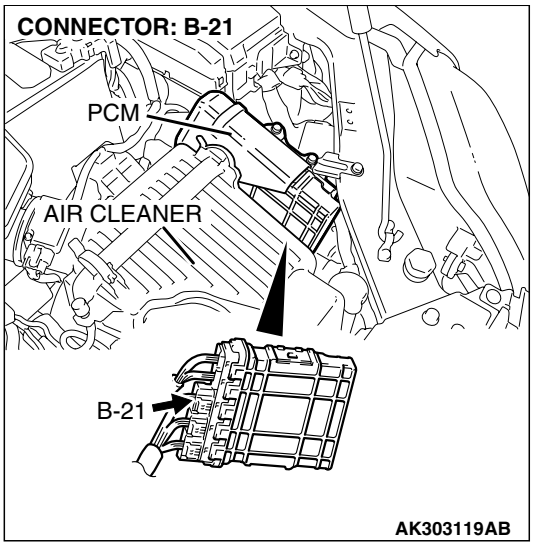




CIRCUIT OPERATION

- The knock sensor sends a signal voltage to the PCM (terminal No. 59).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it. If there is a malfunction of the knock sensor, the voltage output will not change.
- The PCM checks whether the voltage output changes.

DTC SET CONDITIONS

Check Conditions

- 2 seconds or more have passed since the starting sequence was completed.
- Engine speed is higher than 2,500 r/min.

Judgment Criteria

- Knock sensor output voltage (knock sensor peak voltage in each 1/2 turn of the crankshaft) has not changed more than 0.06 volt in the last consecutive 200 periods.

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

- Knock sensor failed.
- Open or shorted knock sensor circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

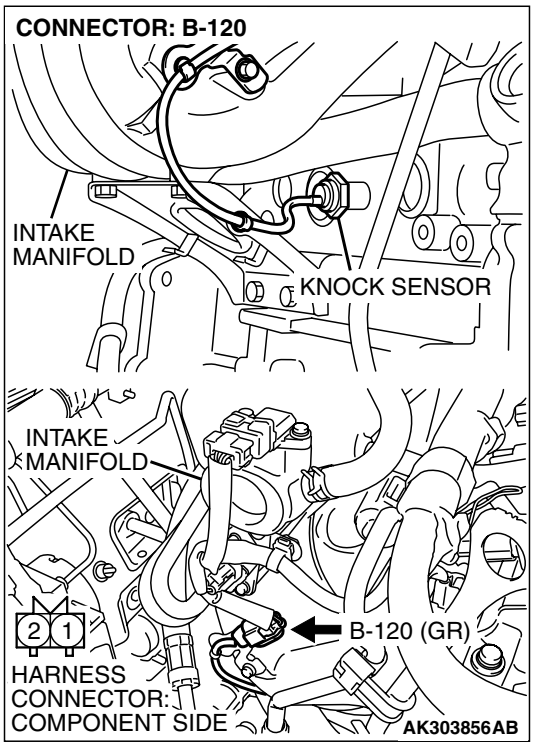
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check harness connector B-120 at the knock sensor for damage.

Q: Is the harness connector in good condition?

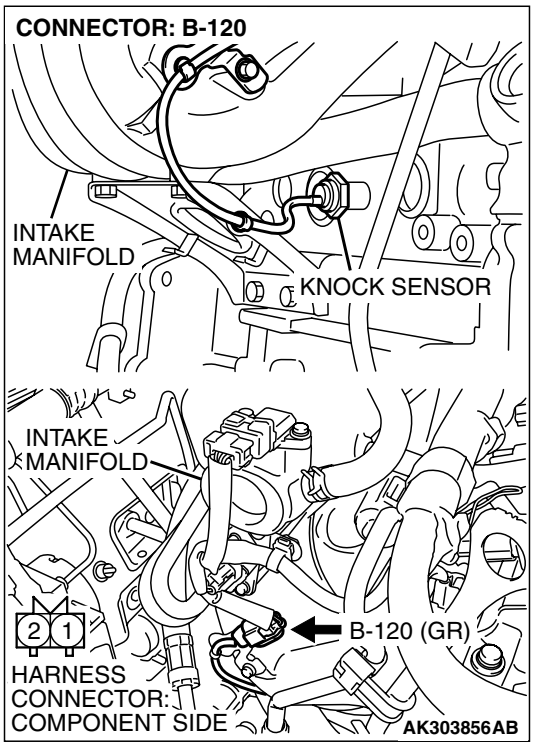
YES : Go to Step 2.

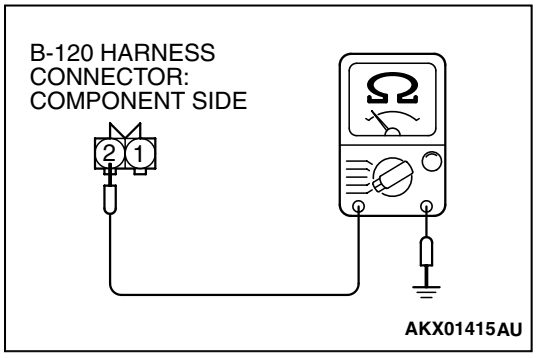
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.



STEP 2. Check the continuity at knock sensor harness side connector B-120.

(1) Disconnect the connector B-120 and measure at the harness side.



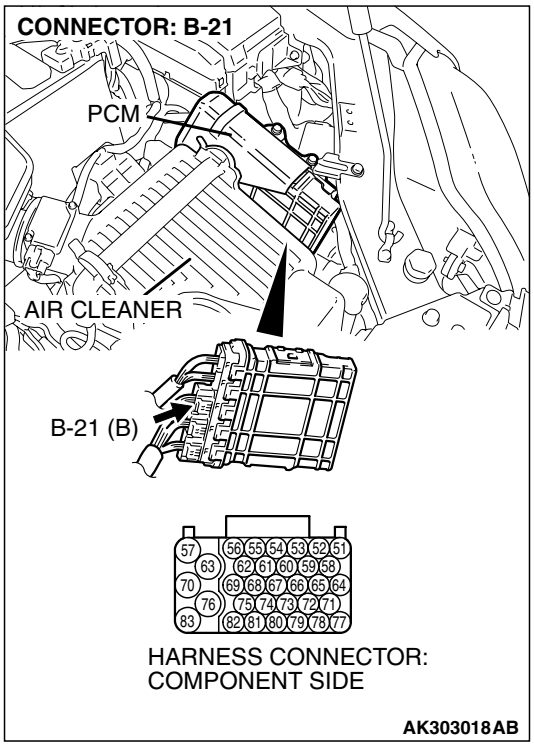


(2) Check for the continuity between terminal No. 2 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 3.

NO : Repair harness wire between knock sensor connector B-120 (terminal No. 2) and ground because of open circuit or harness damage. Then go to Step 6.



STEP 3. Check harness connector B-21 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

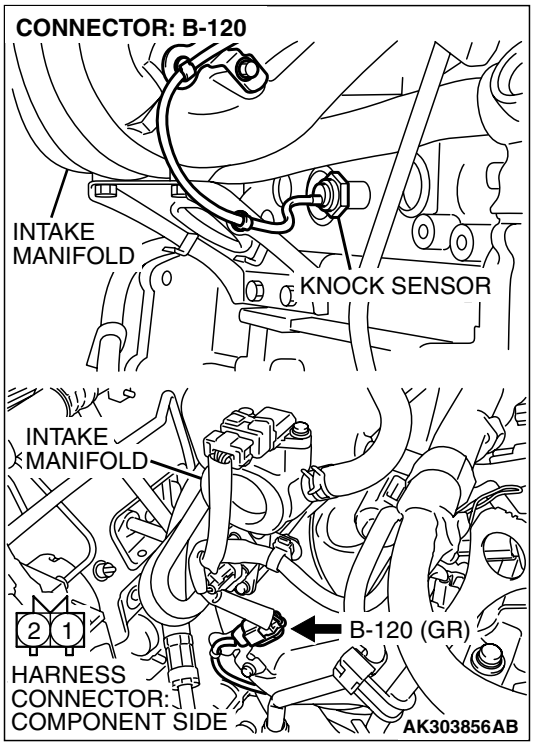
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.

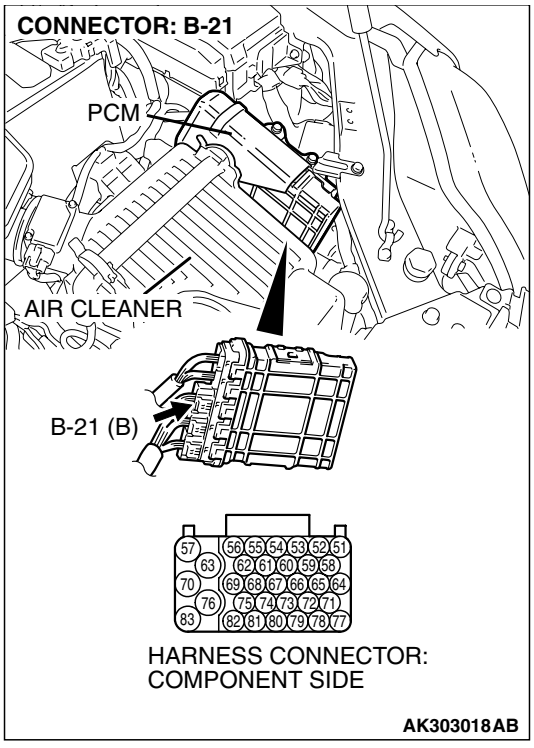
STEP 4. Check for open circuit and short circuit to ground and harness damage between knock sensor connector B-120 (terminal No. 1) and PCM connector B-21 (terminal No. 59).

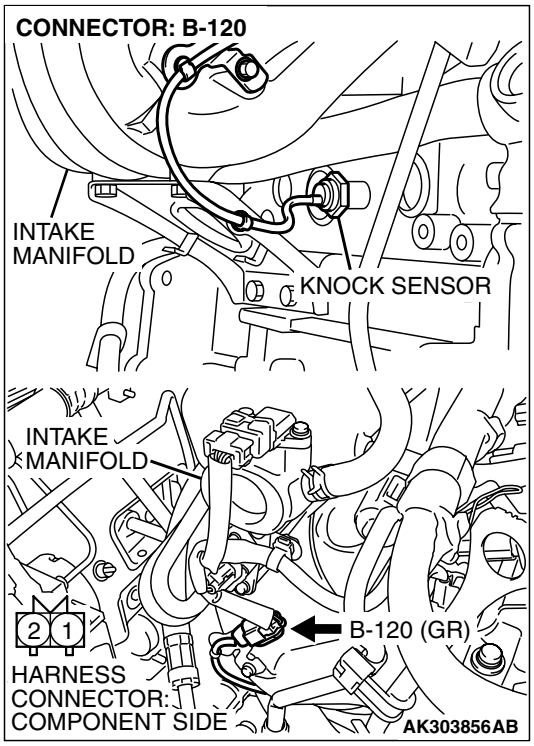
Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair it. Then go to Step 6.

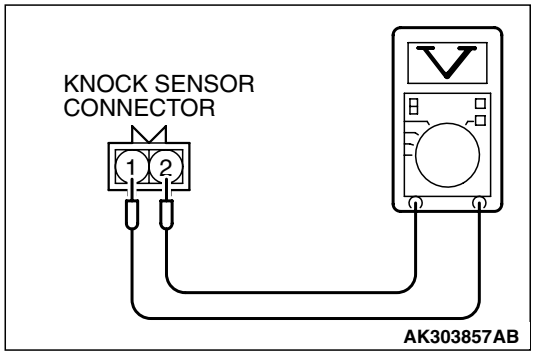






STEP 5. Check the knock sensor.

(1) Disconnect the knock sensor connector B-120.
(2) Start the engine and run at idle.

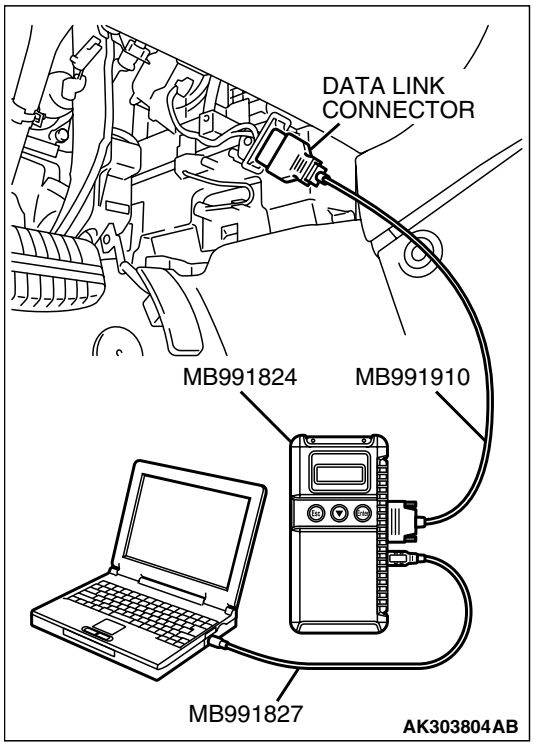


(3) Measure the voltage between knock sensor side connector terminal No. 1 (output) and No. 2 (ground).
(4) Gradually increase the engine speed.
- The voltage increases with the increase in the engine speed.

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

Q: Is the sensor operating properly?

YES : Replace the PCM. Then go to Step 6.
NO : Replace the knock sensor. Then go to Step 6.



STEP 6. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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) Erase the DTC.
(4) Test drive under the following conditions:
- Engine speed: 3000 – 5000r/min
- Engine load: 40% or more
- Drive a minimum of 3 seconds after the above conditions have been met.

(5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

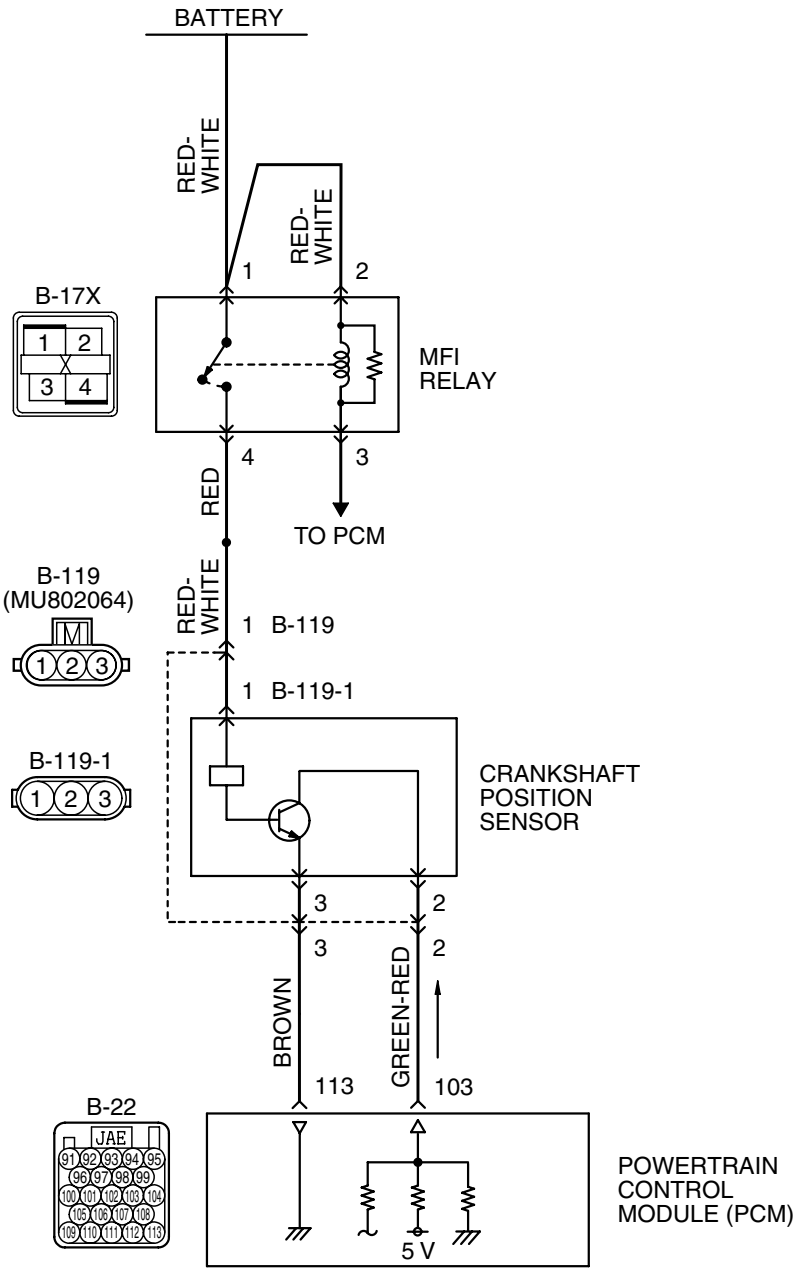
Q: Is DTC P0325 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC P0335: Crankshaft Position Sensor Circuit

⚠ CAUTION
If DTC P0335 has been set, TCL related DTC U1120 is also set. After P0335 has been diagnosed, don't forget to erase DTC U1120.

Crankshaft Position Sensor Circuit



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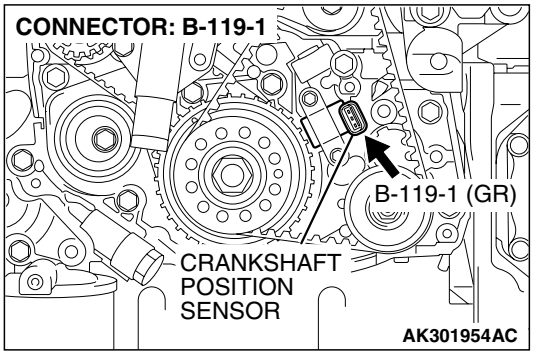
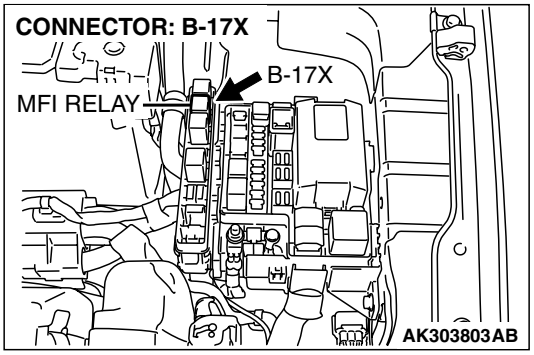
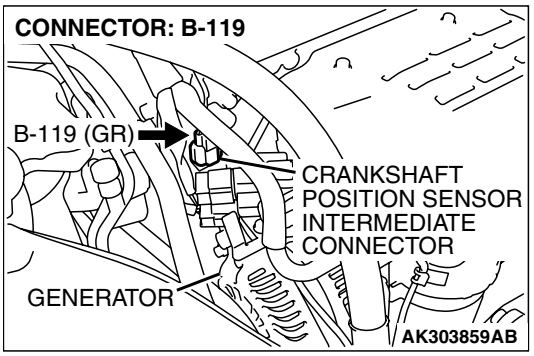
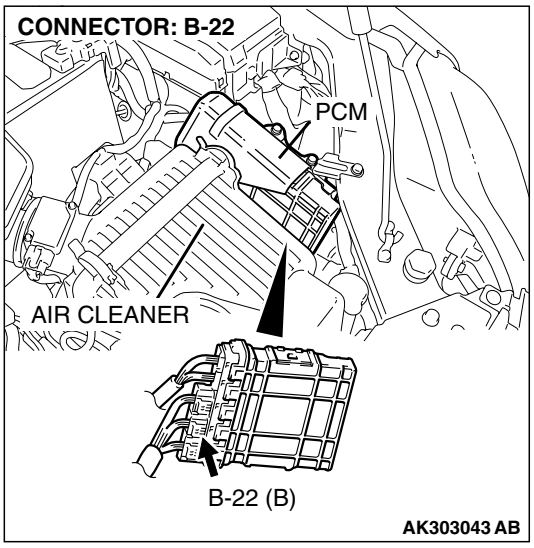








CIRCUIT OPERATION

- The crankshaft position sensor power is supplied from the MFI relay (terminal No. 4).
- Terminal No. 3 of the crankshaft position sensor is grounded with PCM (terminal No. 113).
- A 5-volt voltage is applied on the crankshaft position sensor output terminal (terminal No. 2) from the PCM (terminal No. 103). The crankshaft position sensor generates a pulse signal when the output terminal is opened and grounded.

TECHNICAL DESCRIPTION

- The crankshaft position sensor detects the crank angle (position) of each cylinder, and converts that data to pulse signals, then which are input to the PCM.
- When the engine is running, the crankshaft position sensor outputs a pulse signal.
- The PCM checks whether pulse signal is input while the engine is cranking.

DESCRIPTIONS OF MONITOR METHODS

- Crankshaft position sensor signal does not change.
- Crankshaft position sensor signal is not normal pattern.

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)

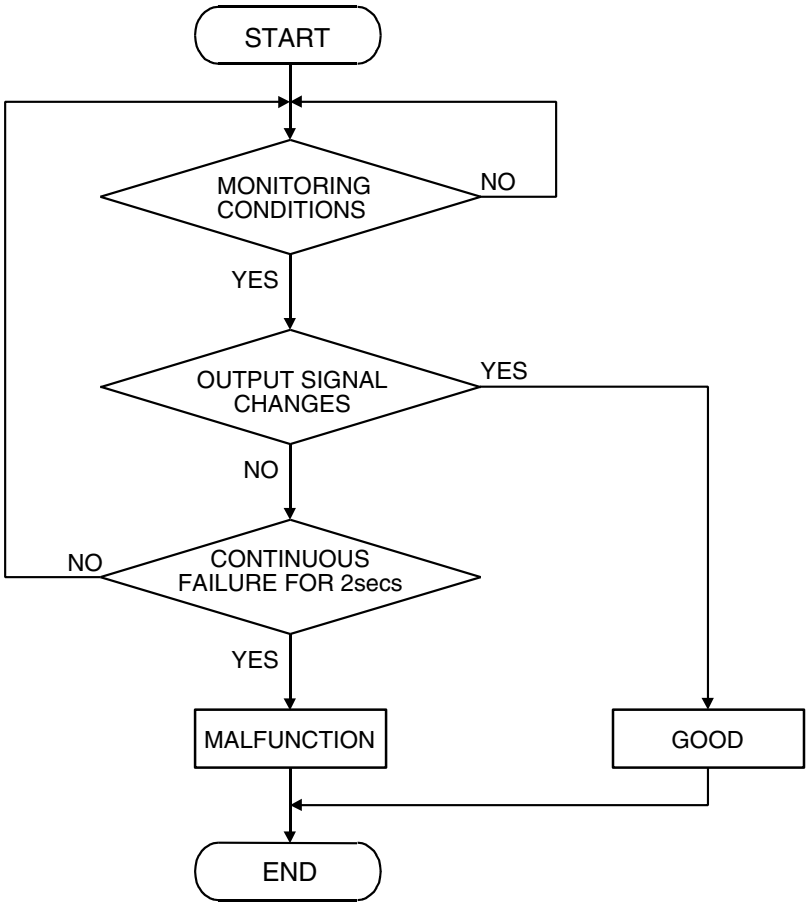
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity>

Logic Flow Chart



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Check Conditions

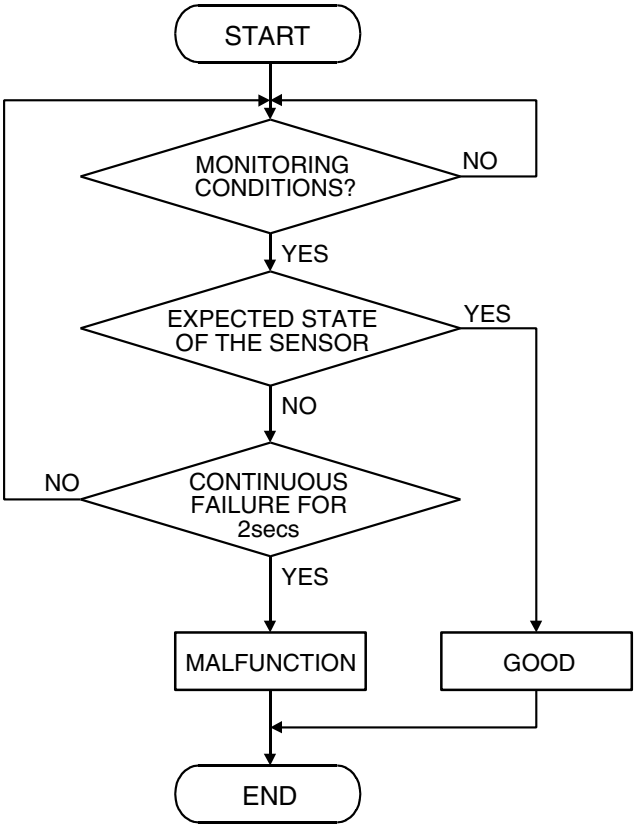
- Engine is being cranked.

Judgment Criteria

- Crankshaft position sensor output voltage has not changed (no pulse signal is input) for 2 seconds.

DTC SET CONDITIONS <Range/Performance problem – alignment>

Logic Flow Chart



AK302035

Check Conditions, Judgment Criteria

- Normal signal pattern has not been input for cylinder identification from the crankshaft position sensor signal and camshaft position sensor signal for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

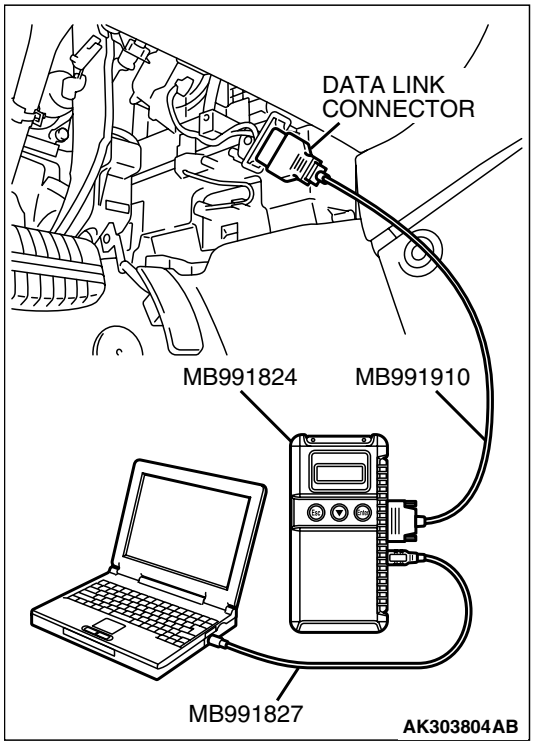
- Crankshaft position sensor failed.
- Open or shorted crankshaft position sensor circuit, or harness damage, or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 22: Crankshaft Position 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.

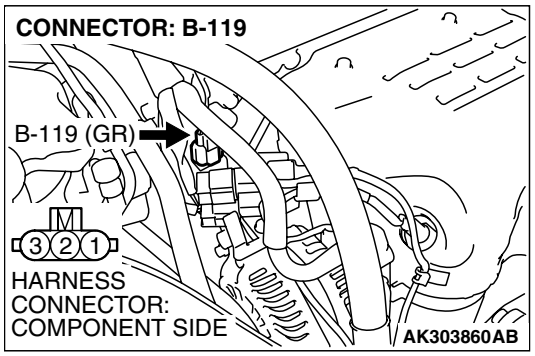
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 22, Crankshaft Position Sensor.
  - The tachometer and engine speed indicated on the scan tool should match.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

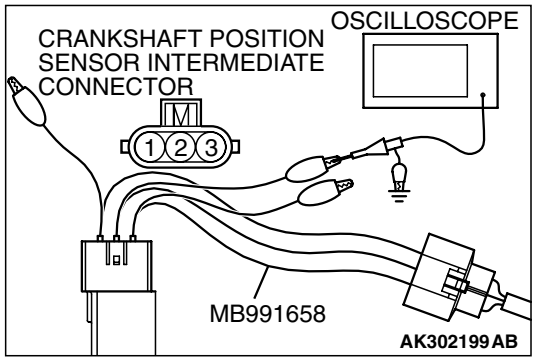
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Go to Step 2.

STEP 2. Using the oscilloscope, check the crankshaft position sensor.



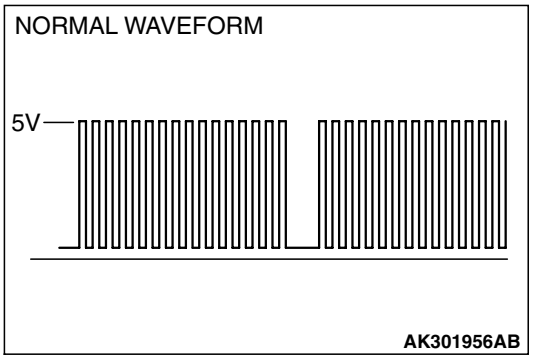
(1) Disconnect the crankshaft position sensor intermediate connector B-119 and connect the test harness special tool (MB991658) between the separated connectors.



(2) Connect the oscilloscope probe to terminal No. 2 of the crankshaft position sensor side connector.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 103.

(3) Start the engine and run at idle.



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

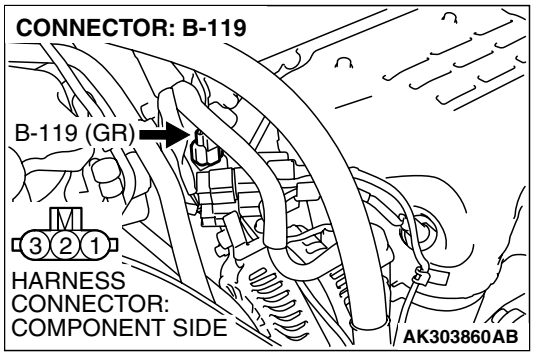
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

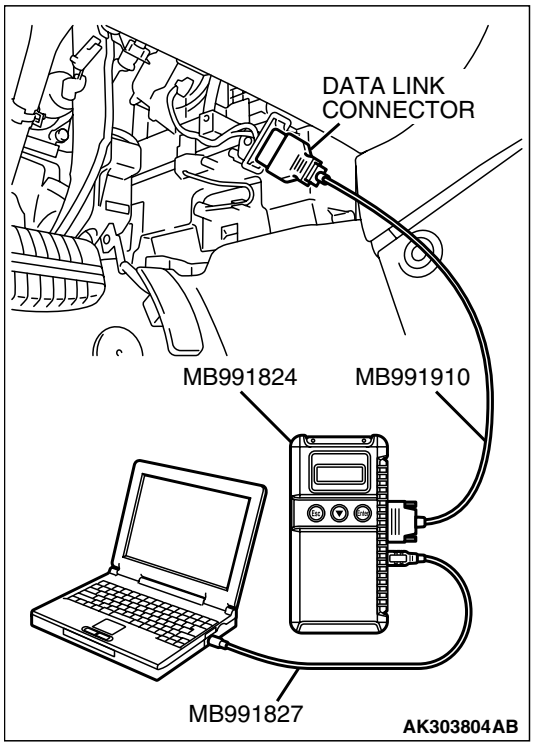
YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check harness connector B-119 at the crankshaft position sensor intermediate connector for damage.

Q: Is the harness connector in good condition?



YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.



STEP 4. Using scan tool MB991958, check data list item 22: Crankshaft Position 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.

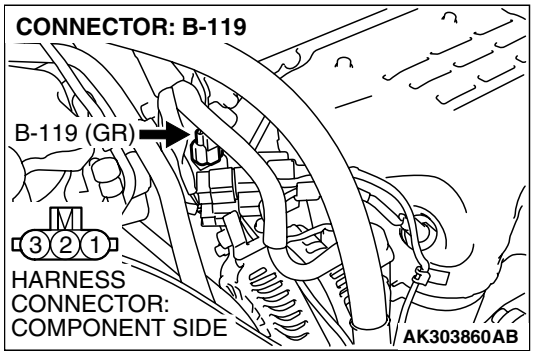
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 22, Crankshaft Position Sensor.
- The tachometer and engine speed indicated on the scan tool should match.

(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 Malfunctions P.00-14.

NO : Replace the PCM. Then go to Step 22.

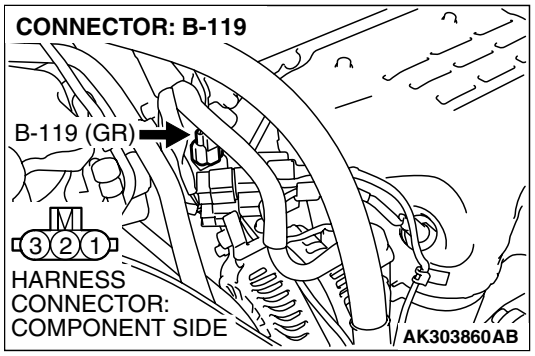


STEP 5. Check harness connector B-119 at the crankshaft position sensor intermediate connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 6.

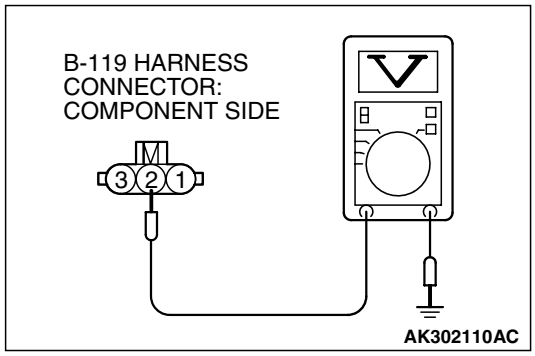
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.



STEP 6. Measure the sensor supply voltage at crankshaft position sensor intermediate harness side connector B-119.

(1) Disconnect the connector B-119 and measure at the harness side.

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



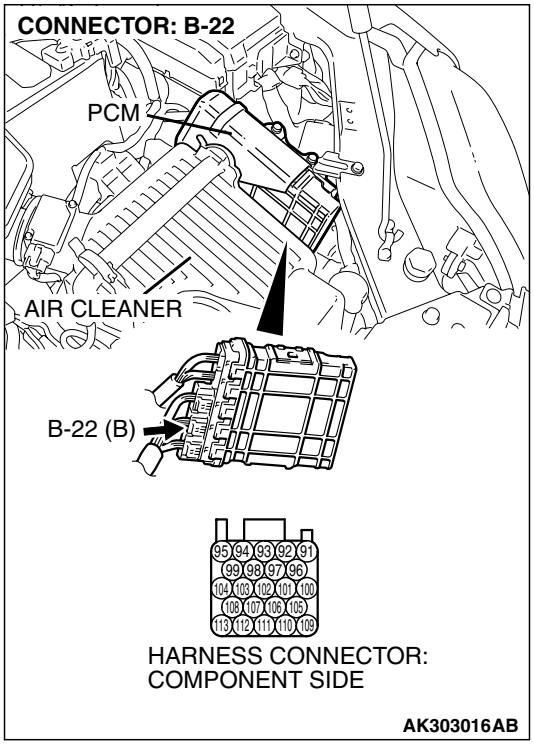
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

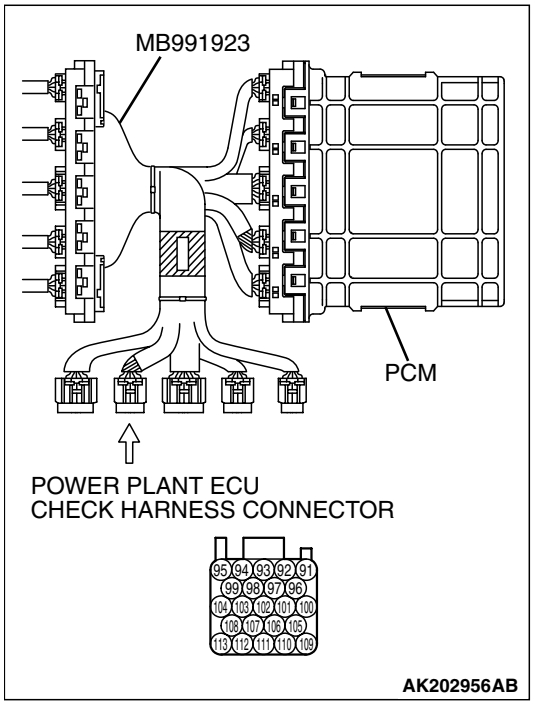
YES : Go to Step 11.

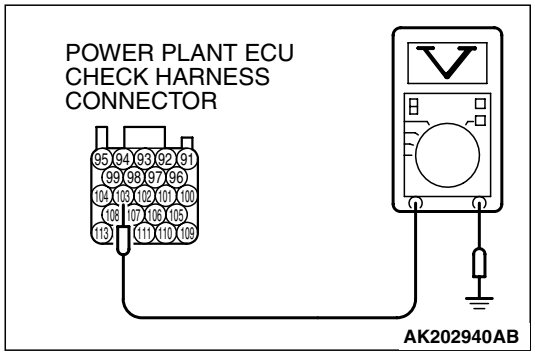
NO : Go to Step 7.



STEP 7. Measure the sensor supply voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect the all PCM connectors and connect power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Disconnect the crankshaft position sensor intermediate connector B-119.
(3) Turn the ignition switch to the "ON" position.



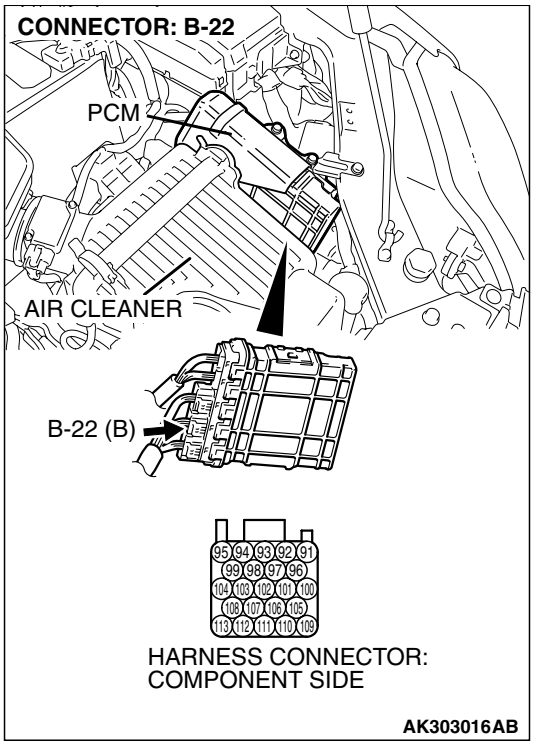


(4) Measure the voltage between terminal No. 103 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

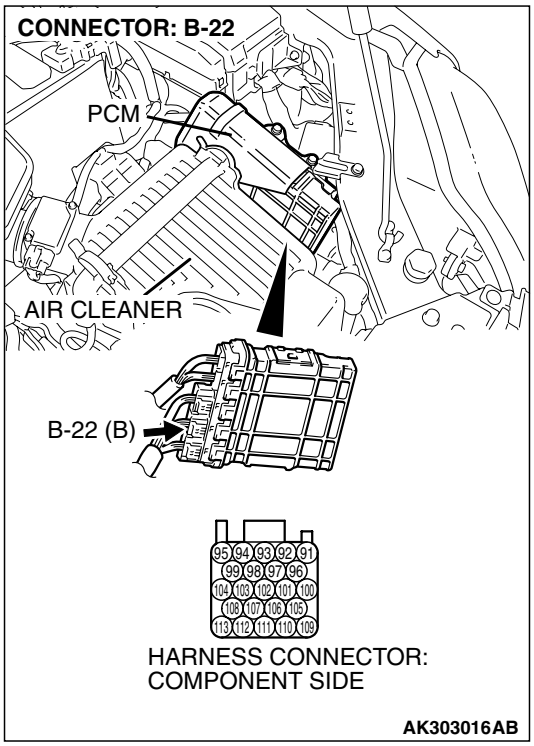
YES : Go to Step 8.
NO : Go to Step 9.



STEP 8. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between crankshaft position sensor intermediate connector B-119 (terminal No. 2) and PCM connector B-22 (terminal No. 103) because of open circuit. Then go to Step 22.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

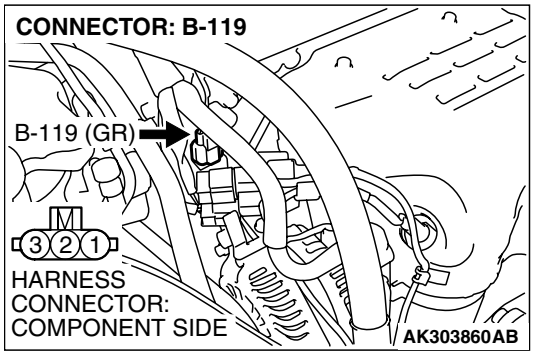


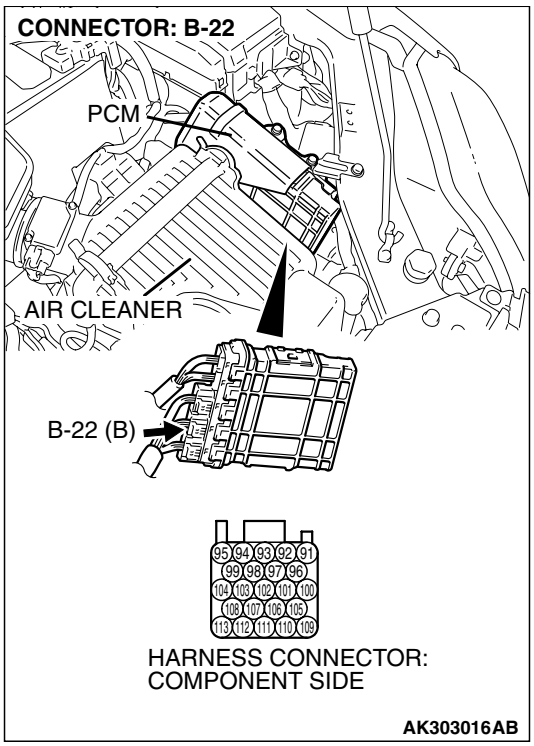
STEP 9. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.





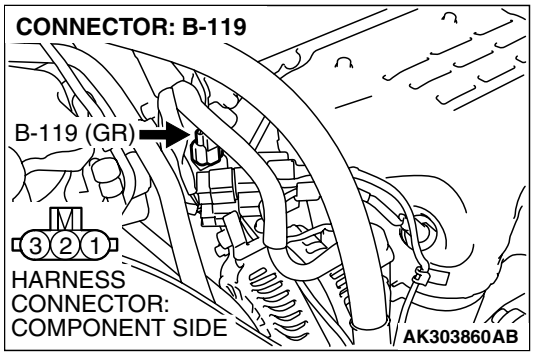
STEP 10. Check for short circuit to ground between crankshaft position sensor intermediate connector B-119 (terminal No. 2) and PCM connector B-22 (terminal No. 103).

Q: Is the harness wire in good condition?

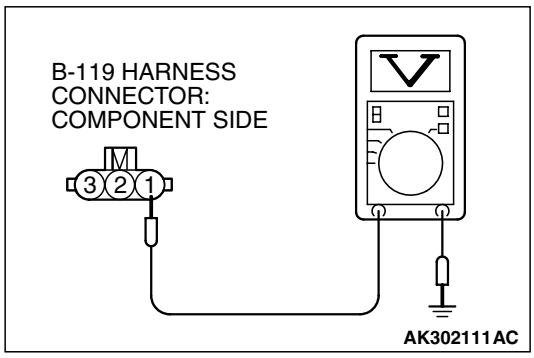
YES : Replace the PCM. Then go to Step 22.

NO : Repair it. Then go to Step 22.

STEP 11. Measure the power supply voltage at crankshaft position sensor intermediate harness side connector B-119.



(1) Disconnect the connector B-119 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



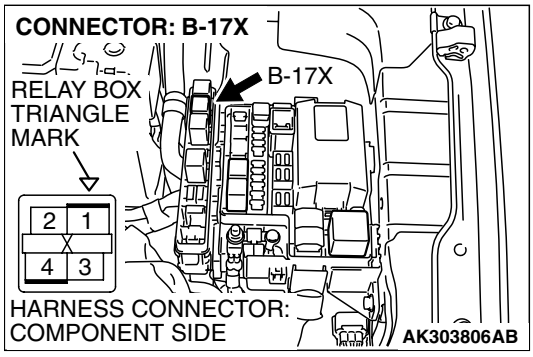
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

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

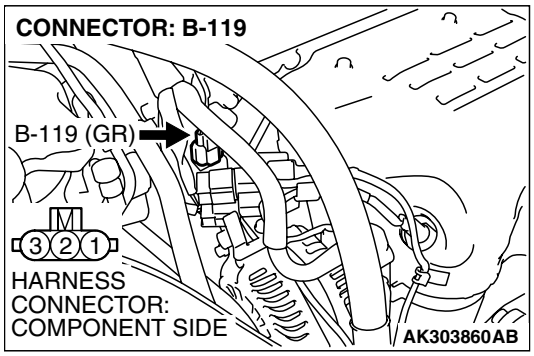
STEP 12. Check harness connector B-17X at MFI relay for damage.



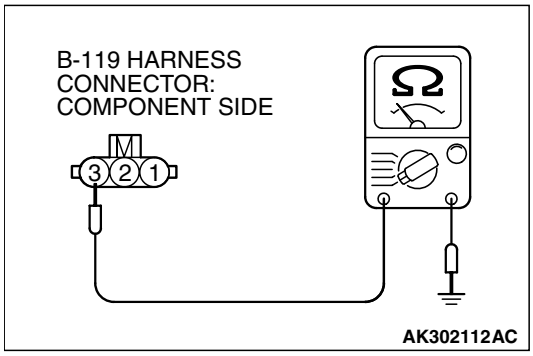
Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and crankshaft position sensor intermediate connector B-119 (terminal No. 1) because of open circuit or short circuit to ground. Then go to Step 22.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

STEP 13. Check the continuity at crankshaft position sensor intermediate harness side connector B-119.



(1) Disconnect the connector B-119 and measure at the harness side.

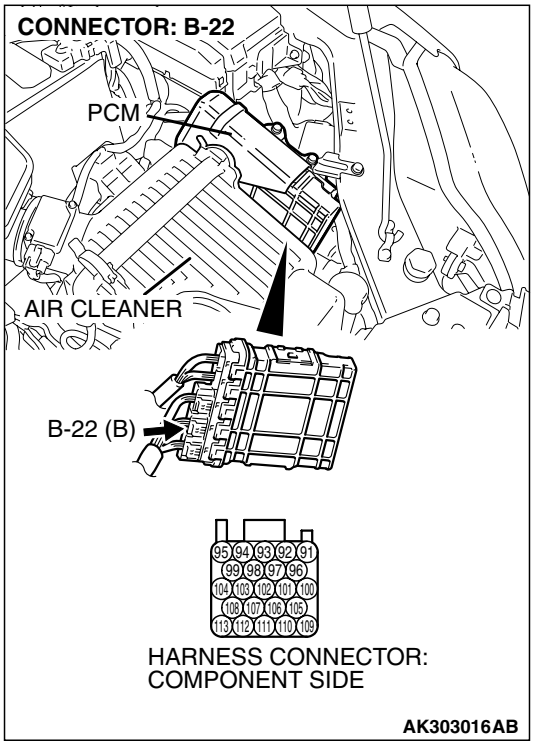


(2) Check for the continuity between terminal No. 3 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 16.
NO : Go to Step 14.

STEP 14. Check harness connector B-22 at PCM for damage.



Q: Is the harness connector in good condition?

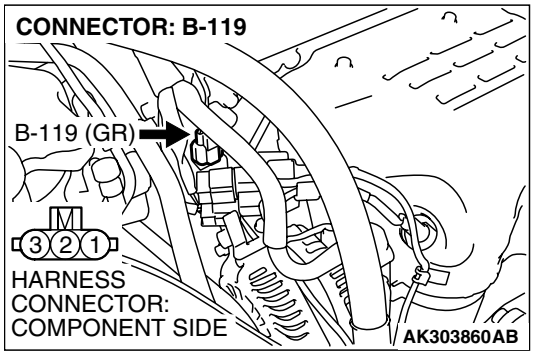
YES : Go to Step 15.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

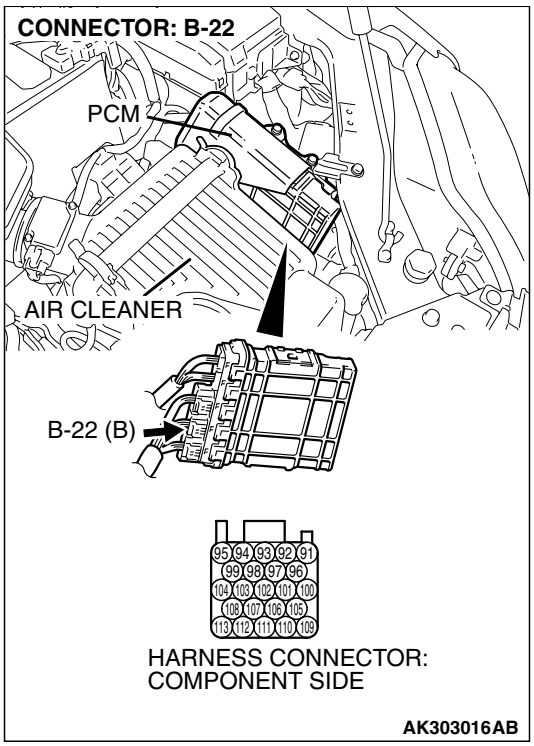
STEP 15. Check for open circuit and harness damage between crankshaft position sensor intermediate connector B-119 (terminal No. 3) and PCM connector B-22 (terminal No. 113).

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 22.

NO : Repair it. Then go to Step 22.



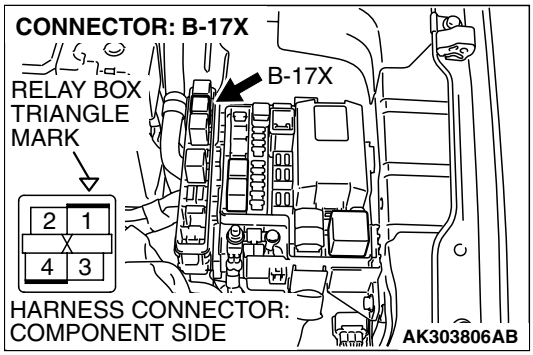


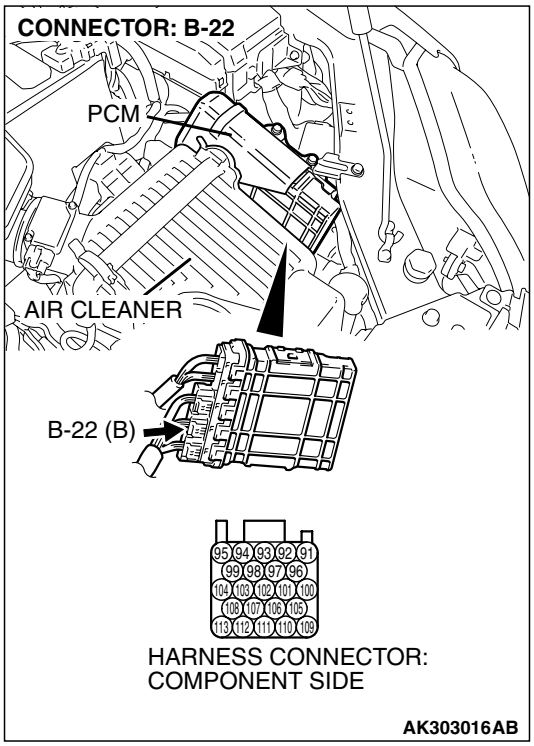
STEP 16. Check harness connector B-17X at the MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.



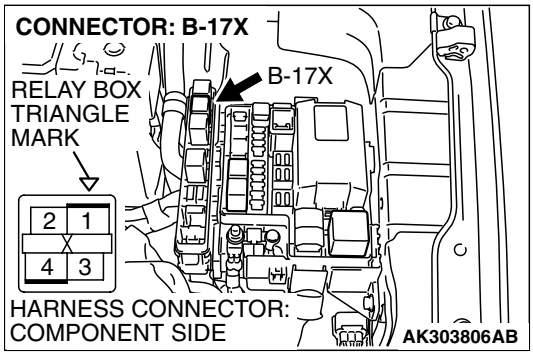


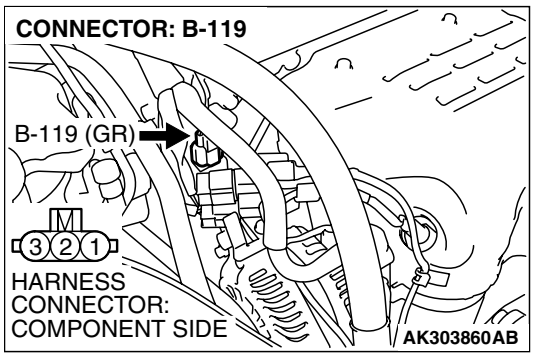
STEP 17. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 18.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.





STEP 18. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and crankshaft position sensor intermediate connector B-119 (terminal No. 1).

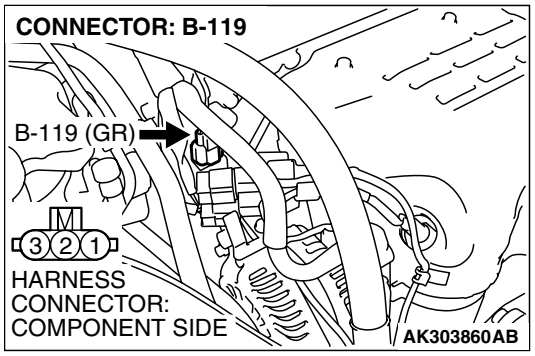
Q: Is the harness wire in good condition?

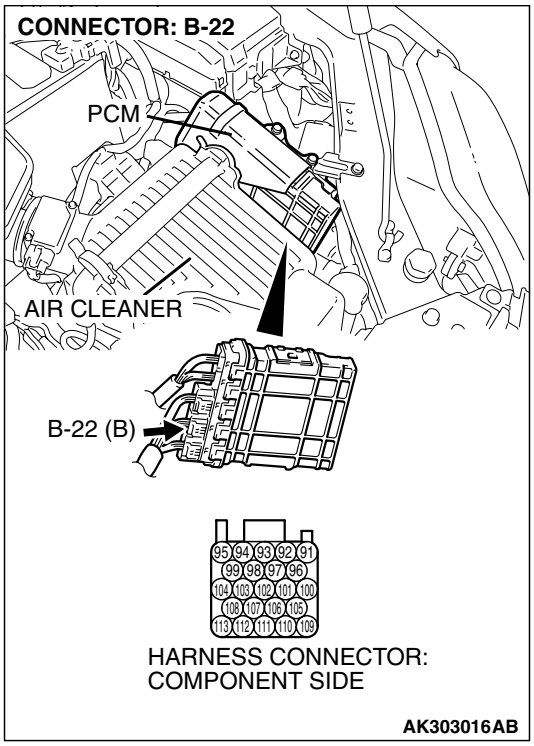
YES : Go to Step 19.

NO : Repair it. Then go to Step 22.

STEP 19. Check for harness damage between crankshaft position sensor intermediate connector B-119 (terminal No. 2) and PCM connector B-22 (terminal No. 103).
Q: Is the harness wire in good condition?

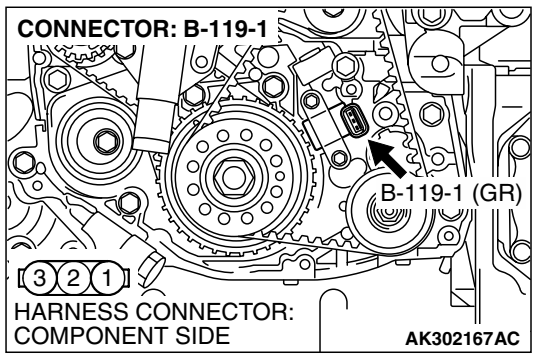
YES : Go to Step 20.
NO : Repair it. Then go to Step 22.

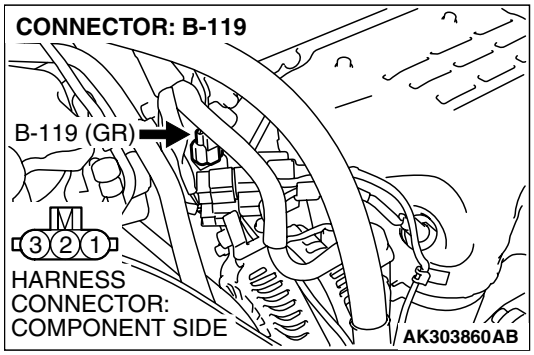


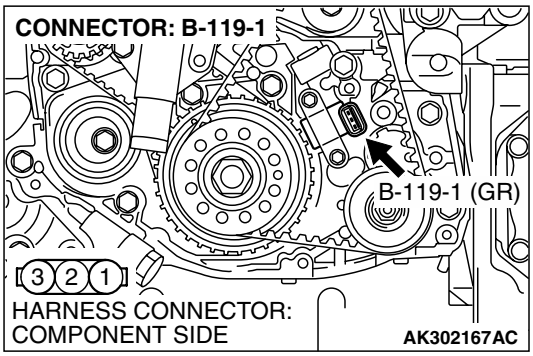


STEP 20. Check harness connector B-119-1 at crankshaft position sensor for damage.
Q: Is the harness connector in good condition?

YES : Go to Step 21.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.







STEP 21. Check for open circuit and short circuit to ground and harness damage between crankshaft position sensor intermediate connector B-119 and crankshaft position sensor connector B-119-1.

Q: Is the harness wire in good condition?

YES : Replace the crankshaft position sensor. Then go to Step 22.

NO : Replace the timing belt cover (lower). Then go to Step 22.

STEP 22. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0335 set?

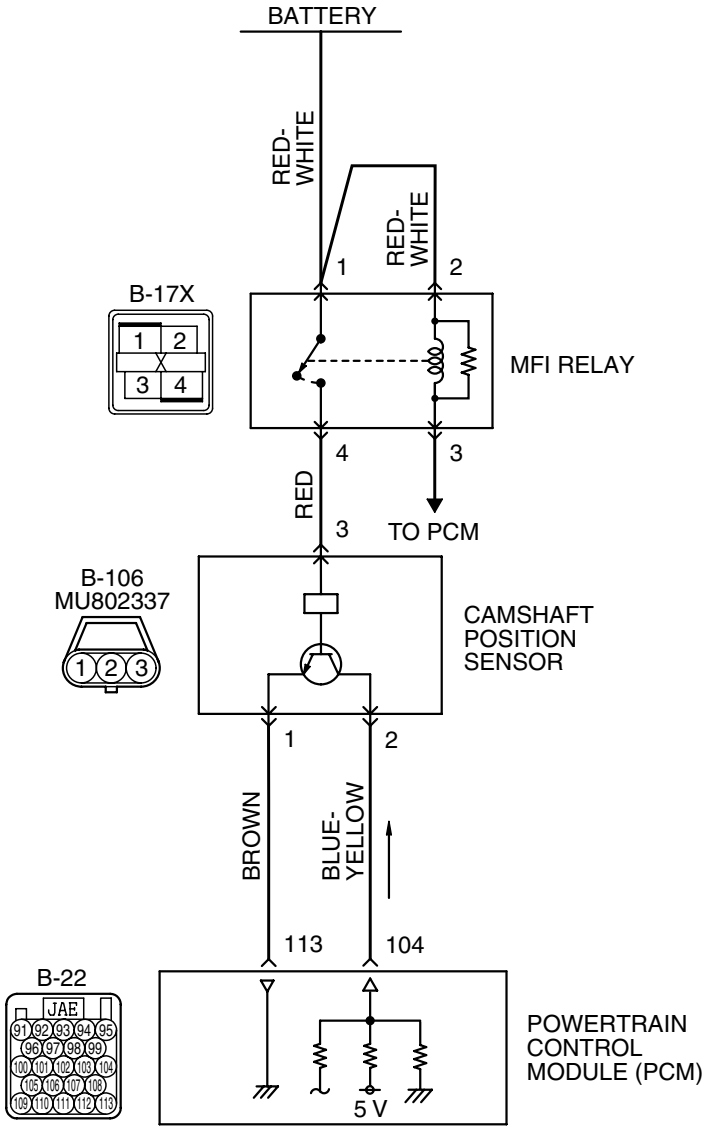
YES : Retry the troubleshooting.

NO : The inspection is complete.

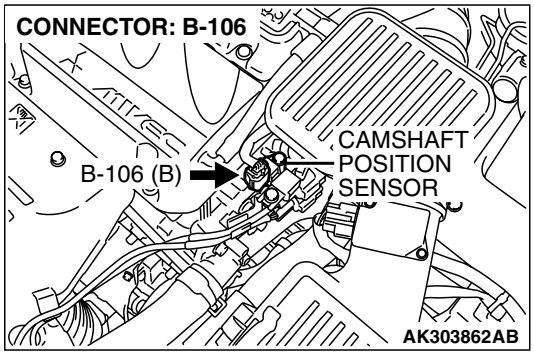
DTC P0340: Camshaft Position Sensor Circuit

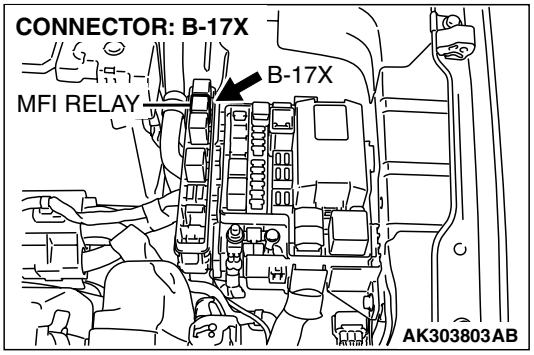
⚠ CAUTION
If DTC P0340 has been set, TCL related DTC U1120 is also set. After P0340 has been diagnosed, don't forget to erase DTC U1120.

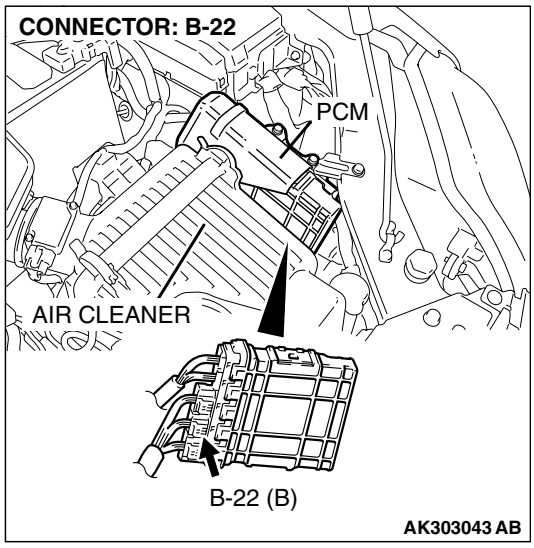
Camshaft Position Sensor Circuit



AK400890







CIRCUIT OPERATION

- The camshaft position sensor power is supplied from the MFI relay (terminal No. 4).
- Terminal No. 1 of the camshaft position sensor is grounded with PCM (terminal No. 113).
- A 5-volt voltage is applied on the camshaft position sensor output terminal (terminal No. 2) from the PCM (terminal No. 104). The camshaft position sensor generates a pulse signal when the output terminal is opened and grounded.

TECHNICAL DESCRIPTION

- The camshaft position sensor functions to detect the top dead center position of the number 1 cylinder and to convert that data to pulse signals that are input to the PCM.
- When the engine is running, the camshaft position sensor outputs a pulse signal.
- The PCM checks whether pulse signal is input while the engine is cranking.

DESCRIPTIONS OF MONITOR METHODS

- Camshaft position sensor signal does not change.
- Camshaft position sensor signal is not normal pattern.

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

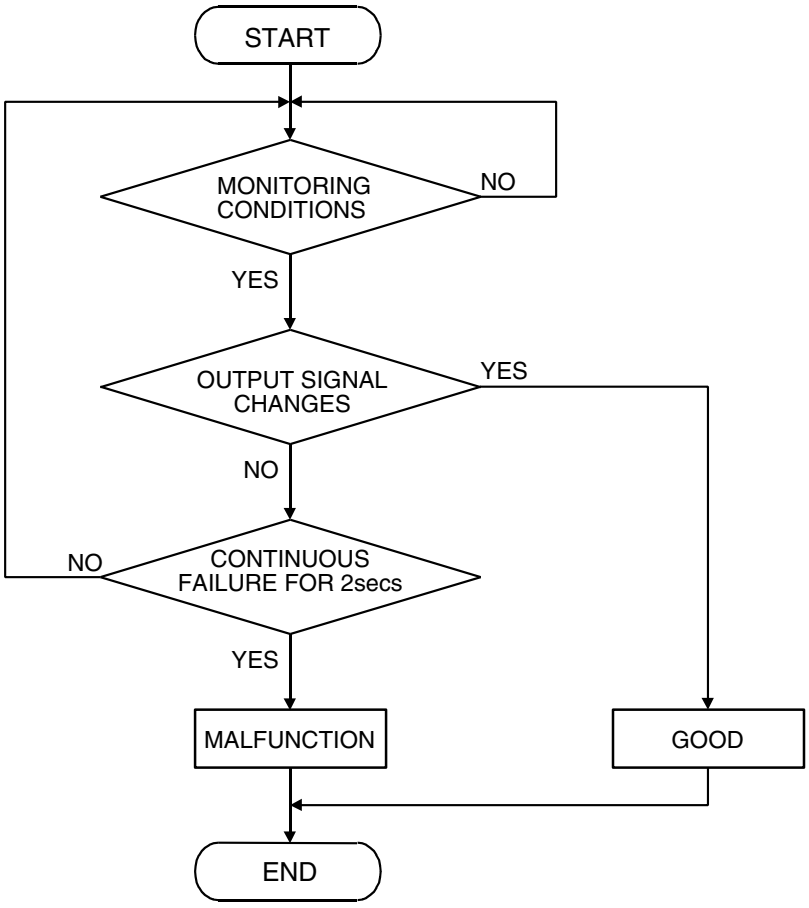
Sensor (The sensor below is determined to be normal)

- Not applicable

TSB Revision

DTC SET CONDITIONS <Circuit continuity>

Logic Flow Chart



AK302034

Check Conditions

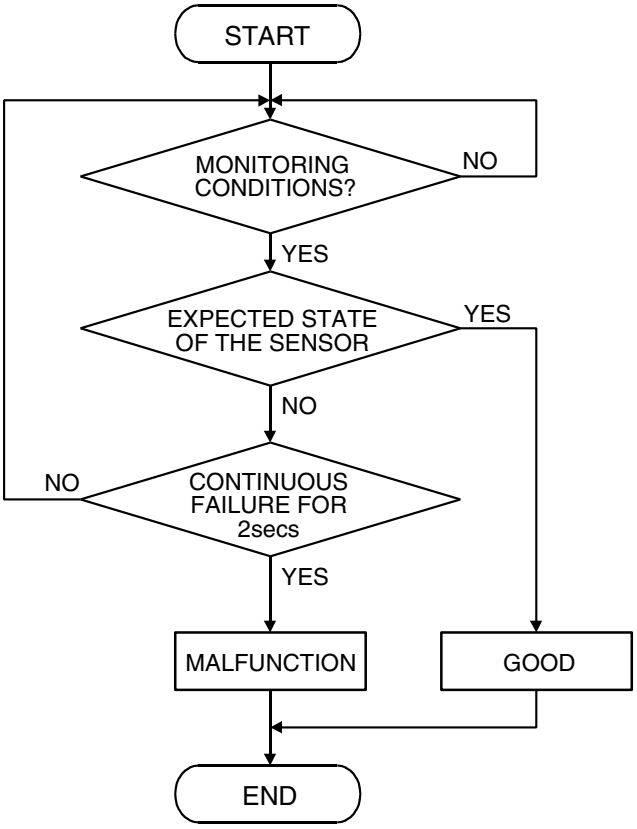
- Engine speed is higher than 50 r/min.

Judgment Criteria

- Camshaft position sensor output voltage has not changed (no pulse signal is input) for 2 seconds.

DTC SET CONDITIONS <Range/Performance problem – alignment>

Logic Flow Chart



AK302035

Check Conditions

- Engine speed is higher than 50 r/min.

Judgment Criteria

- Normal signal pattern has not been input for cylinder identification from the crankshaft position sensor signal and camshaft position sensor signal for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

- Camshaft position sensor failed.
- Open or shorted camshaft position sensor circuit, or harness damage, or connector damage.
- PCM failed.

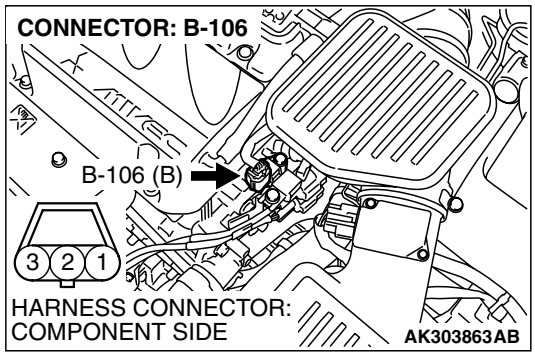
DIAGNOSIS

Required Special Tool:

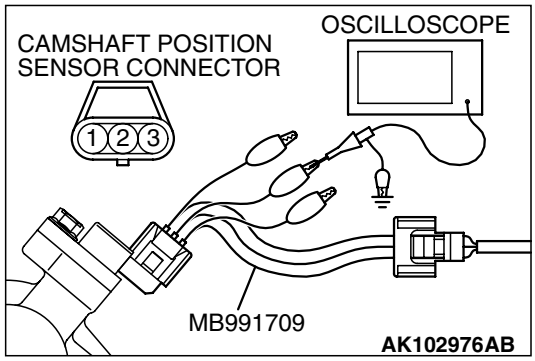
- MB991709: Test Harness
- MB991923: Power Plant ECU Check Harness

TSB Revision

STEP 1. Using the oscilloscope, check the camshaft position sensor.



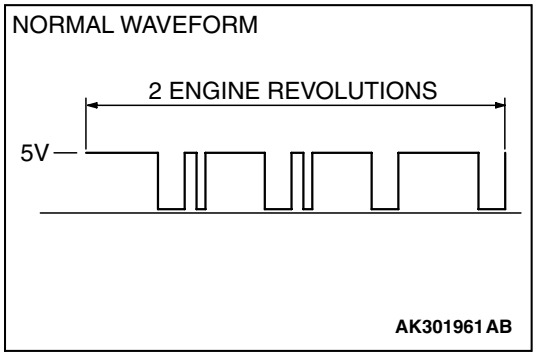
(1) Disconnect the camshaft position sensor connector B-106, and connect test harness special tool (MB991709) between the separated connectors. (All terminals should be connected.)



(2) Connect the oscilloscope probe to the camshaft position sensor side connector terminal No. 2.

NOTE: When measuring with the PCM side connector, disconnect the all PCM connectors and connect check harness special tool (MB991923) between the separated connectors. Then connect the oscilloscope probe to the check harness connector terminal No. 104.

(3) Start the engine and run at idle.



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

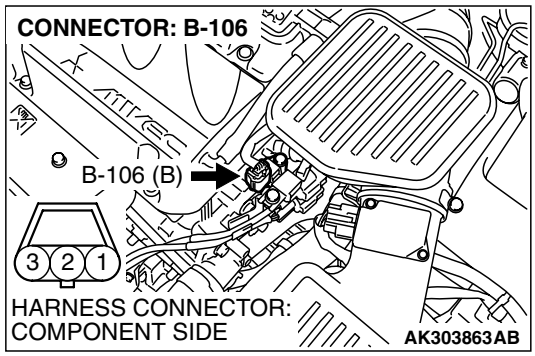
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 2.
NO : Go to Step 4.

STEP 2. Check harness connector B-106 at camshaft position sensor for damage.

Q: Is the harness connector in good condition?



YES : Go to Step 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

STEP 3. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0340 set?

YES : Replace the PCM. Then go to Step 20.

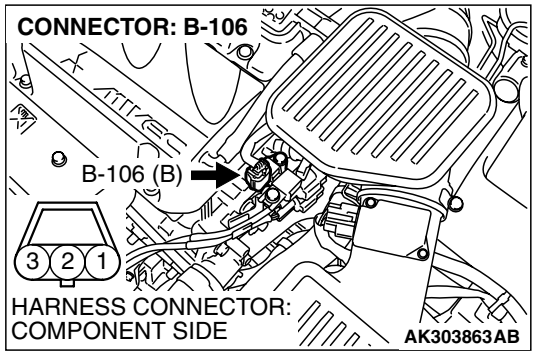
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 4. Check harness connector B-106 at camshaft position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

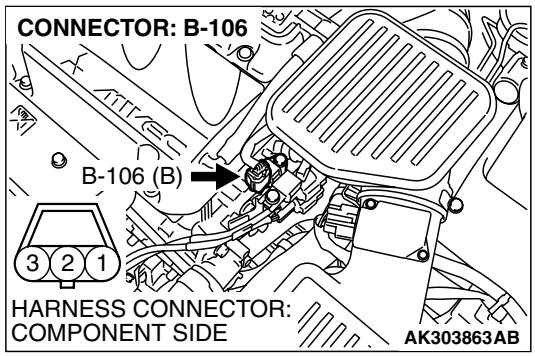
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

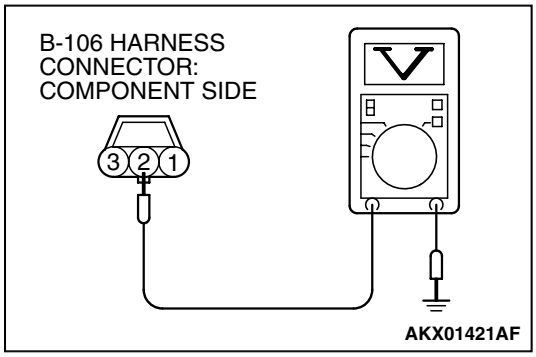


STEP 5. Measure the sensor supply voltage at camshaft position sensor connector B-106.

(1) Disconnect the connector B-106 and measure at the harness side.

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





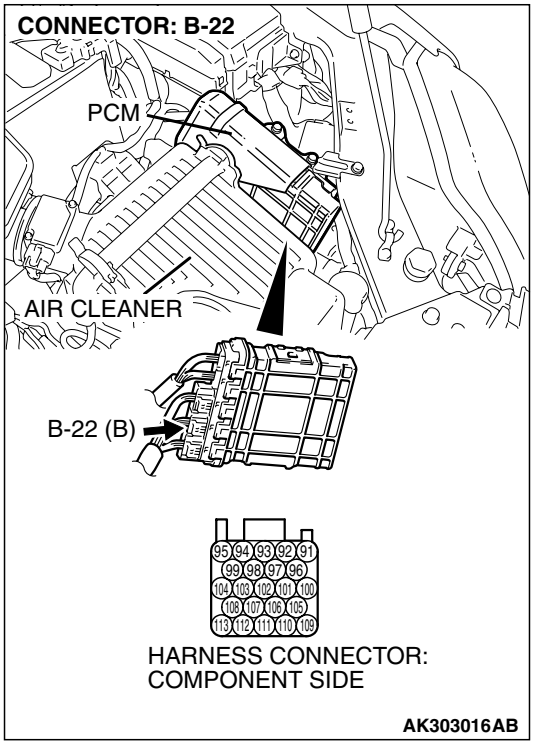
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

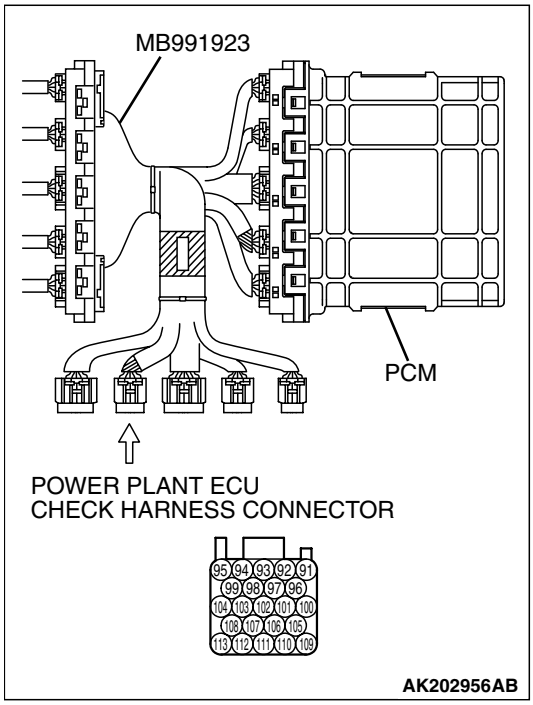
YES : Go to Step 10.

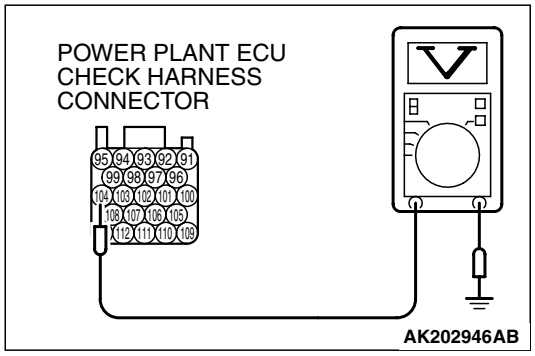
NO : Go to Step 6.



STEP 6. Measure the sensor supply voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect the all PCM connectors and connect power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Disconnect the camshaft position sensor connector B-106.
(3) Turn the ignition switch to the "ON" position.



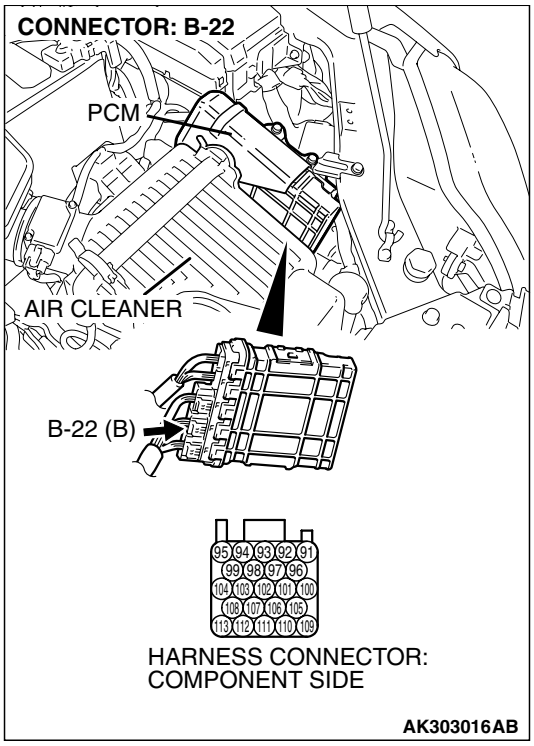


(4) Measure the voltage between terminal No. 104 and ground by backprobing.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

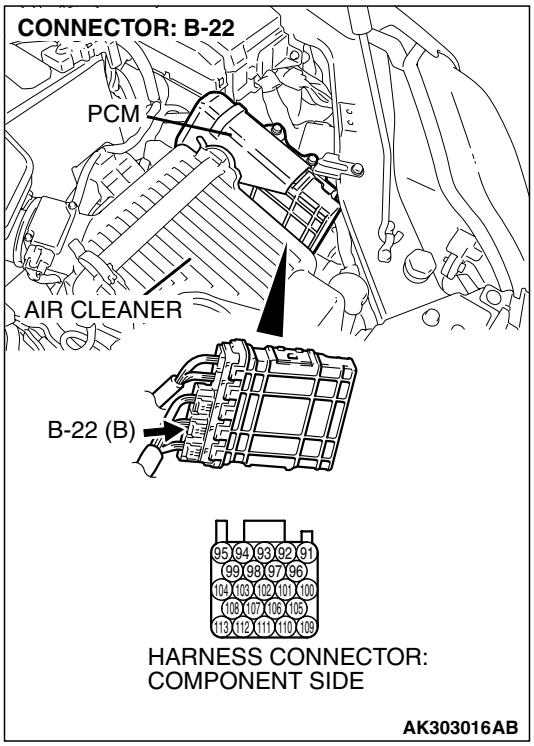
YES : Go to Step 7.
NO : Go to Step 8.



STEP 7. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between camshaft position sensor connector B-106 (terminal No. 2) and PCM connector B-22 (terminal No. 104) because of open circuit. Then go to Step 20.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

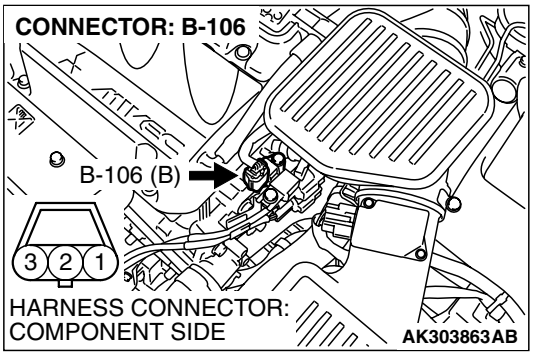


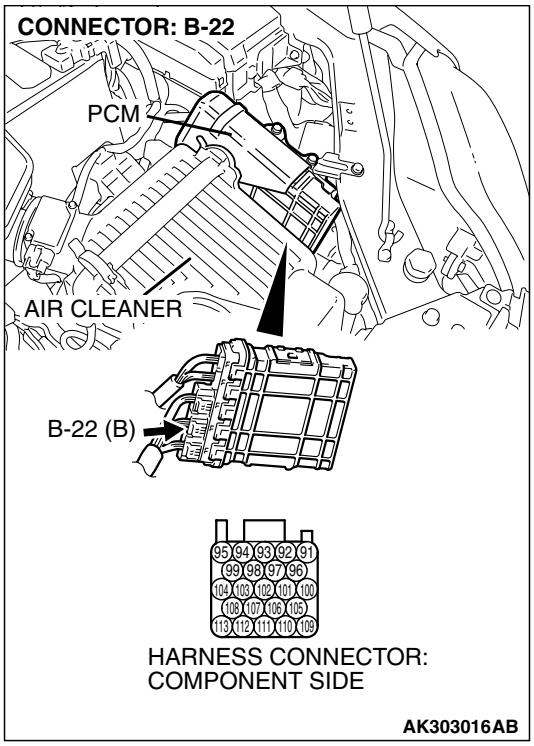
STEP 8. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.





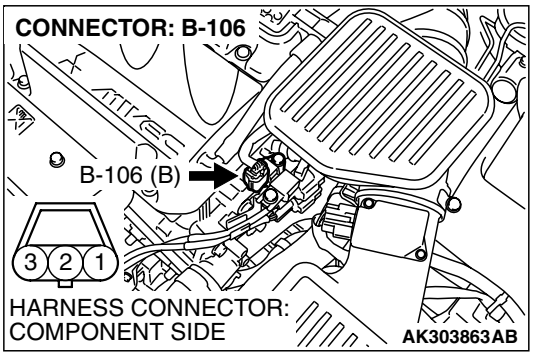
STEP 9. Check for short circuit to ground between camshaft position sensor connector B-106 (terminal No. 2) and PCM connector B-22 (terminal No. 104).

Q: Is the harness wire in good condition?

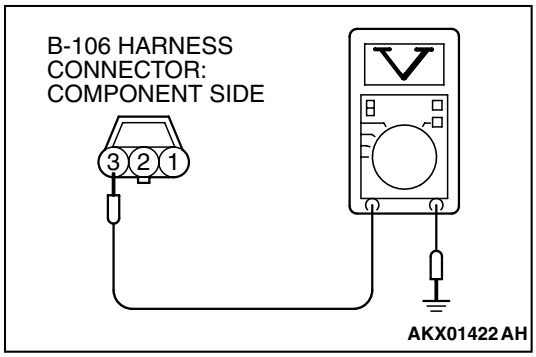
YES : Replace the PCM. Then go to Step 20.

NO : Repair it. Then go to Step 20.

STEP 10. Measure the power supply voltage at camshaft position sensor connector B-106.



(1) Disconnect the connector B-106 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



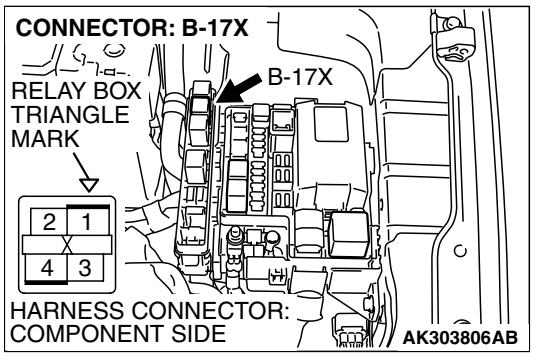
(3) Measure the voltage between terminal No. 3 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 12.
NO : Go to Step 11.

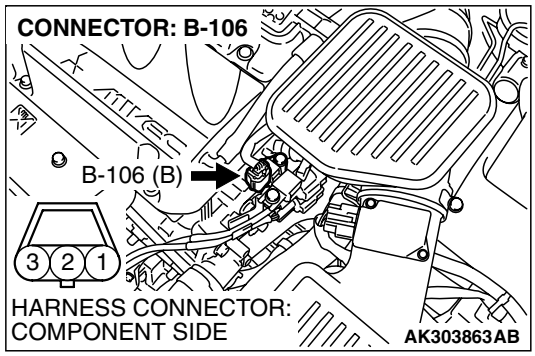
STEP 11. Check harness connector B-17X at MFI relay for damage.



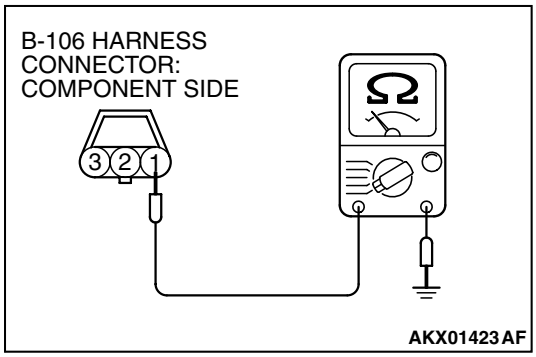
Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and camshaft position sensor connector B-106 (terminal No. 3) because of open circuit or short circuit to ground. Then go to Step 20.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

STEP 12. Check the continuity at camshaft position sensor connector B-106.



(1) Disconnect the connector B-106 and measure at the harness side.

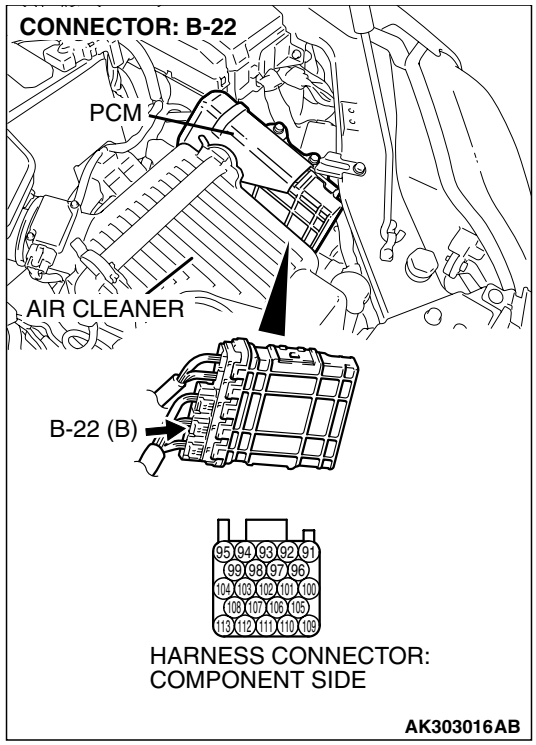


(2) Check for the continuity between terminal No. 1 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 15.
NO : Go to Step 13.

STEP 13. Check harness connector B-22 at PCM for damage.



Q: Is the harness connector in good condition?

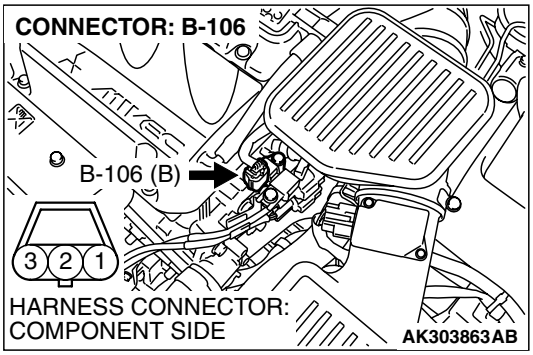
YES : Go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

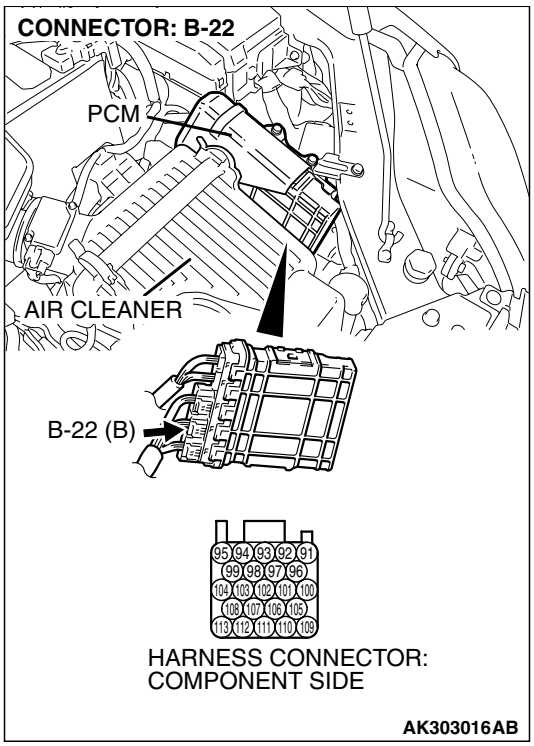
STEP 14. Check for open circuit and harness damage between camshaft position sensor connector B-106 (terminal No. 1) and PCM connector B-22 (terminal No. 113).

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 20.

NO : Repair it. Then go to Step 20.



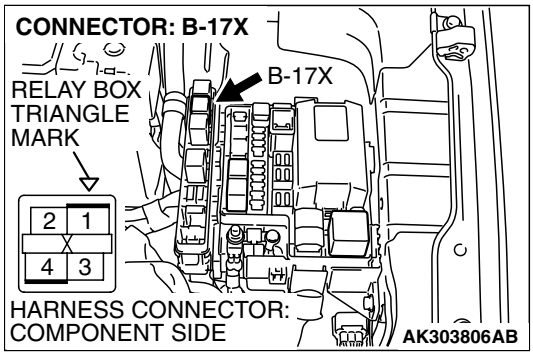


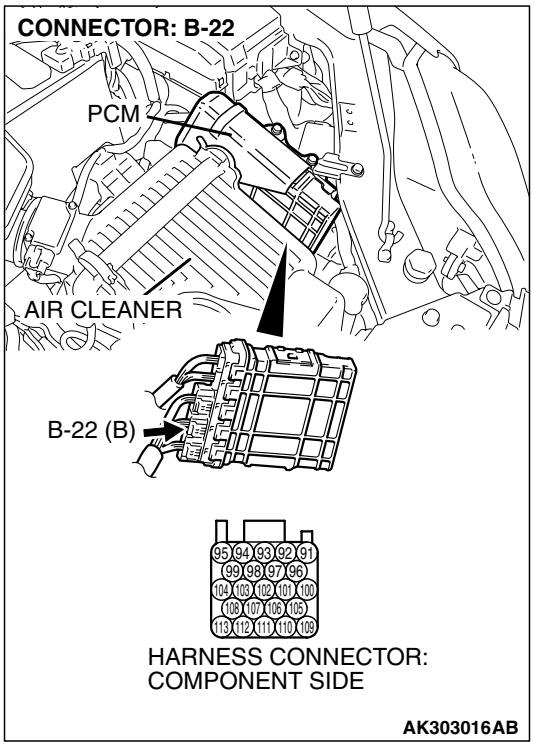
STEP 15. Check harness connector B-17X at the MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 16.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.



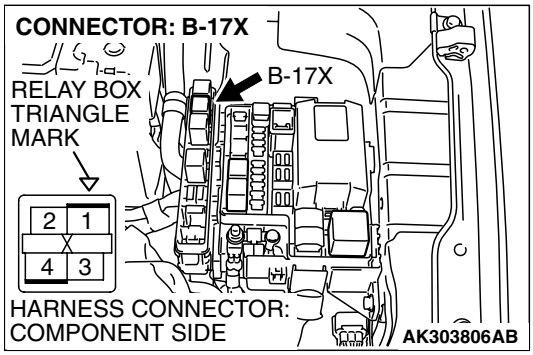


STEP 16. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

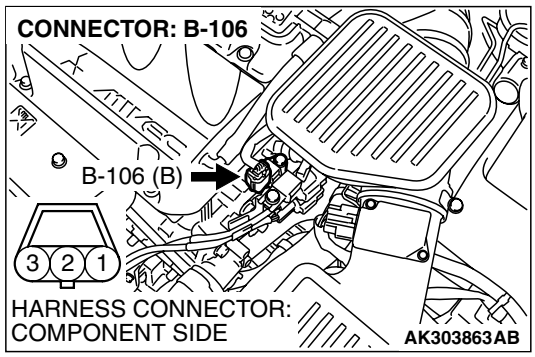


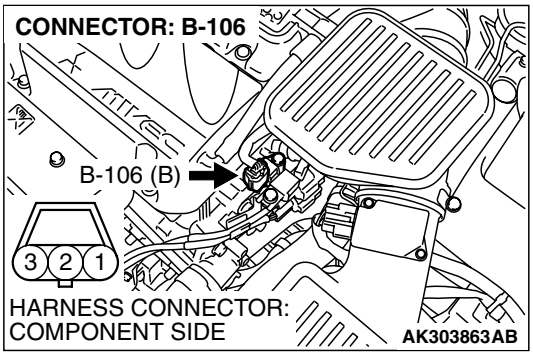
STEP 17. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and camshaft position sensor connector B-106 (terminal No. 3).

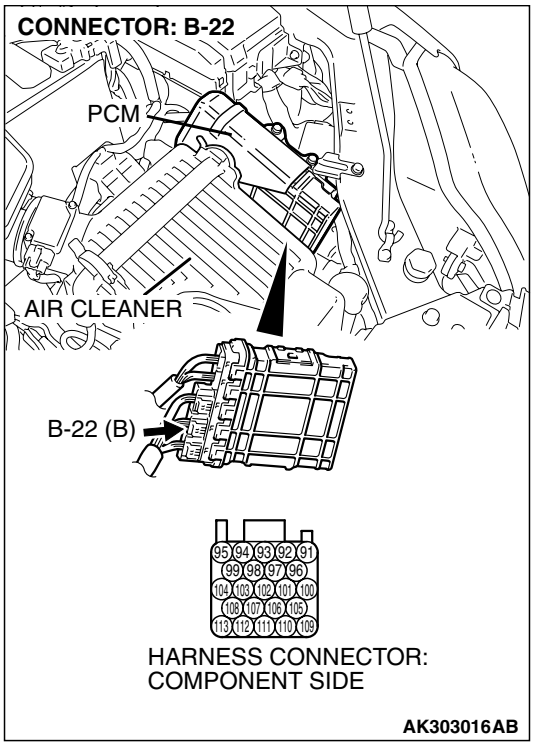
Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair it. Then go to Step 20.







STEP 18. Check for harness damage between camshaft position sensor connector B-106 (terminal No. 2) and PCM connector B-22 (terminal No. 104).

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair it. Then go to Step 20.

STEP 19. Check the camshaft position sensing cylinder.

Q: Is the camshaft position sensing cylinder in good condition?

YES : Replace the camshaft position sensor. Then go to Step 20.

NO : Repair it. Then go to Step 20.

STEP 20. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0340 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

TSB Revision

DTC P0401: Exhaust Gas Recirculation Flow Insufficient Detected

TECHNICAL DESCRIPTION

- When the EGR valve (stepper motor) is actuated from the fully closed position toward the open position while the engine is running, EGR gas flows.
- The PCM checks how the EGR gas flow signal changes.

DESCRIPTIONS OF MONITOR METHODS

Small manifold pressure change during exhaust gas recirculation (EGR) operation from closed to open.

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)

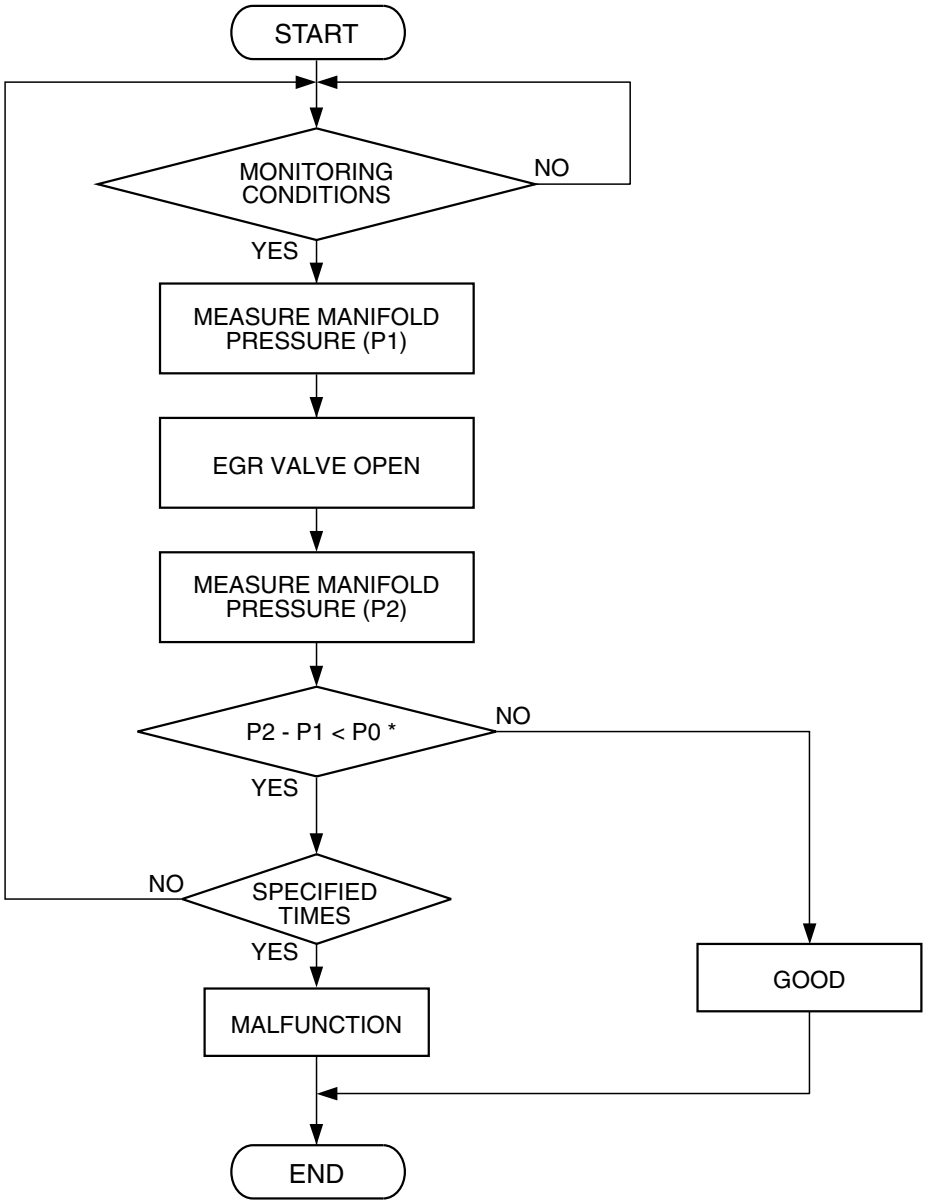
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor
- Accelerator pedal position sensor
- Manifold absolute pressure sensor

DTC SET CONDITIONS

Logic Flow Chart



∗ P0 : THRESHOLD VALUE

AK302036

Check Conditions

- At least 20 seconds have passed since the last monitor was complete.
- Engine coolant temperature is higher than 76°C (169°F).
- Engine speed is at between 1,100 and 1,750 r/min.
- Intake air temperature is higher than –10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Vehicle speed is 20 km/h (32 mph) or more.
- At least 90 seconds have passed since manifold absolute pressure sensor output voltage fluctuated 1.5 volts or more.
- Battery positive voltage is higher than 10.3 volts.
- Accelerator pedal is closed.
- Volumetric efficiency is lower than 23.8 percent.

TSB Revision

- The PCM monitors for this condition for 3 cycles of 2.0 seconds each during the drive cycle.

Judgement Criteria

- When the EGR valve opens to the prescribed opening, when intake manifold pressure fluctuation width is lower than 2.0 kPa (0.59 in.Hg).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 5 – Exhaust Gas Recirculation (EGR) System Monitor P.13A-6.

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

- Contaminated EGR valve and EGR passage.
- EGR valve (stopper motor) failed.
- Open or shorted EGR valve (stopper motor) circuit, or connector damage.
- Manifold absolute pressure sensor failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

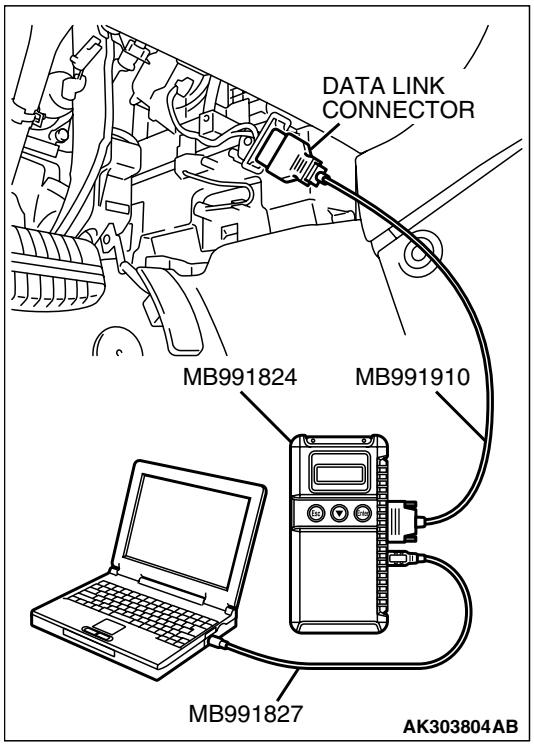
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check the EGR system

Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System – General Information P.17-89.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 3.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure 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 and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
(4) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
- Should be between 16 – 36 kPa (4.7 – 10.6 in.Hg) at engine idling.

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

Q: Is the sensor operating properly?

YES : Clean the EGR valve and EGR passage. Then go to Step 3.

NO : Refer to DTC P0106 – Manifold Absolute Pressure Sensor Circuit Range/Performance Problem P.13A-72, DTC P0107 – Manifold Absolute Pressure Sensor Circuit Low Input P.13A-86, DTC P0108 – Manifold Absolute Pressure Sensor Circuit High Input P.13A-98.

STEP 3. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 5 – Exhaust Gas Recirculation (EGR) System Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

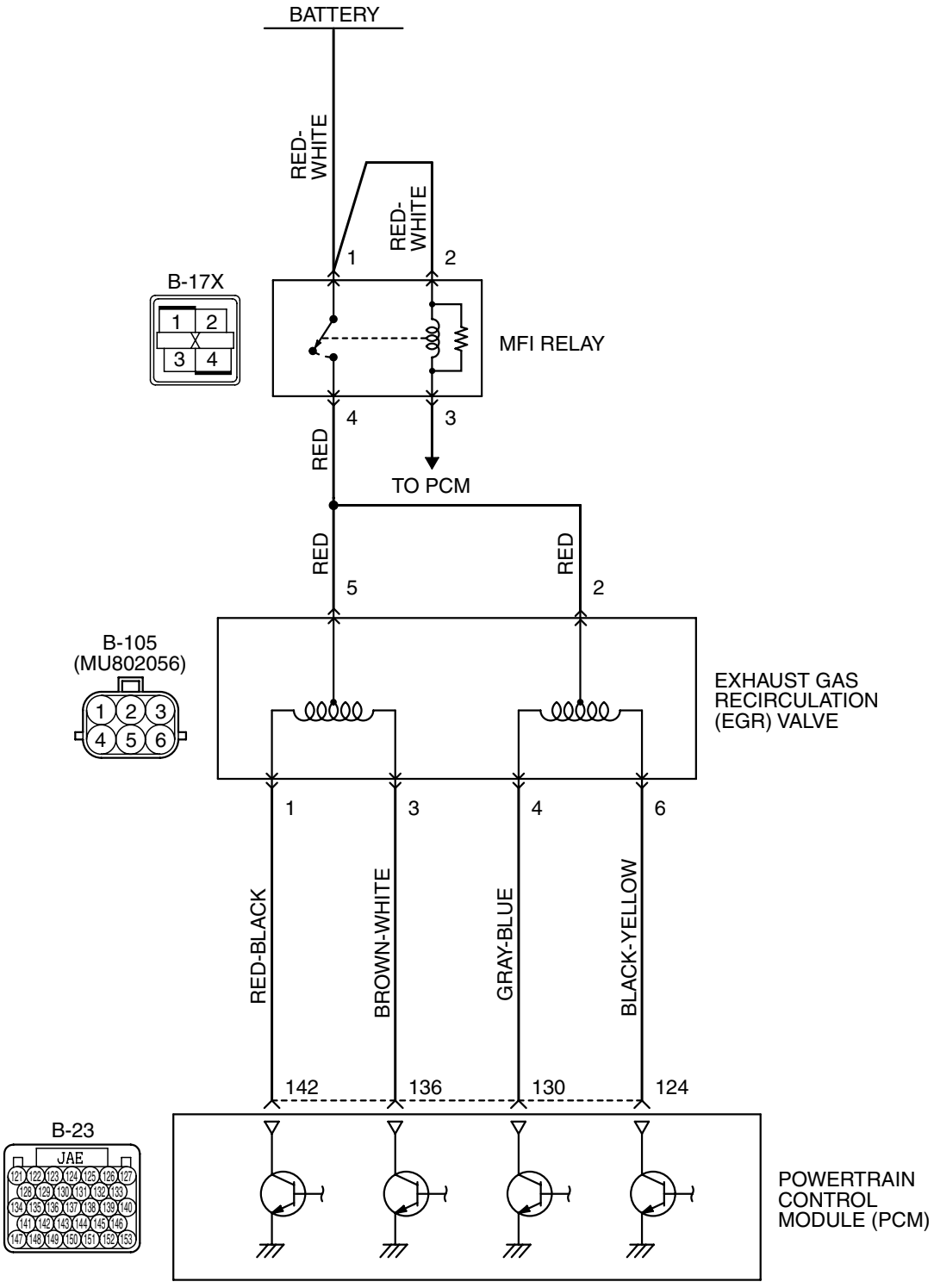
Q: Is DTC P0401 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0403: Exhaust Gas Reculation Control Circuit

EGR Valve Circuit



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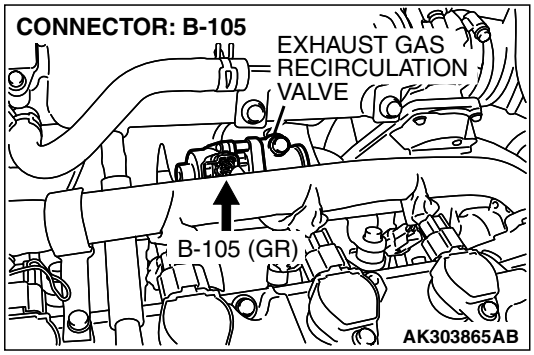
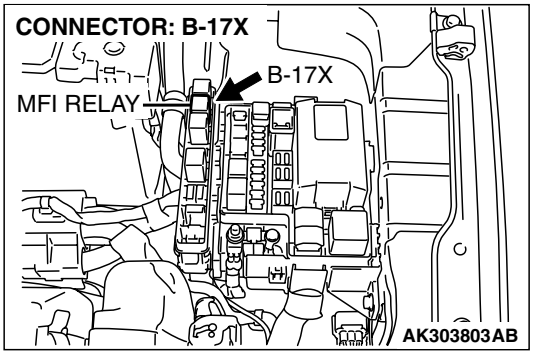
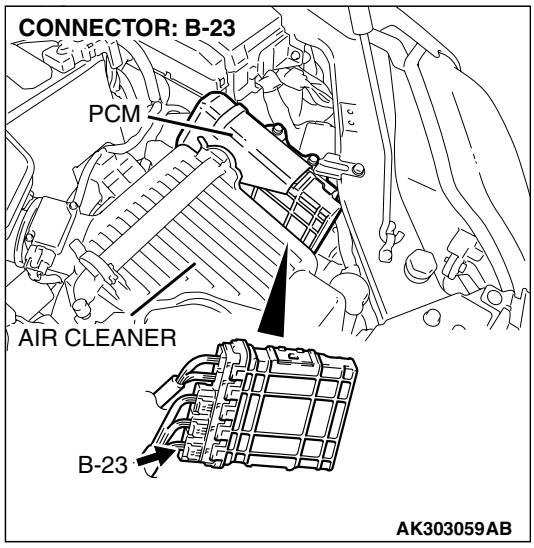
TSB Revision







CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 4).
- The PCM (terminals No. 124, No. 130, No. 136, No. 142) drives the stepper motor by sequentially turning "ON" the power transistors in the PCM and providing ground to the idle air control motor (terminal No. 1, No. 3, No. 4, No. 6).

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the EGR valve (stepper motor) drive circuit, PCM measure the surge voltage of the EGR valve motor coil.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after stepper motor is operated on to 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)

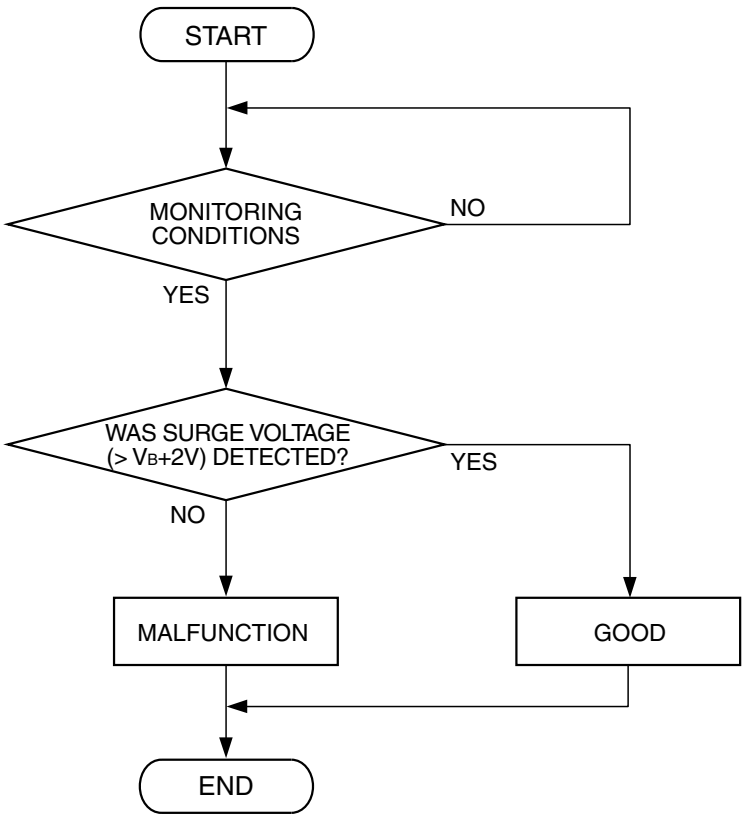
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor
- Accelerator pedal position sensor
- Manifold absolute pressure sensor

DTC SET CONDITIONS

Logic Flow Chart



AK204017

Check Conditions
- Battery positive voltage is higher than 10.3 volts.
- In a few seconds, just after ignition switch is turned to the "ON" position from the "LOCK"(OFF) position. (While EGR valve is initialized.)

Judgment Criteria
- The EGR valve motor coil surge voltage (battery positive voltage +2 volts) is not detected for 3 seconds.

Check Conditions
- Battery positive voltage is higher than 10.3 volts.
- EGR valve is in operation after the engine starting process is complete.

Judgment Criteria
- The EGR valve motor coil surge voltage (battery positive voltage +2 volts) is not detected for 30 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.

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

- EGR valve (stepper motor) failed.
- Open or shorted EGR valve (stepper motor) circuit, harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:

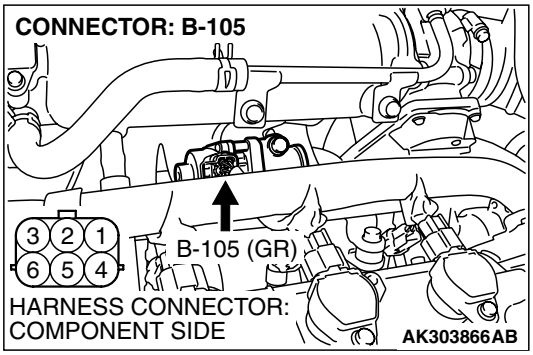
- MB991958: Scan tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness Set
- MB991923: Power Plant ECU Check Harness

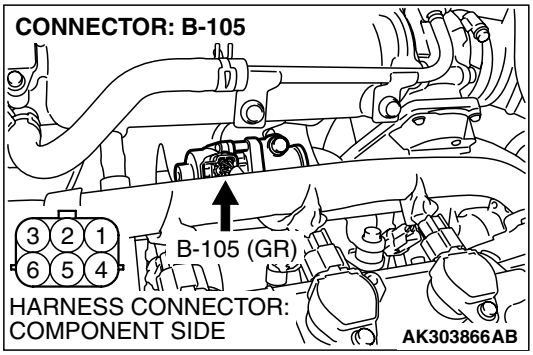
STEP 1. Check harness connector B-105 at EGR valve for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2.

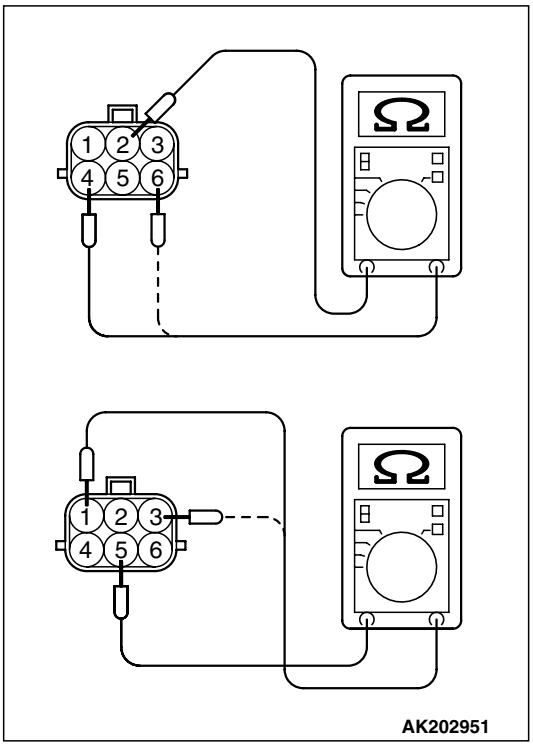
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.





STEP 2. Measure the EGR valve motor coil resistance.

(1) Disconnect the EGR valve connector B-105.



(2) Measure the resistance between EGR valve connector terminal No. 2 and either terminal No. 4 or terminal No. 6.

Standard value: 20 – 24 ohms [at 20°C (68°F)]

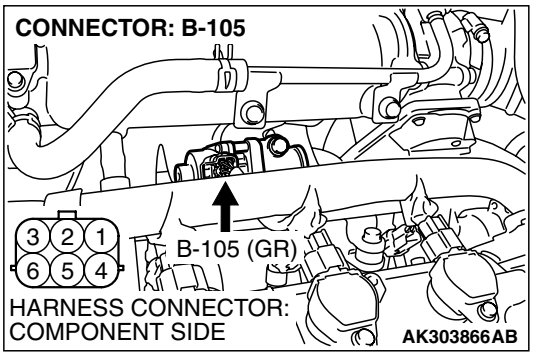
(3) Measure the resistance between EGR valve connector terminal No. 5 and either terminal No. 1 or terminal No. 3.

Standard value: 20 – 24 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 20 and 24 ohms [at 20°C (68°F)]?

YES : Go to Step 3.

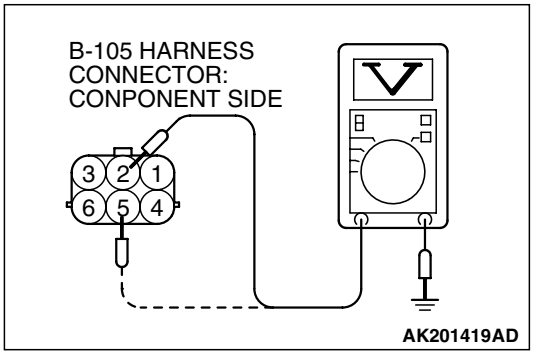
NO : Replace the EGR valve. Then go to Step 12.



STEP 3. Measure the power supply voltage at EGR valve harness side connector B-105.

(1) Disconnect the connector B-105 and measure at the harness side.

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



(3) Measure the voltage between terminal No. 2, No. 5 and ground.

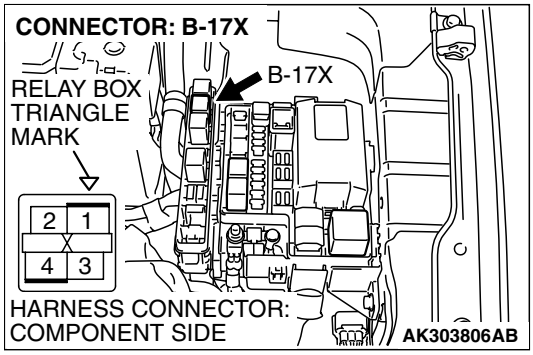
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 5.

NO : Go to Step 4.



STEP 4. Check harness connector B-17X at MFI relay for damage.

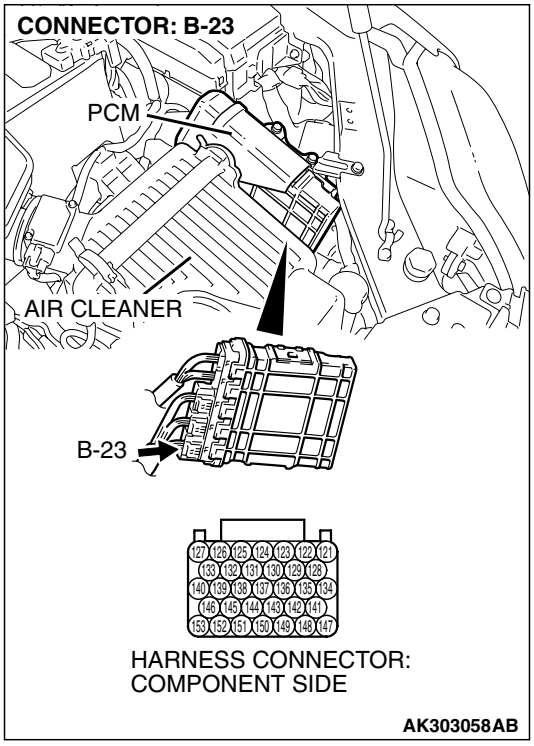
Q: Is the harness connector in good condition?

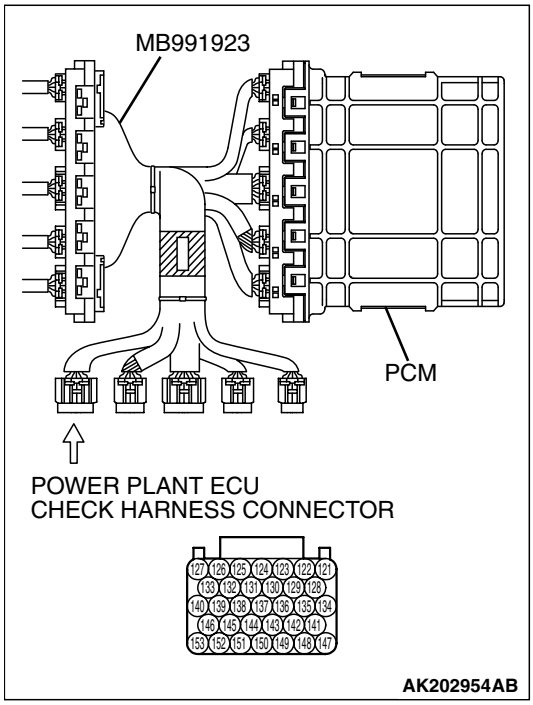
YES : Repair harness wire between MFI relay connector B-17X (terminal No. 4) and EGR valve connector B-105 (terminal No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 12.

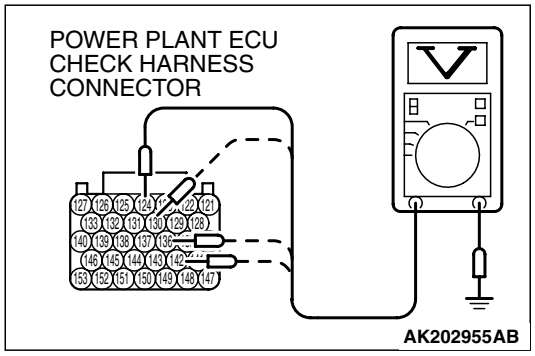
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 5. Measure the power supply voltage at PCM connector B-23 by using power plant ECU check harness special tool MB991923.

(1) Disconnect the all PCM connectors and connect power plant ECU check harness special tool MB991923 between the separated connectors.





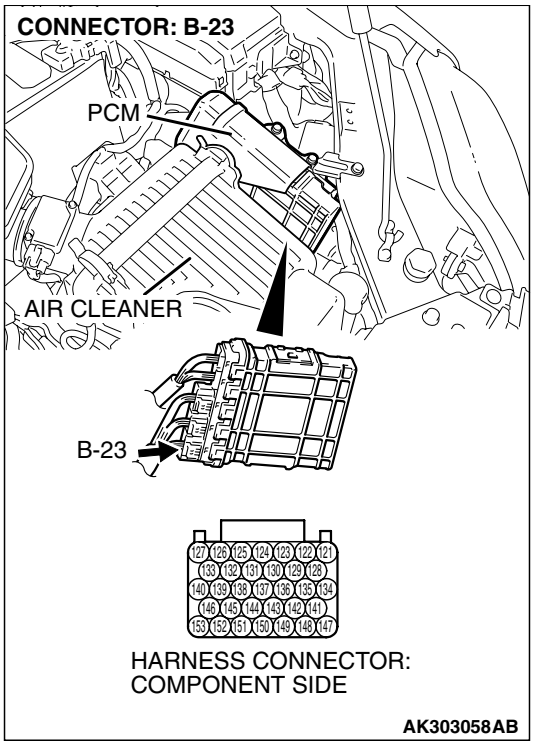


(2) Measure the voltage between terminal (No. 124, No. 130, No. 136, No. 142) and ground.
- The voltage should be between 5 and 8 volts for approximately 3 seconds when the Ignition switch is turned from the "LOCK" (OFF) position to the "ON" position.

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

Q: Is the voltage normal?

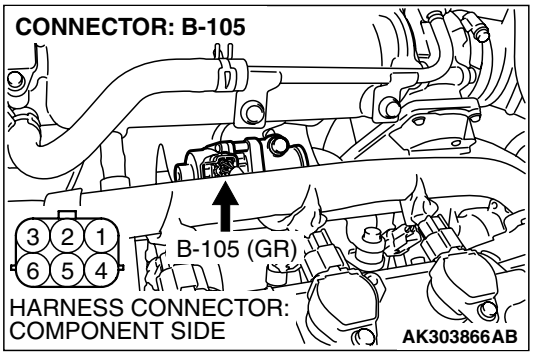
YES : Go to Step 8.
NO : Go to Step 6.

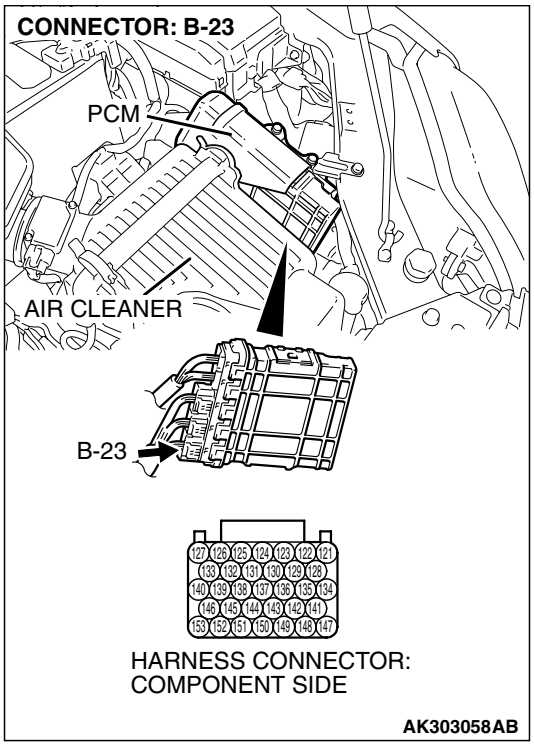


STEP 6. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 7.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.



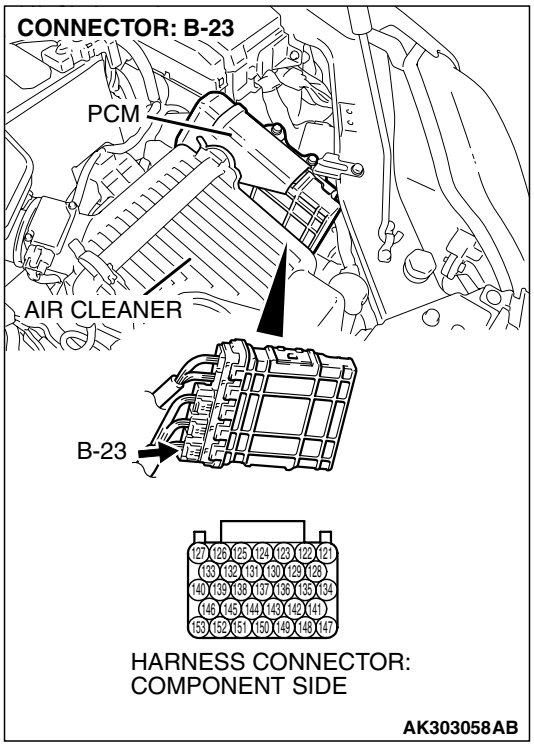


STEP 7. Check for open circuit and short circuit to ground between EGR valve connector B-105 and PCM connector B-23.

a. EGR valve connector B-105 (terminal No. 1) and PCM connector B-23 (terminal No. 142).
b. EGR valve connector B-105 (terminal No. 3) and PCM connector B-23 (terminal No. 136).
c. EGR valve connector B-105 (terminal No. 4) and PCM connector B-23 (terminal No. 130).
d. EGR valve connector B-105 (terminal No. 6) and PCM connector B-23 (terminal No. 124).

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 12.
NO : Repair it. Then go to Step 12.



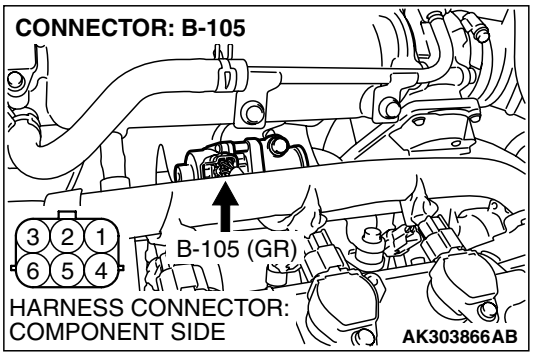
STEP 8. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

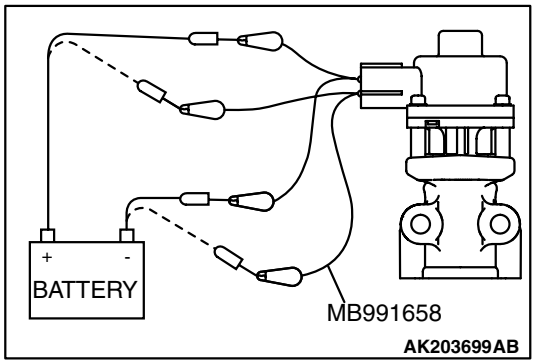
YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 9. Check the EGR valve operation using special tool MB991658.



(1) Remove the EGR valve.



(2) Connect special tool MB991658 to the EGR valve. (All terminals should be connected.)
(3) Use the jumper wires to connect terminal No. 5 of the EGR valve connector to the positive battery terminal.
(4) Check to ensure that the motor operates when the terminal No. 1 and No. 3 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
- Vibration should be present at each application of voltage to test clip combination.

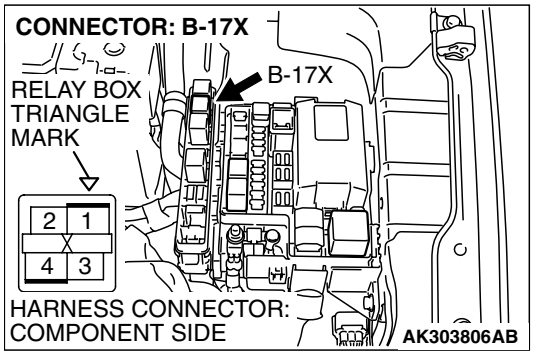
(5) Then, use jumper wires to connect the terminal No. 2 of the EGR valve connector to the positive battery terminal.
(6) Check to ensure that the motor operates when terminal No. 4 and No. 6 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
- Vibration should be present at each application of voltage to test clip combination.

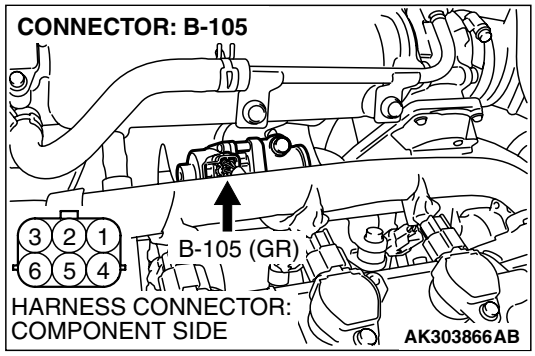
(7) Reinstall the EGR valve, using a new gasket, and tighten to the specified torque.

Tighten torque: 24 ± 3 N·m [17 ± 3 ft·lb]

Q: Is the EGR valve operating properly?

YES : Go to Step 10.
NO : Replace the EGR valve. Then go to Step 12.



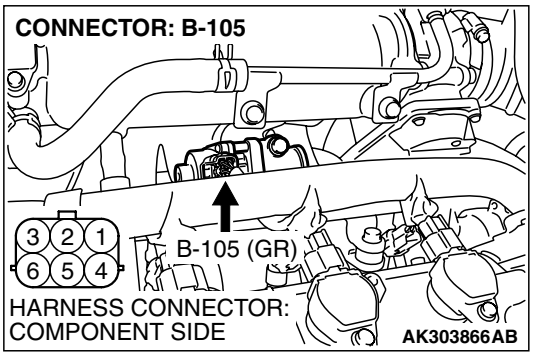


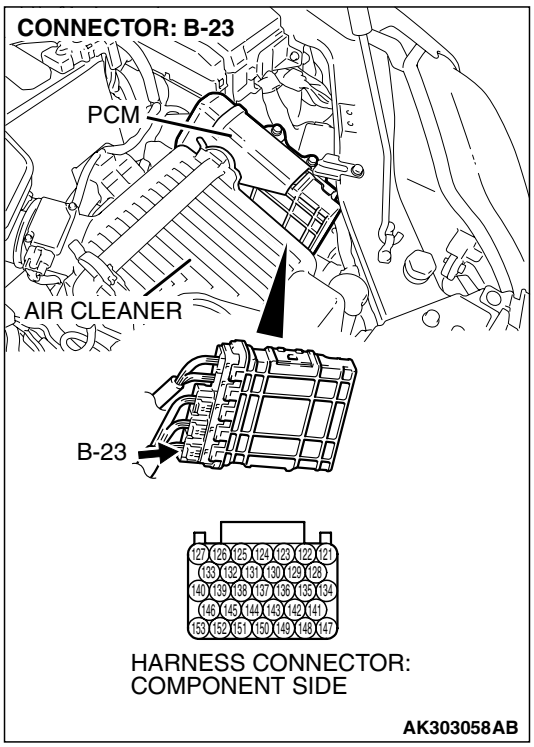
STEP 10. Check for harness damage between MFI relay connector B-17X (terminal No. 4) and EGR valve connector B-105 (terminal No. 2, No. 5).

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it. Then go to Step 12.





STEP 11. Check for harness damage between EGR valve connector B-105 and PCM connector B-23.

a. EGR valve connector B-105 (terminal No. 1) and PCM connector B-23 (terminal No. 142).
b. EGR valve connector B-105 (terminal No. 3) and PCM connector B-23 (terminal No. 136).
c. EGR valve connector B-105 (terminal No. 4) and PCM connector B-23 (terminal No. 130).
d. EGR valve connector B-105 (terminal No. 6) and PCM connector B-23 (terminal No. 124).

Q: Is the harness wire in good condition?

YES : Replace the PCM. Then go to Step 12.
NO : Repair it. Then go to Step 12.

STEP 12. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0403 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

NEXT>>