

ENGINE CONTROL SYSTEM

GENERAL INFORMATION

A cable-type accelerator mechanism and a suspended-type pedal have been adopted.

SERVICE SPECIFICATIONS

Items		Standard value
Accelerator cable play mm	Variable-venturi carburettor <A/T>	35
	Variable-venturi carburettor <M/T>, MPI	12
Engine idle speed r/min	Variable-venturi carburettor <M/T>	800 ± 50
	Variable-venturi carburettor <A/T>	850 ± 50
	MPI	750 ± 50
Pedal stroke when the accelerator pedal switch is operated mm		2–4

ON-VEHICLE SERVICE

ACCELERATOR CABLE CHECK AND ADJUSTMENT

<Variable-venturi carburettor>

1. Turn A/C and lamps OFF.
Inspect and adjust at no load.
2. Warm engine until stabilized at idle.
3. Confirm idle speed is at prescribed value.

Standard value:

<M/T> 800 ± 50 r/min

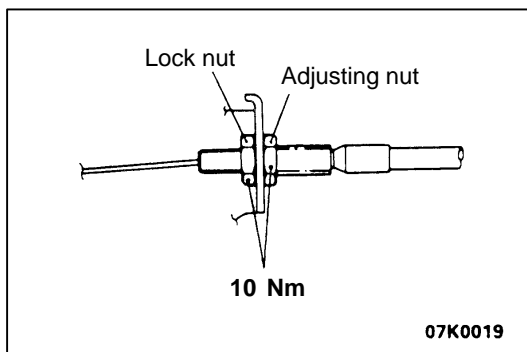
<A/T> 850 ± 50 r/min

4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.

Standard value:

<M/T> 1 – 2 mm

<A/T> 3 – 5 mm



7. If there is too much slack or no slack, adjust play by the following procedures.
 - (1) Loosen the lock nut and adjusting nut to close the throttle valve fully.
 - (2) Tighten the adjusting nut until the throttle lever start to move, turn back one turn, and tighten the lock nut to the specified torque.

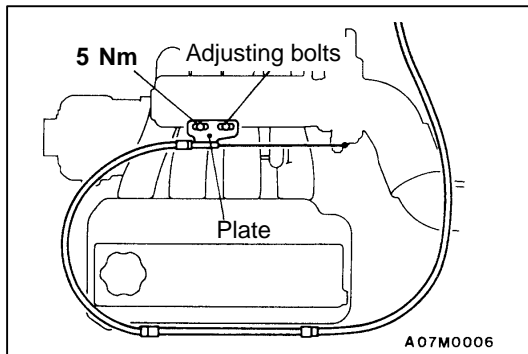
<MPI>

1. Turn A/C and lamps OFF.
Inspect and adjust at no load.
2. Warm engine until stabilized at idle.
3. Confirm idle speed is at prescribed value.

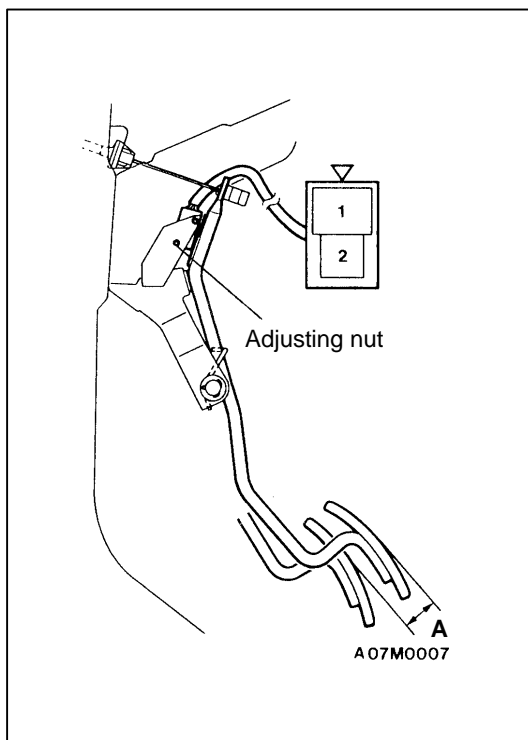
Standard value: 750 ± 100 r/min

4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.

Standard value: 1–2 mm



7. If there is too much slack or no slack, adjust play by the following procedures.
 - (1) Loosen the adjusting bolt to release the cable.
 - (2) Move the plate until the inner cable play is at the standard value, and then tighten the adjusting bolt to the specified torque.



ACCELERATOR PEDAL SWITCH CHECK AND ADJUSTMENT <Variable-venturi carburettor (A/T)>

1. Warm the engine until the engine coolant temperature reaches normal temperature [80 – 90°C], and then stop the engine.
2. Check if there is continuity between the accelerator pedal switch terminals when the accelerator pedal is free.
3. Check if there is no continuity between the accelerator pedal switch is depressed, and the stroke A in the diagram is at the standard value.

Standard value (A): 2 – 4 mm

If the stroke departs from the standard value, adjust with the adjusting nuts.

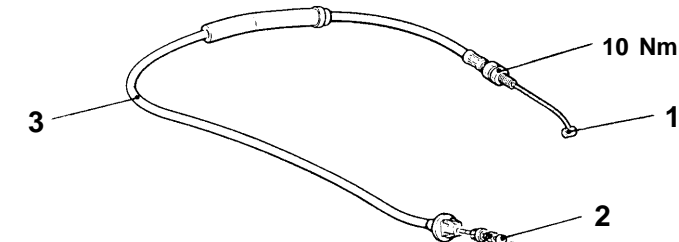
ACCELERATOR CABLE AND PEDAL REMOVAL AND INSTALLATION

Post-installation Operation

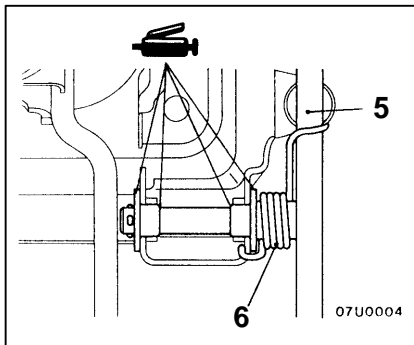
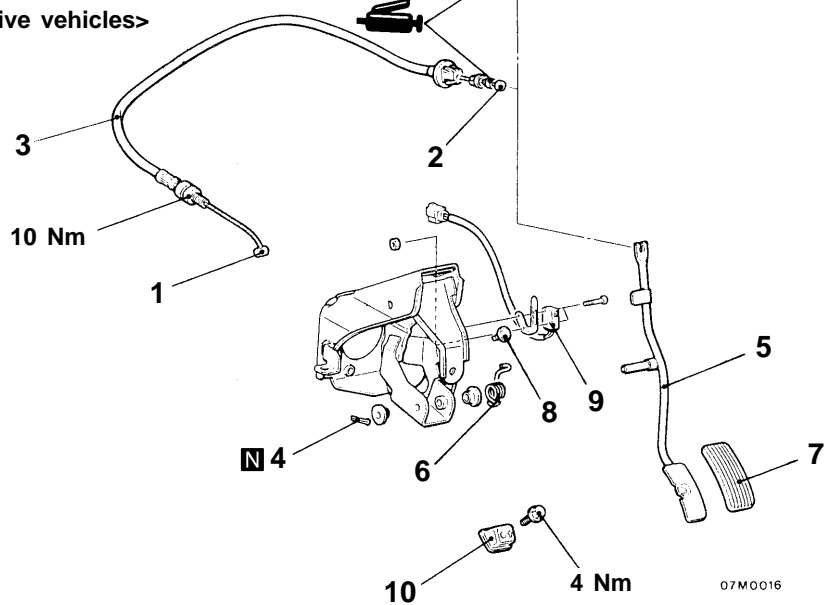
- (Refer to [Adjusting the Accelerator Cable.](#))

<Variable-venturi carburettor>

<L.H. drive vehicles>



<R.H. drive vehicles>



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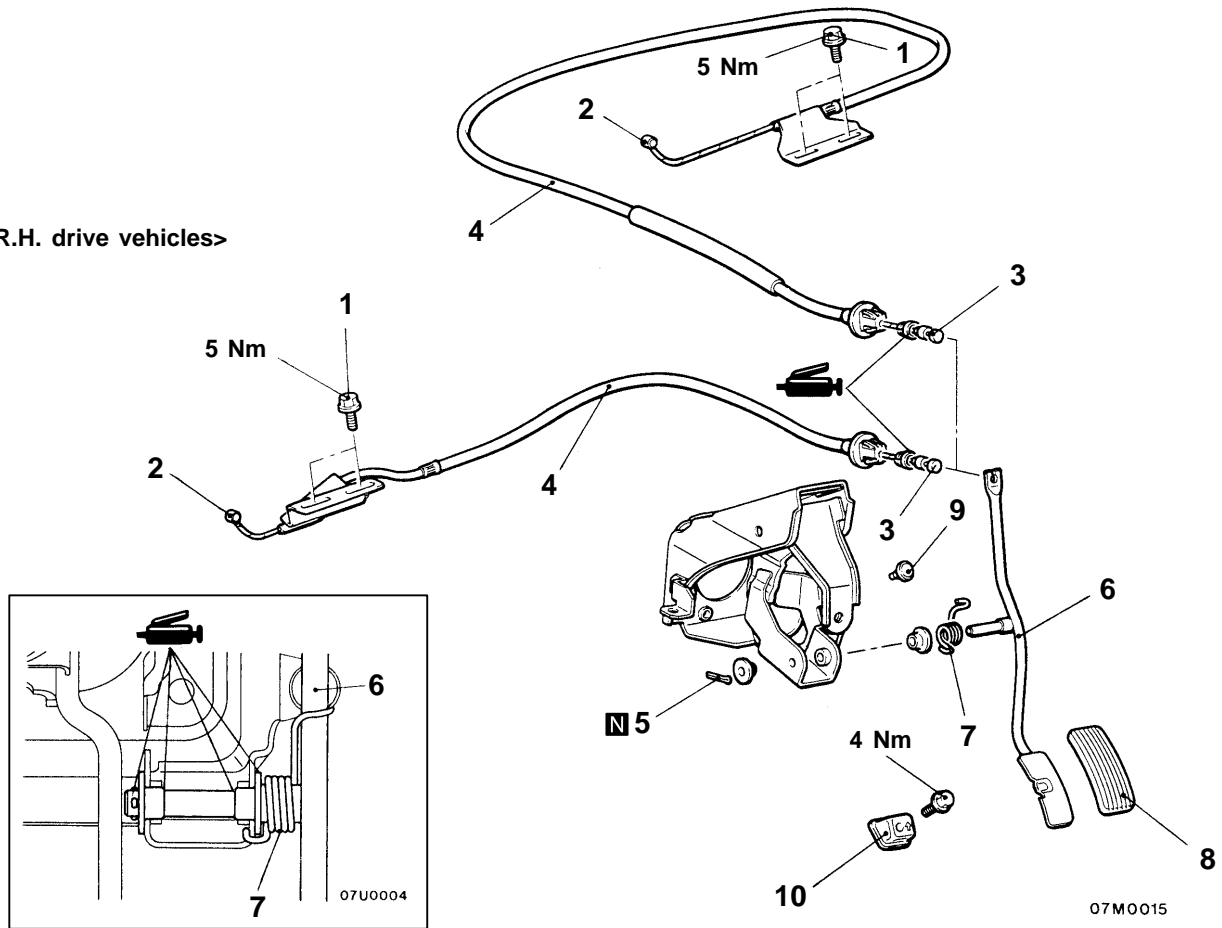
Removal steps

1. Inner cable connection (Throttle body side)
2. Inner cable connection (Accelerator pedal side)
3. Accelerator cable
4. Split pin
5. Accelerator pedal
6. Spring
7. Pedal pad
8. Stopper
9. Accelerator pedal switch <A/T>
10. Accelerator pedal stopper

<MPI>

<L.H. drive vehicles>

<R.H. drive vehicles>



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Removal steps

1. Adjusting bolts
2. Inner cable connection (Throttle body side)
3. Inner cable connection (Accelerator pedal side)
4. Accelerator cable
5. Split pin
6. Accelerator pedal
7. Spring

8. Pedal pad
9. Stopper
10. Accelerator pedal stopper

EMISSION CONTROL SYSTEM <VARIABLE-VENTURI CARBURETTOR>

GENERAL INFORMATION

The emission control system consists of the following subsystems:

- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control valve	Equipped Single diaphragm type (Purpose: HC reduction)
Exhaust emission control system	Exhaust gas recirculation (EGR) system* ¹ <ul style="list-style-type: none"> • EGR valve • Thermo valve 	Equipped Single type Bimetal type (Purpose: NOx reduction)
	Intake air temperature control system	Vacuum control type (Purpose: CO, HC reduction)
	High altitude compensation system* ² <ul style="list-style-type: none"> • High altitude compensator 	Equipped Bellows type (Purpose: CO, HC reduction)
	Deceleration spark advance control system* ³	Vacuum control type

NOTE

*1: Vehicles for GCC (A/T)

*2: Vehicles for high altitude

*3: M/T

EMISSION CONTROL DEVICE REFERENCE TABLE

Related parts	Crankcase emission control system	Evaporative emission control system	Exhaust gas recirculation system	Intake air temperature control system	High altitude compensation system	Deceleration spark advance control system
PCV valve	X					
Purge control valve		X				
Canister		X				
EGR valve			X			
Thermo valve			X			
Air control valve				X		
Thermo sensor				X		
High altitude compensator					X	
Vacuum control valve						X

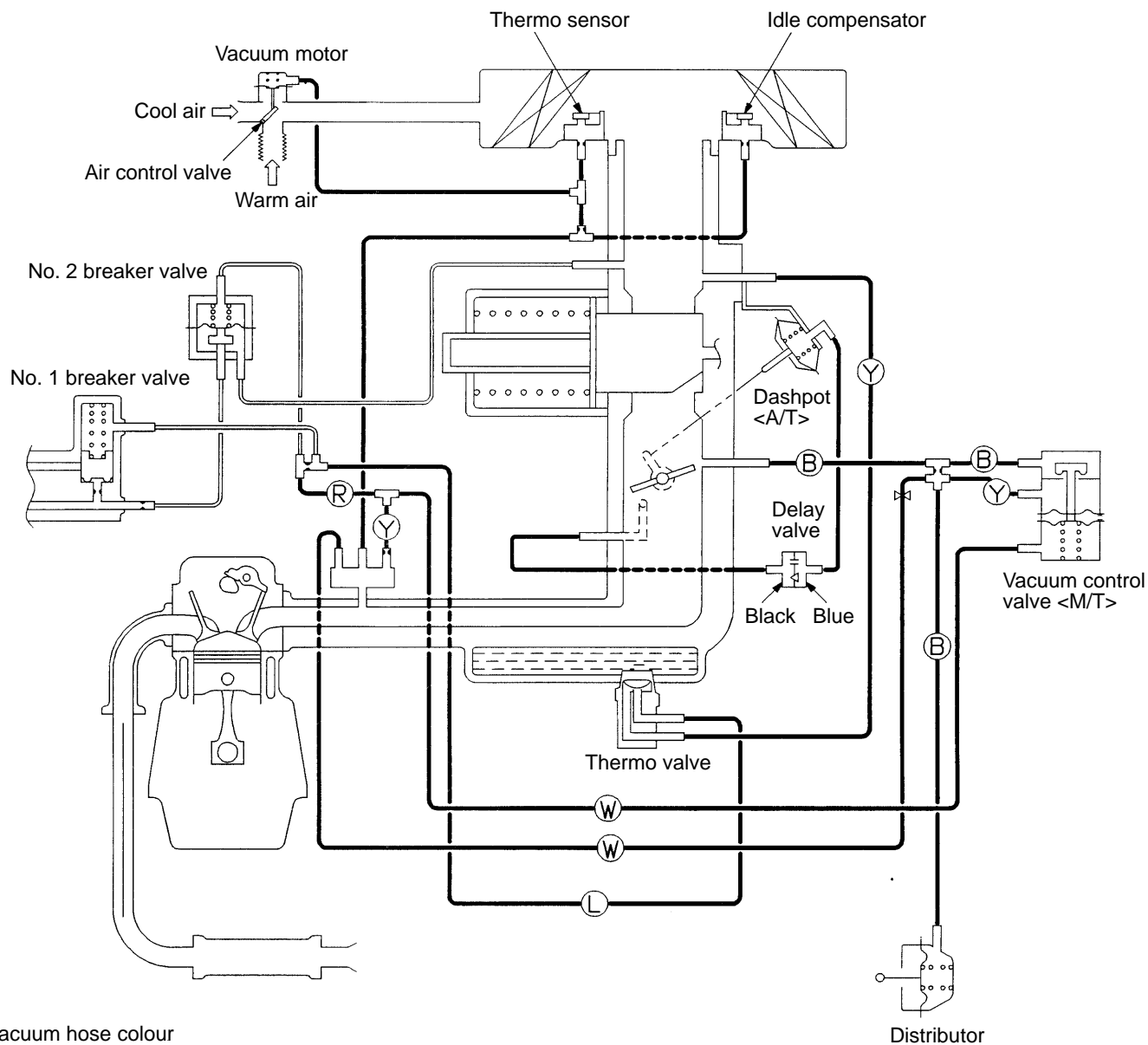
SEALANT

Item	Specified sealant	Remarks
Thermo valve threaded portion	Mitsubishi Genuine Part No. MD970389 or equivalent	Drying sealant

VACUUM HOSE

VACUUM HOSE PIPING DIAGRAM

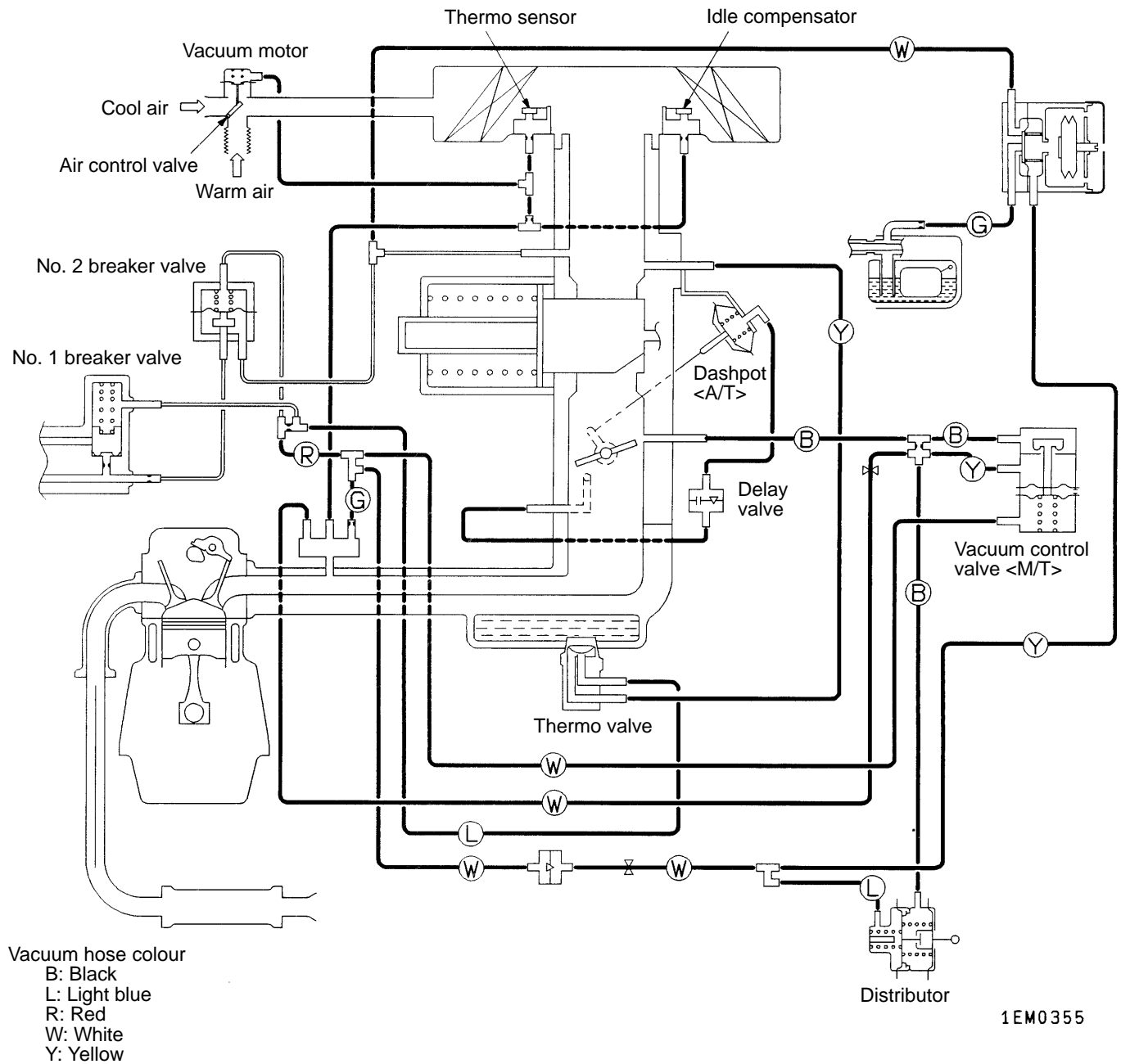
<General export – except vehicles for high altitude>



Vacuum hose colour
B: Black
L: Light blue
R: Red
W: White
Y: Yellow

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<General export – vehicles for high altitude>



CRANKCASE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

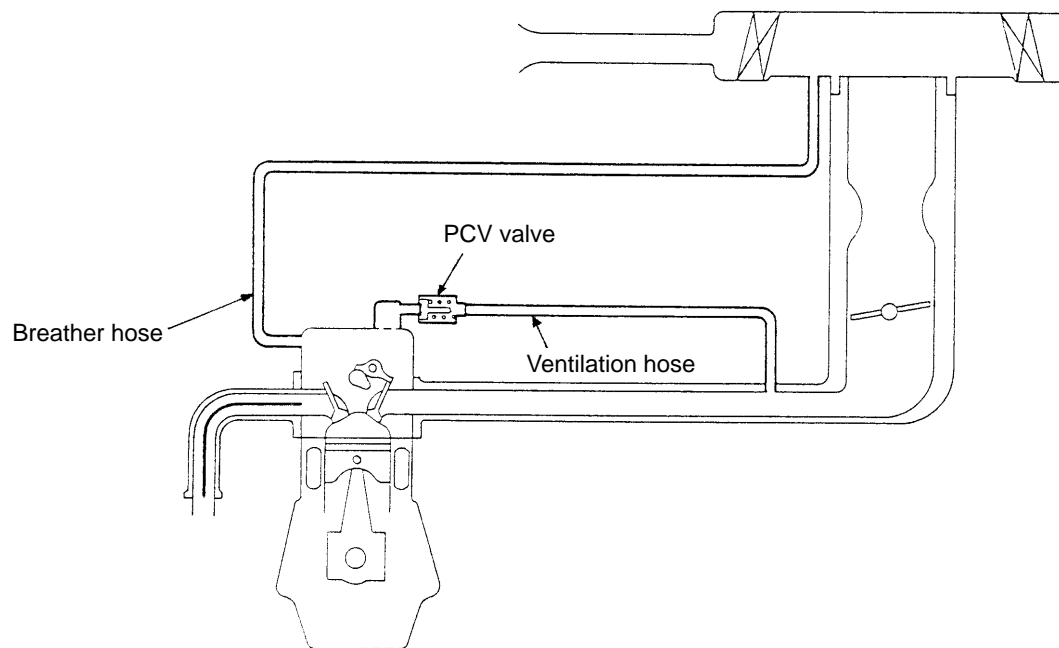
The crankcase emission control system prevents blow-by gases from escaping inside the crankcase into the atmosphere.

Fresh air is sent from the air cleaner into the crankcase through the breather hose. The air becomes mixed with the blow-by gases inside the crankcase.

The blow-by gas inside the crankcase is drawn into the intake manifold through the positive crankcase ventilation (PCV) valve.

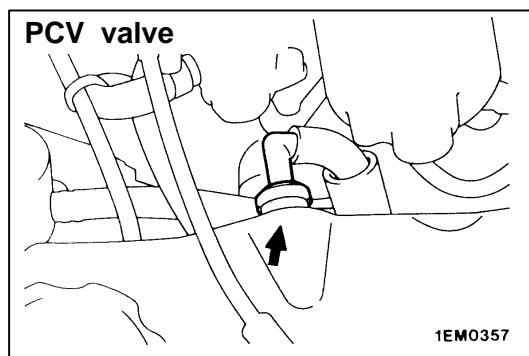
The PCV valve lifts the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

SYSTEM DIAGRAM



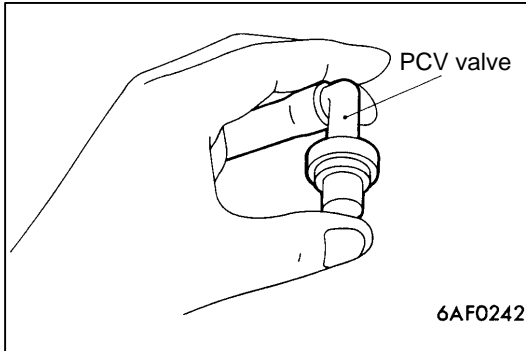
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COMPONENT LOCATION



POSITIVE CRANKCASE VENTILATION SYSTEM CHECK

1. Remove the ventilation hose from the PCV valve.
2. Remove the PCV valve from the rocker cover.
3. Reinstall the PCV valve at the ventilation hose.
4. Start the engine and run at idle.

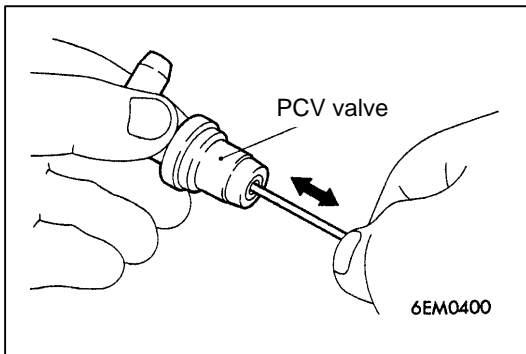


5. Place a finger at the opening of the PCV valve and check that vacuum of the intake manifold is felt.

NOTE

At this moment, the plunger in the PCV valve moves back and forth.

6. If vacuum is not felt, clean the PCV valve or replace it.

**PCV VALVE CHECK**

1. Insert a thin rod into the PCV valve from the side shown in the illustration (rocker cover installation side), and move the rod back and forth to check that the plunger moves.
2. If the plunger does not move, there is clogging in the PCV valve. In this case, clean or replace the PCV valve.

EVAPORATIVE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The evaporative emission control system prevents fuel vapours generated in the fuel tank from escaping into the atmosphere.

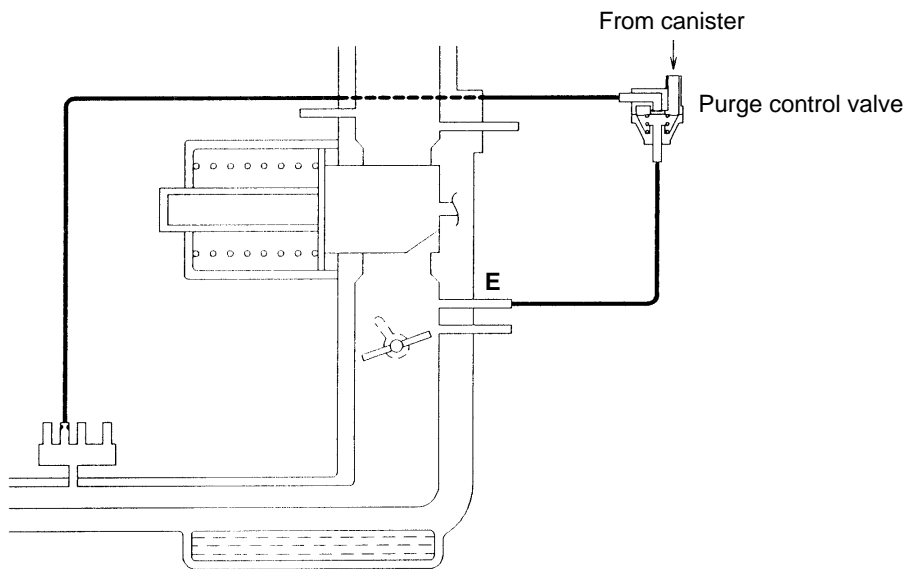
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in

the canister flow through the purge control valve and carburettor and go into the intake manifold to be sent to the combustion chamber.

Furthermore, the purge control valve prevents fuel vapour from entering the engine under low load range when the amount of intake air is small.

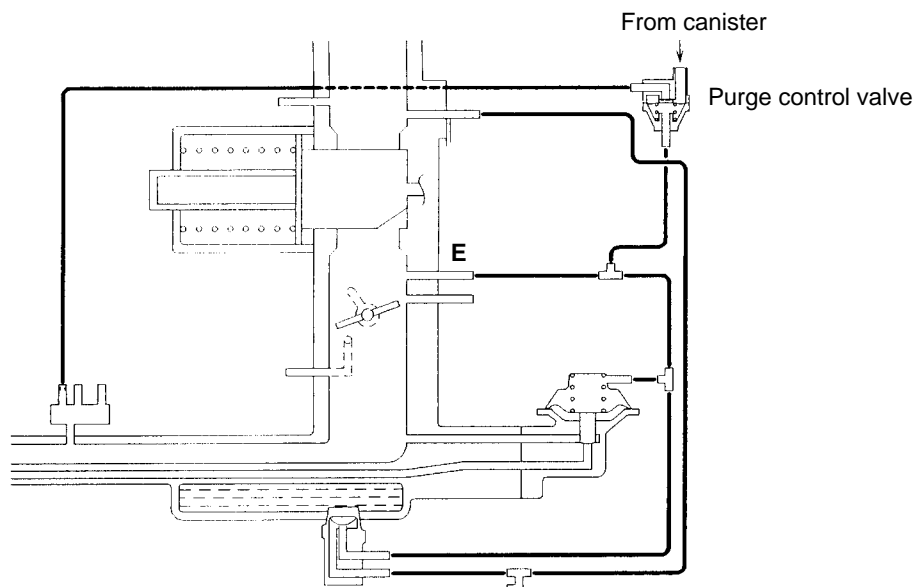
SYSTEM DIAGRAM

<M/T>

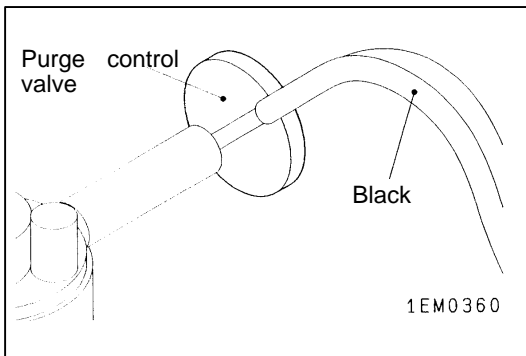


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<A/T>



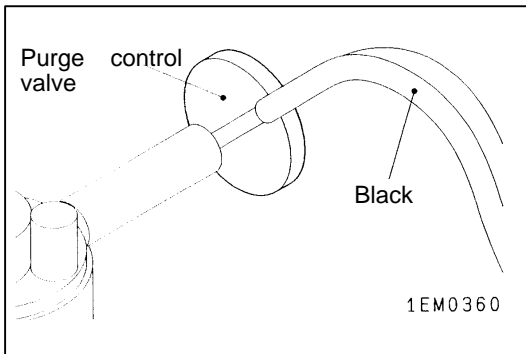
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**PURGE CONTROL SYSTEM CHECK <M/T>**

Engine coolant temperature: 80 – 95°C

1. Disconnect the vacuum hose (black) from the purge control valve, and then connect a hand vacuum pump to the nipple of the purge control valve.
2. Plug the disconnected vacuum hose (black).
3. Apply a vacuum of 53 kPa and check the condition of the vacuum.

Engine condition	Normal condition
Idle	Vacuum is maintained.
2,500 r/min	Vacuum is not maintained.

**PURGE CONTROL SYSTEM CHECK <A/T>**

Engine coolant temperature: 80 – 95°C

1. Disconnect the vacuum hose (black) from the purge control valve, and then connect a hand vacuum pump to the nipple of the purge control valve.
2. Plug the disconnected vacuum hose (black).
3. When the engine is cold or hot, apply a vacuum of 53 kPa and check the condition of the vacuum.

When engine is cold

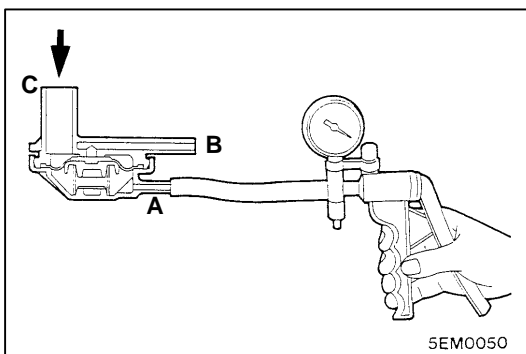
(Engine coolant temperature: 40°C or less)

Engine condition	Normal condition
2,500 r/min	Vacuum is maintained.

When engine is hot

(Engine coolant temperature: 80°C or less)

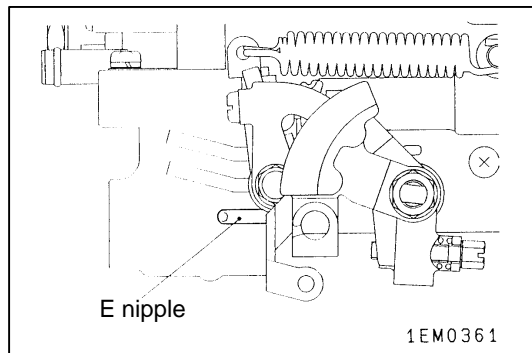
Engine condition	Normal condition
Idle	Vacuum is maintained.
2,500 r/min	Vacuum is no maintained.

**PURGE CONTROL VALVE CHECK**

1. Remove the purge control valve.
2. Connect a hand vacuum pump to the nipple A of the purge control valve.
3. Apply 53 kPa of vacuum, and check that the vacuum is maintained.

4. Blow the air from the nipple C and check the air passage.

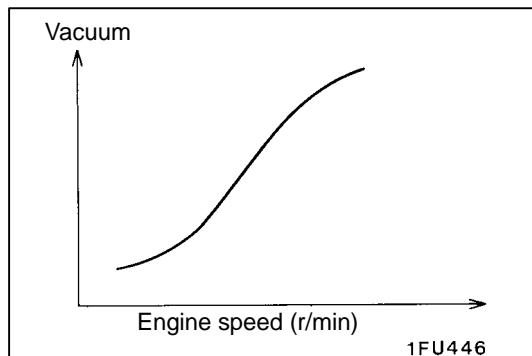
Vacuum	Passage of air
Not applied	Air is not blown out
9.3 kPa or more	Air is blown out



PURGE CONTROL (E NIPPLE) VACUUM CHECK

Engine coolant temperature: 80 – 95°C

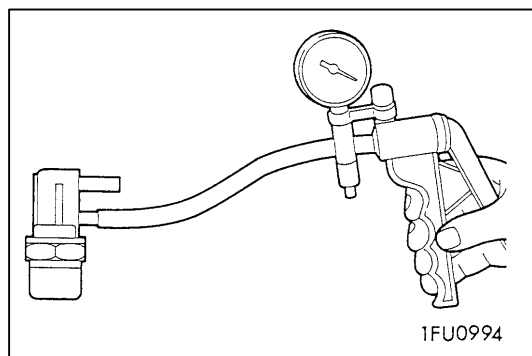
1. Disconnect the vacuum hose (green stripe) from carburettor purge control vacuum nipple (E nipple) and connect a hand vacuum pump to the nipple.



2. Start the engine and check purge control vacuum raises according to engine speed after racing the engine.

NOTE

If there is a problem with the change in vacuum, the carburettor E port may be clogged and require cleaning.



THERMO VALVE CHECK <A/T>

Caution

When removing and installing, do not apply the spanner to the resin section of the thermo valve.

1. Disconnect the vacuum hose (yellow stripe, green stripe) and connect a hand vacuum pump to the nipple of thermo valve.
2. Apply a vacuum to check the thermo valve.

Engine coolant temperature	Normal condition
40°C or less	Vacuum is not maintained
80°C or higher	Vacuum is maintained.

3. Apply sealant to threaded portion.

Specified sealant:

Mitsubishi Genuine Part No. MD970389 or equivalent

4. Tighten to the specified torque.

Specified torque: 27 Nm

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NOx) is generated in the combustion chamber. Therefore, this system recirculated part of emission gas from

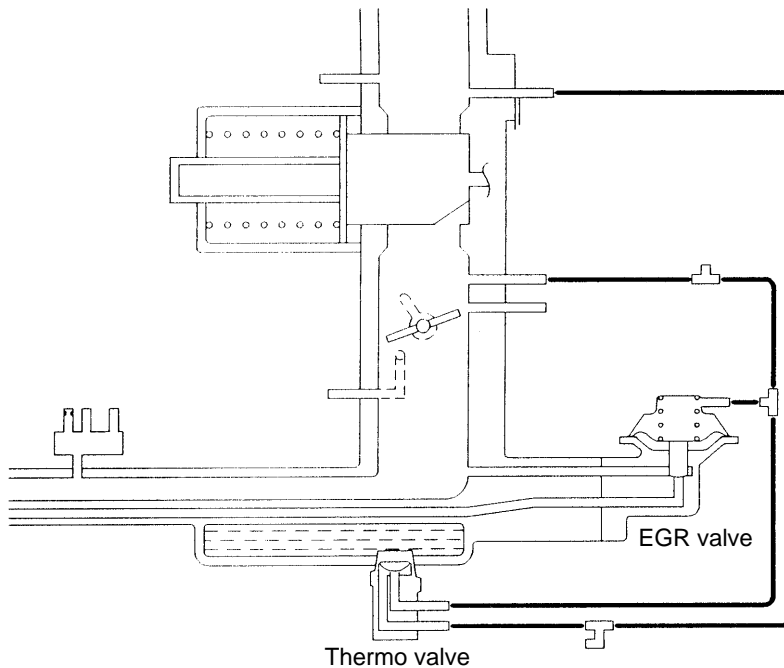
the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NOx. The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION

The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

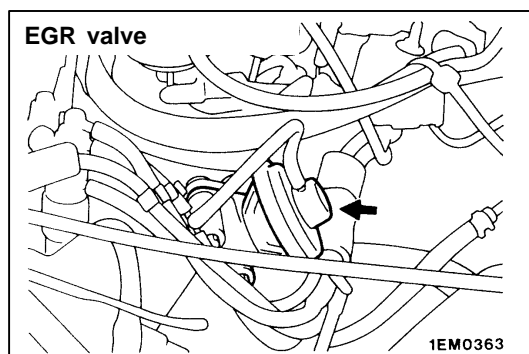
- The engine coolant temperature is low.
- The engine is at idle.
- The throttle valve is widely opened.

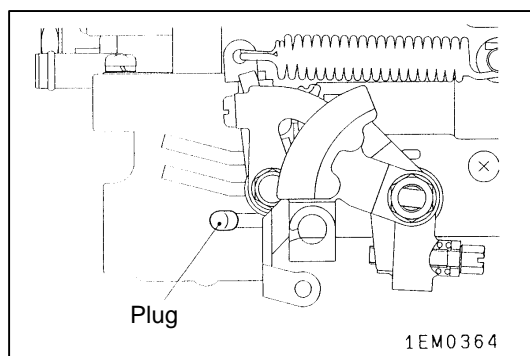
SYSTEM DIAGRAM



1EM0362

COMPONENT LOCATION





EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

1. Remove the vacuum hose (green stripe) from the carburettor, and connect a hand vacuum pump to the vacuum hose.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum while the engine is at idle, and check the condition of the engine and the vacuum.

When engine is cold

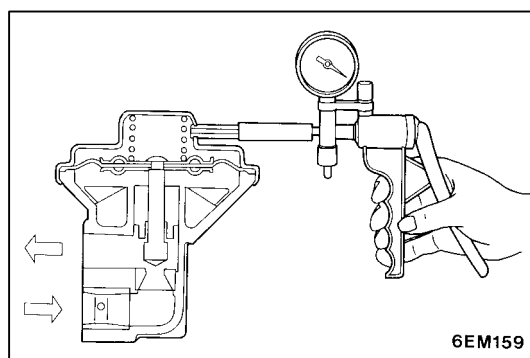
(Engine coolant temperature: 40°C or less)

Item	Normal engine condition	Normal vacuum condition
Vacuum is applied	No change	Vacuum leaks

When engine is hot

(Engine coolant temperature: 80°C or higher)

Item	Normal engine condition	Normal vacuum condition
5.3 kPa of vacuum is applied	No change	Vacuum is maintained
16 kPa of vacuum is applied	Idling becomes slightly unstable	



EGR VALVE CHECK

1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.
4. Apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

Vacuum	Passage of air
5.3 kPa or less	Air is not blown out
16 kPa or more	Air is blown out

5. Replace the gasket, and tighten to the specified torque.

Specified torque: 22 Nm

EGR CONTROL (E NIPPLE) **VACUUM CHECK**

MAIN

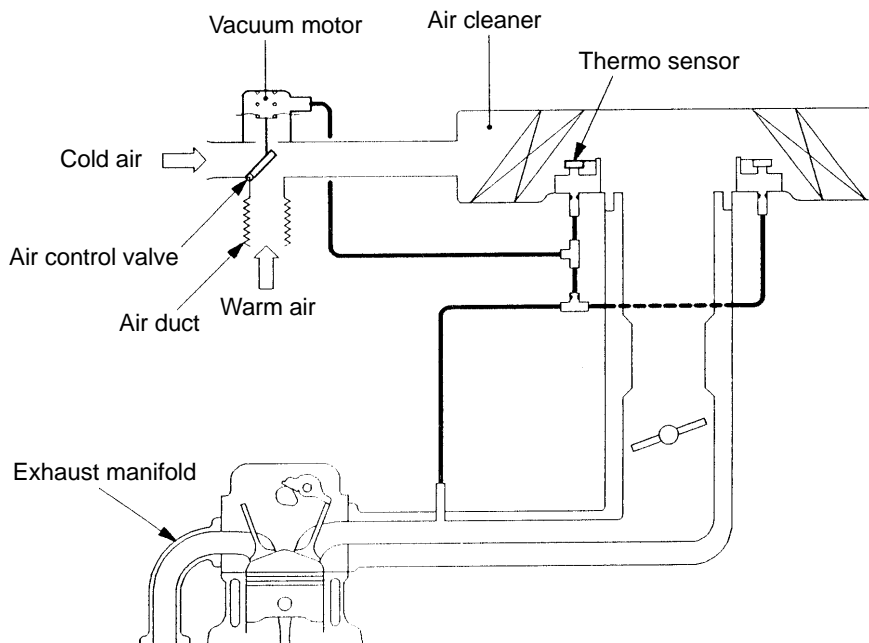
THERMO VALVE CHECKGroup
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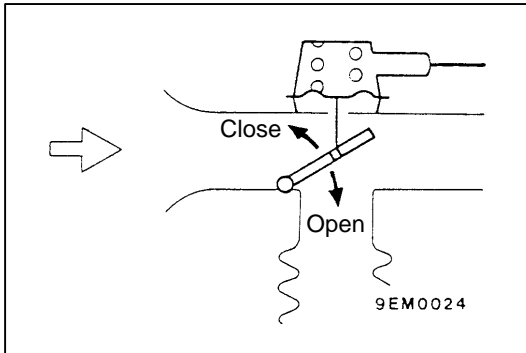
INTAKE AIR TEMPERATURE CONTROL SYSTEM**GENERAL INFORMATION**

The air/fuel mixture ratio after being measured in the carburettor supplied to the engine is leaner when the air temperature is cold, because the density of the air is greater. Conversely, when the air temperature is warm, the air/fuel mixture ratio is richer because the density of the air is poorer. Thus, the intake air temperature control system

maintains the temperature of the intake air at an almost constant level in order to provide a stable air/fuel mixture ratio. This provides improved stability of the exhaust gas level and also improves fuel consumption and driveability. In addition, the addition of warm air during cold weather prevents the carburettor from icing up.

SYSTEM DIAGRAM

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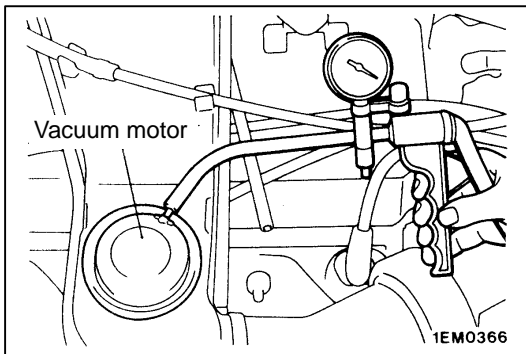
INTAKE AIR TEMPERATURE CONTROL SYSTEM CHECK

1. Start the engine.
2. Check the opening and closing of the air control valve while the engine is at idle.

Thermo sensor temperature	Normal condition
30°C or less	Cold air side inlet closes
45°C or more	Cold air side inlet opens

NOTE

If necessary, apply compressed air to cool or apply hot air using a hair dryer, etc. to heat.

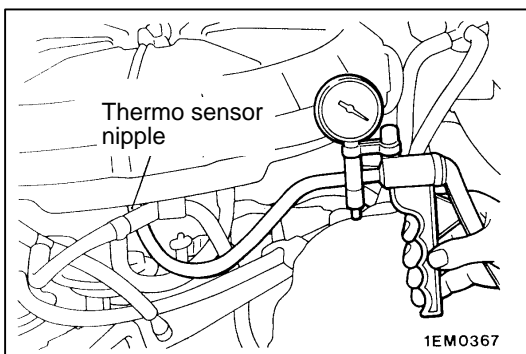


AIR CONTROL VALVE CHECK

1. Disconnect the vacuum hose from the vacuum motor and connect a hand vacuum pump to the valve nipple.
2. Apply a vacuum of 67 kPa and check airtightness.
3. Check air control valve operation.

Vacuum	Normal condition
10 kPa or less	Cold air side inlet opens
33 kPa or more	Cold air side inlet closes

4. Connect the disconnected vacuum hose to the original position.



THERMO SENSOR CHECK

Connect a hand vacuum pump to the thermo sensor nipple and check airtightness.

Thermo sensor temperature	Normal condition
30°C or less	Vacuum holds
45°C or more	Vacuum leaks

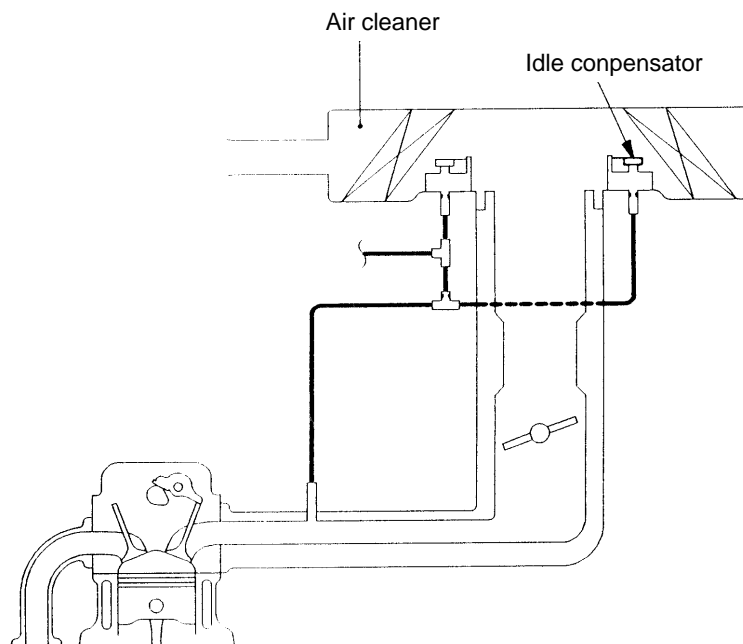
IDLE COMPENSATOR

GENERAL INFORMATION

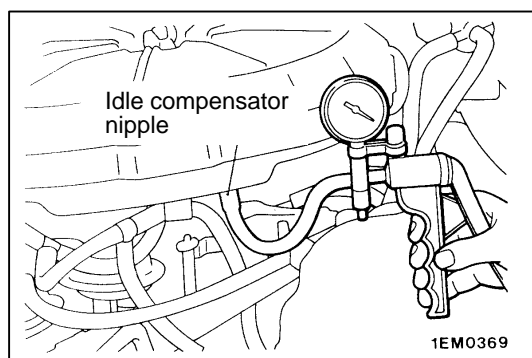
The idle compensator opens the valve by means of a bimetal which operates at warm temperatures, so that air flows downstream from the throttle valve

to the bypass. That prevents the air/fuel mixture from becoming too rich at high temperatures.

SYSTEM DIAGRAM



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IDLE COMPENSATOR CHECK

1. Disconnect air hose from the air cleaner idle compensator nipple.
2. Connect a hand vacuum pump to the idle compensator nipple.
3. Apply vacuum by the hand vacuum pump and check air bleed valve seal.

Air bleed valve temperature	Normal condition
55°C or less	Vacuum is maintained
65°C or more	Vacuum leaks

NOTE

If required, remove air cleaner cover and cool valve by blowing compressed air or warm it with a hair dryer.

HIGH ALTITUDE COMPENSATION SYSTEM

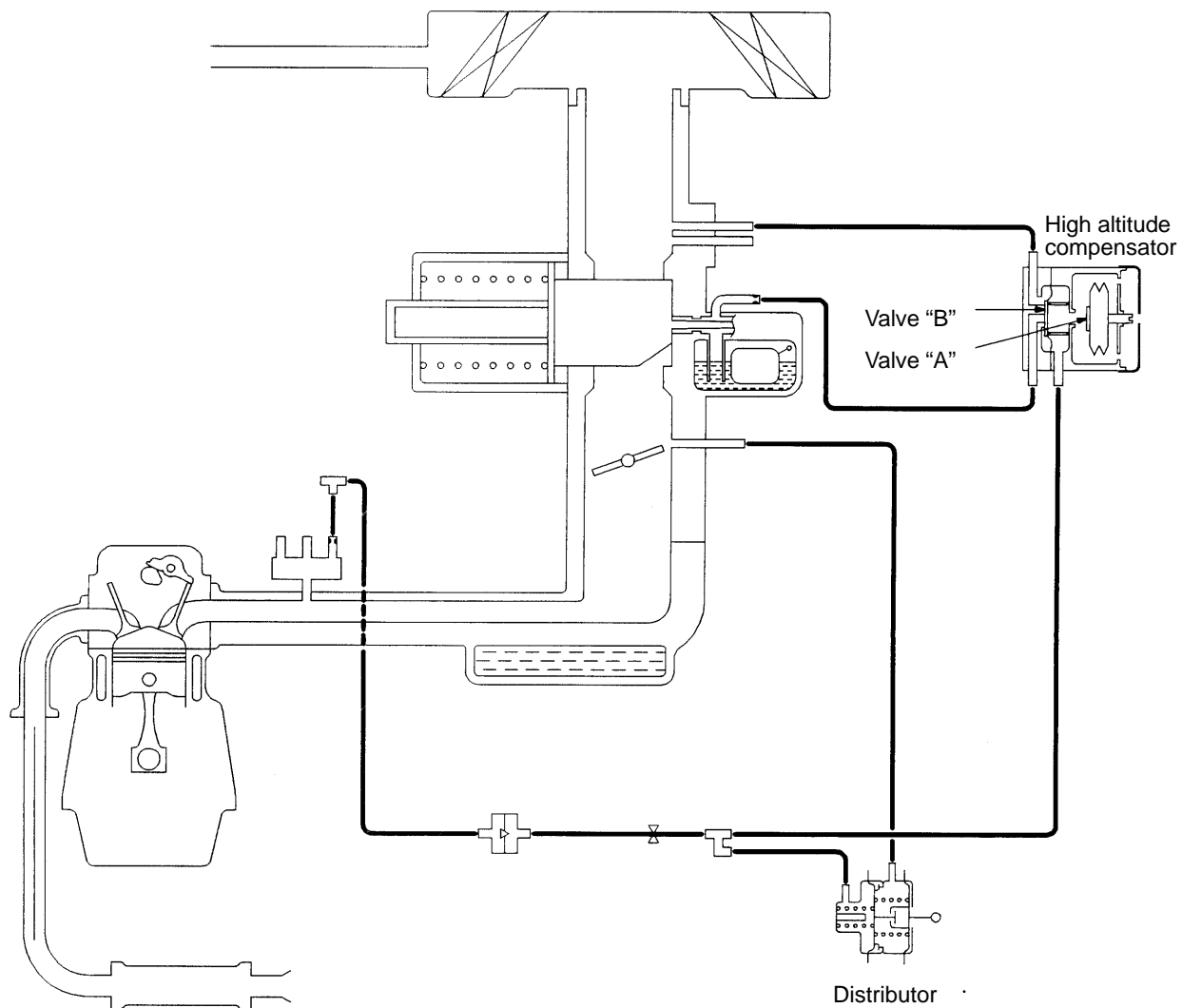
GENERAL INFORMATION

The carburettor meters out the fuel according to the volumetric flow of air, and supplies the resulting air/fuel mixture to the engine. Therefore, when the air/fuel mixture is optimum at low altitudes, the air is thinner at high altitudes, which means that the air/fuel mixture becomes too rich. Because of this, additional bleed air is supplied to the carburettor main air bleed nipple at high altitudes to make the air/fuel mixture leaner. This prevents the air/fuel mixture too rich.

OPERATION

At low altitudes, the valve A inside the high altitude compensator is open, causing the vacuum inside the intake manifold to leak through the high altitude compensator to the atmosphere. Since the valve B inside the high altitude compensator is closed, the bleed air passage remains closed. As a result, the bleed air is not supplied to the carburettor. At high altitudes, the valve A inside the high altitude compensator closes. Since the vacuum inside the intake manifold causes valve B inside the high altitude compensator to open, the bleed air passage opens. This causes bleed air to be supplied to the carburettor.

SYSTEM DIAGRAM

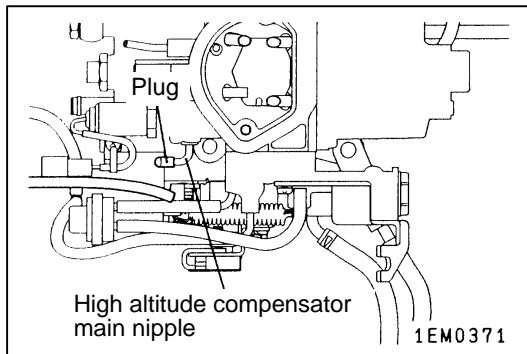


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HIGH ALTITUDE COMPENSATION SYSTEM CHECK

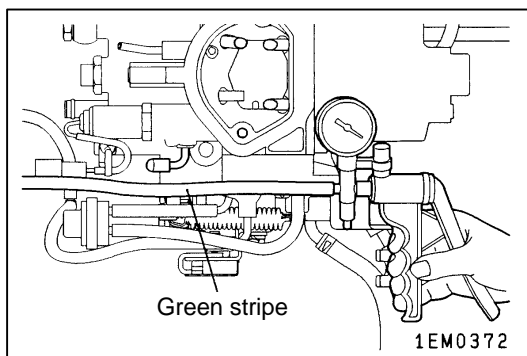
NOTE

1. The range between altitudes of 1,500 m and 2,500 m is the range where the high altitude compensator switches from operating to not operating. Thus the operation in this range of altitude will be unstable. Accordingly, do not check the operation of the high altitude compensator within this range of altitude. Move the vehicle to an altitude of either 1,500 m or below, or to an altitude of 2,500 m or above before checking.
2. When disconnecting the vacuum hose, put a mark on the hose so that it may be reconnected at original position.

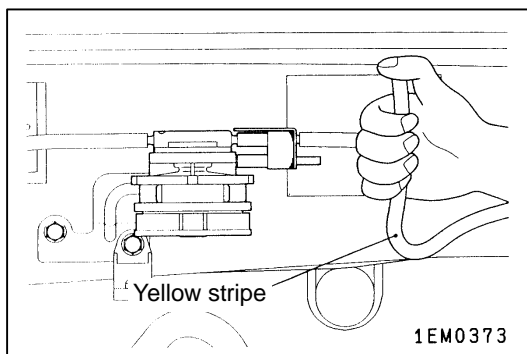


INSPECTION AT ALTITUDE BELOW APPROX. 1,500 m

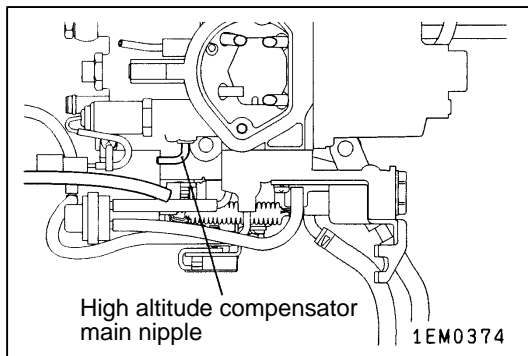
1. Remove the air cleaner.
2. Disconnect the vacuum hose (green stripe) from the carburettor high altitude compensator main nipple and the plug the nipple.



3. Connect a hand vacuum pump to the vacuum hose and check that vacuum is held when applied while running the engine at idle.
4. Connect the disconnected vacuum hose to original position.

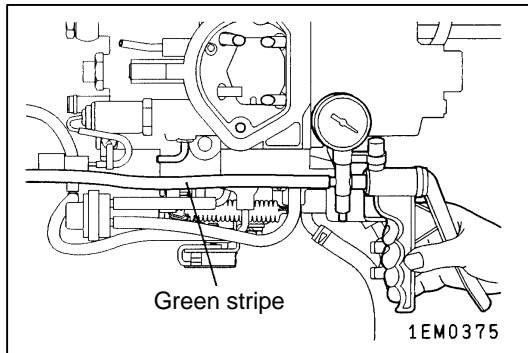


5. While running the engine at idle, disconnect the vacuum hose (yellow stripe) from the high altitude compensator and hold a finger at the hose end to check that vacuum is felt.
6. Connect the disconnected vacuum hose to original position.
7. Run the engine at approximately 3,000 r/min with no load, and check that the engine runs normally.

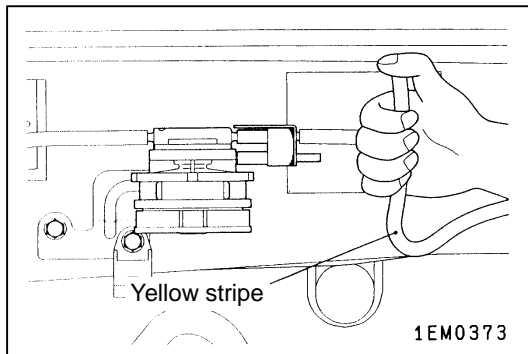


INSPECTION AT ALTITUDE ABOVE APPROX. 2,500 m

1. Remove the air cleaner.
2. Disconnect the vacuum hose (green stripe) from the carburettor high altitude main nipple.



3. Connect a hand vacuum pump to the vacuum hose and while running the engine at idle, apply vacuum from the vacuum pump to check that vacuum leaks and does not built up.
4. Connect the disconnected vacuum hose to original position.

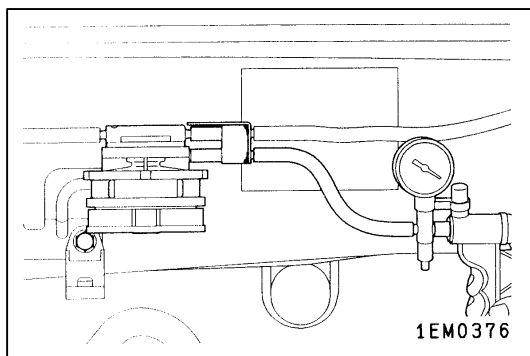


5. While running the engine at idle, disconnect the vacuum hose (yellow stripe) from the high altitude compensator and hold a finger at the hose end to check that vacuum is felt.
6. Connect the disconnected vacuum hose to original position.
7. Run the engine at approximately 3,000 r/min with no load, and check that the engine runs normally with no black smoke being emitted.

HIGH ALTITUDE COMPENSATOR CHECK

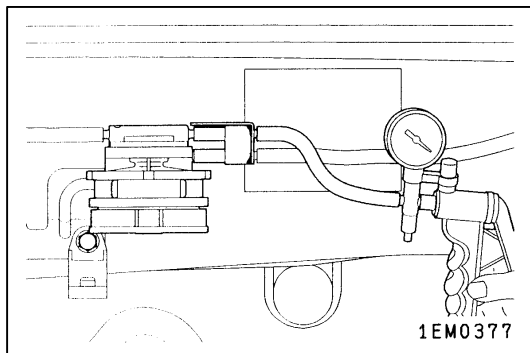
NOTE

1. The range between altitudes of 1,500 m and 2,500 m is the range where the high altitude compensator switches from operating to not operating. Thus the operation in this range of altitude will be unstable. Accordingly, do not check the operation of the high altitude compensator within this range of altitude. Move the vehicle to an altitude of either 1,500 m or below, or to an altitude of 2,500 m or above before checking.
2. When disconnecting the vacuum hose, put a mark on the hose so that it may be reconnected at original position.

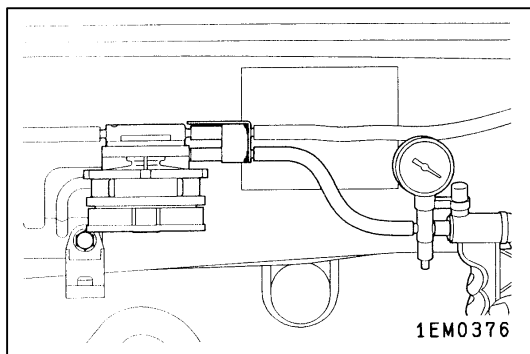


INSPECTION AT ALTITUDE BELOW APPROX. 1,500 m

1. Disconnect the vacuum hose (yellow stripe) from the high altitude compensator and connect a hand vacuum pump to the high altitude compensator nipple.
2. Apply vacuum and check that it leaks and does not hold.
3. Connect the disconnected vacuum hose to original position.

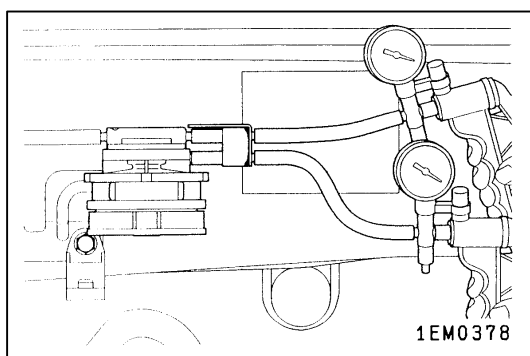


4. Disconnect the vacuum hose (green stripe) from the high altitude compensator and connect a hand vacuum pump to the high altitude compensator nipple.
5. Check that vacuum holds when applied.
6. Connect the disconnected vacuum hose to original position.



INSPECTION AT ALTITUDE ABOVE APPROX. 2,500 m

1. Disconnect the vacuum hose (yellow stripe) from the high altitude compensator and connect a hand vacuum pump to the high altitude compensator nipple.
2. Check that vacuum holds when applied.



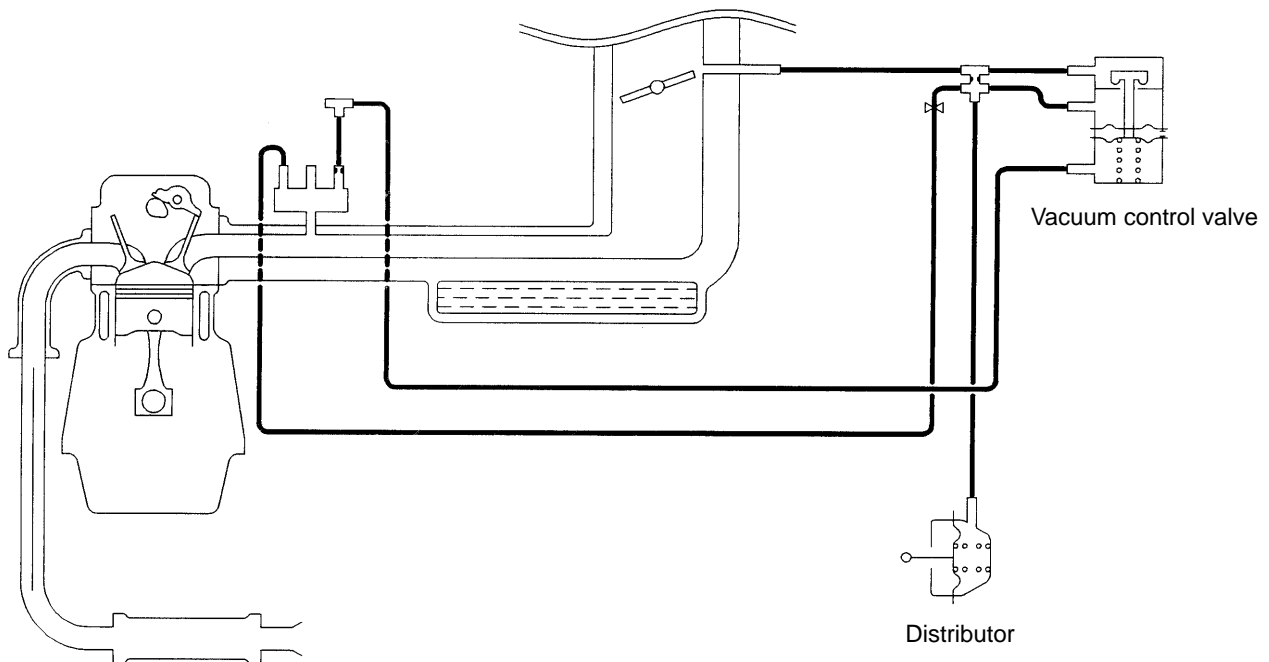
3. Disconnect the vacuum hose (green stripe) from the high altitude compensator and connect another hand vacuum pump to the high altitude compensator nipple.
4. Holding the vacuum applied in procedure (2), apply vacuum and check that it leaks and does not hold.
5. Connect the disconnected vacuum hose to original position.

DECELERATION SPARK ADVANCE CONTROL

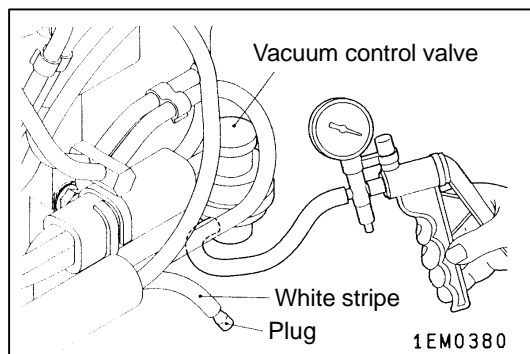
GENERAL INFORMATION

When the vehicle is decelerating, the negative pressure in the intake manifold is introduced into the vacuum chamber of the distributor and the ignition timing is advanced. That prevents after-burning.

SYSTEM DIAGRAM



1EM0379

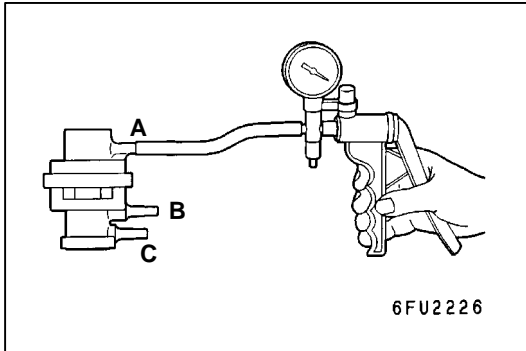


1EM0380

DECELERATION SPARK ADVANCE CONTROL SYSTEM CHECK

1. Connect a timing light.
2. Remove the vacuum hose (black) from the carburetor D nipple, and plug both the nipple and the vacuum hose.
3. Disconnect the vacuum hose (white stripe) from the vacuum control valve, and then connect a hand vacuum pump to the vacuum control valve.
4. Plug the end of the vacuum hose (white stripe) which was disconnected.

5. Start the engine and run it at idle.
6. Check that the ignition timing advances (approximately 20°) when 80 kPa of negative pressure or more is applied.

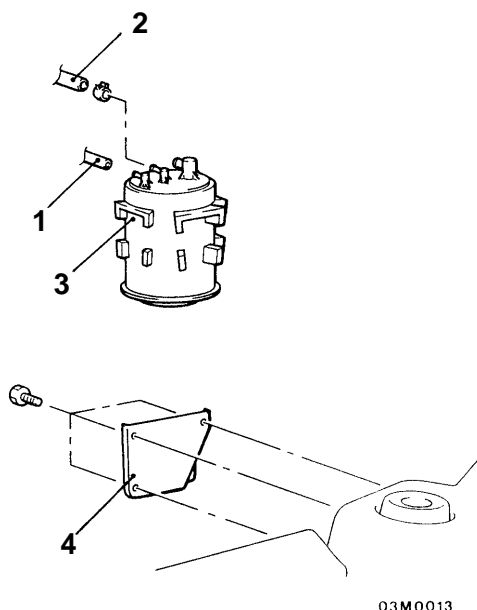


VACUUM CONTROL VALVE CHECK

1. Connect a hand vacuum pump to nipple A of the vacuum control valve.
2. Apply 90 kPa of negative pressure, and check that the negative pressure is maintained.
3. Apply negative pressure and check whether air flows between nipple B and nipple C.

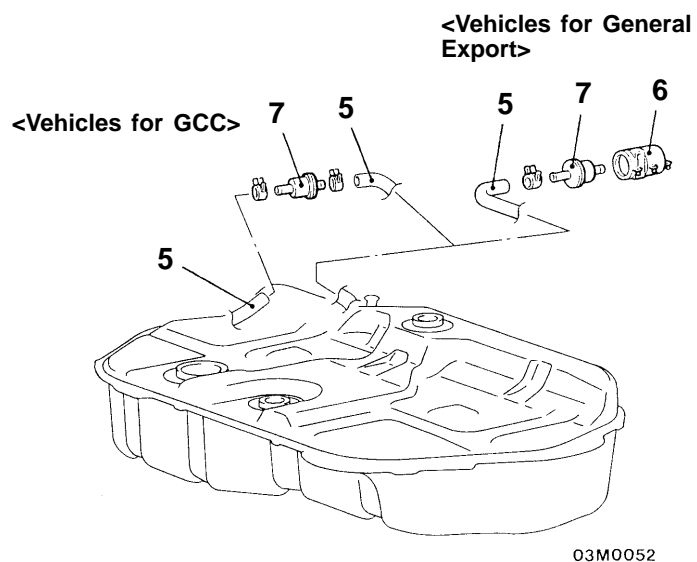
Negative pressure	Air movement
0 kPa	Air flows
80 kPa	Air does not flow

CANISTER AND TWO-WAY VALVE REMOVAL AND INSTALLATION



Canister removal steps <Vehicles for GCC>

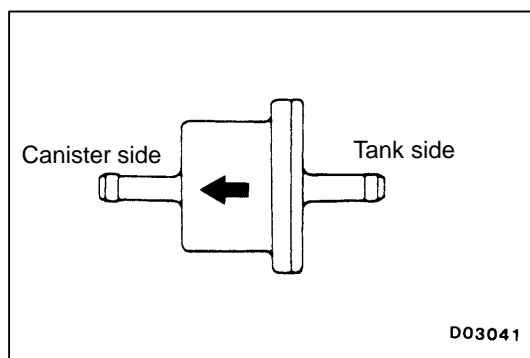
1. Vapour hose
2. Purge hose
3. Canister
4. Canister bracket



00004730

Two-way valve removal steps

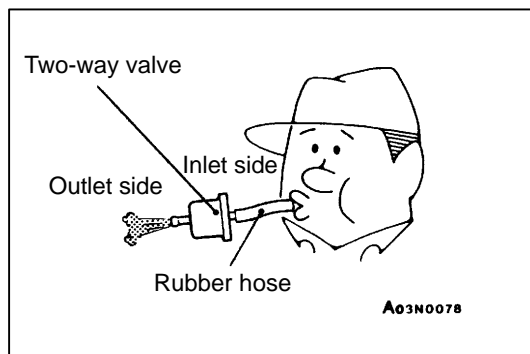
- Fuel tank
- 5. Vapour hose
- 6. Breather case
- 7. Two-way valve



INSTALLATION SERVICE POINT

►A◄ TWO-WAY VALVE INSTALLATION

Be careful about the installation direction of the two-way valve.



INSPECTION

TWO-WAY VALVE SIMPLE CHECK

Attach a clean hose and check the operation of the two-way valve.

Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance.
Lightly blow from outlet side.	Air passes through.

EMISSION CONTROL SYSTEM <MPI>

GENERAL INFORMATION

The emission control system consists of the following subsystems:

- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control solenoid valve	Equipped ON/OFF type solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device—MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system <ul style="list-style-type: none"> • EGR valve • EGR control solenoid valve 	Equipped Single type ON/OFF type solenoid valve <4G1> Duty cycle type solenoid valve <4G9> (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

EMISSION CONTROL DEVICE REFERENCE TABLE

Related parts	Crankcase emission control system	Evaporative emission control system	Air/fuel ratio control system	Catalytic converter	Exhaust gas recirculation system
PCV valve	X				
Purge control solenoid valve		X			
MPI system component		X	X		
Catalytic converter				X	
EGR valve					X
EGR control solenoid valve					X

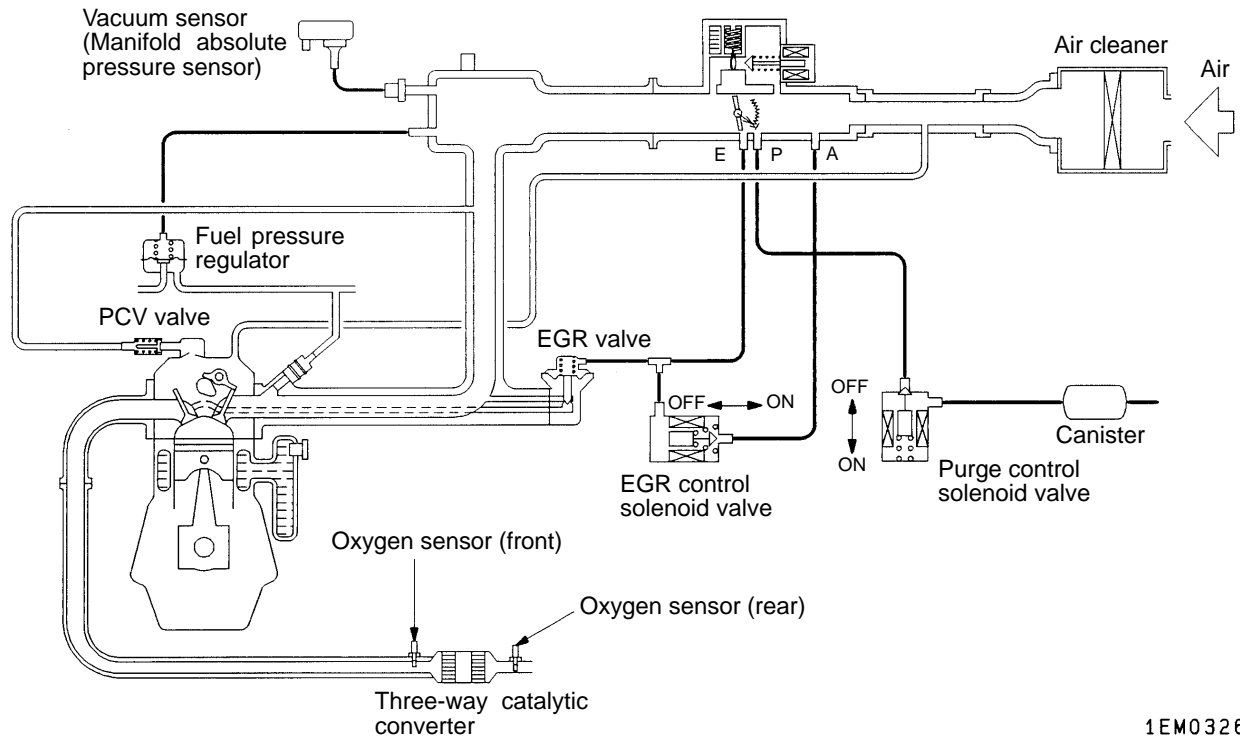
SERVICE SPECIFICATIONS

Items	Standard value
Purge control solenoid valve coil resistance (at 20°C) Ω	36 – 44
EGR control solenoid valve coil resistance (at 20°C) Ω	36 – 44

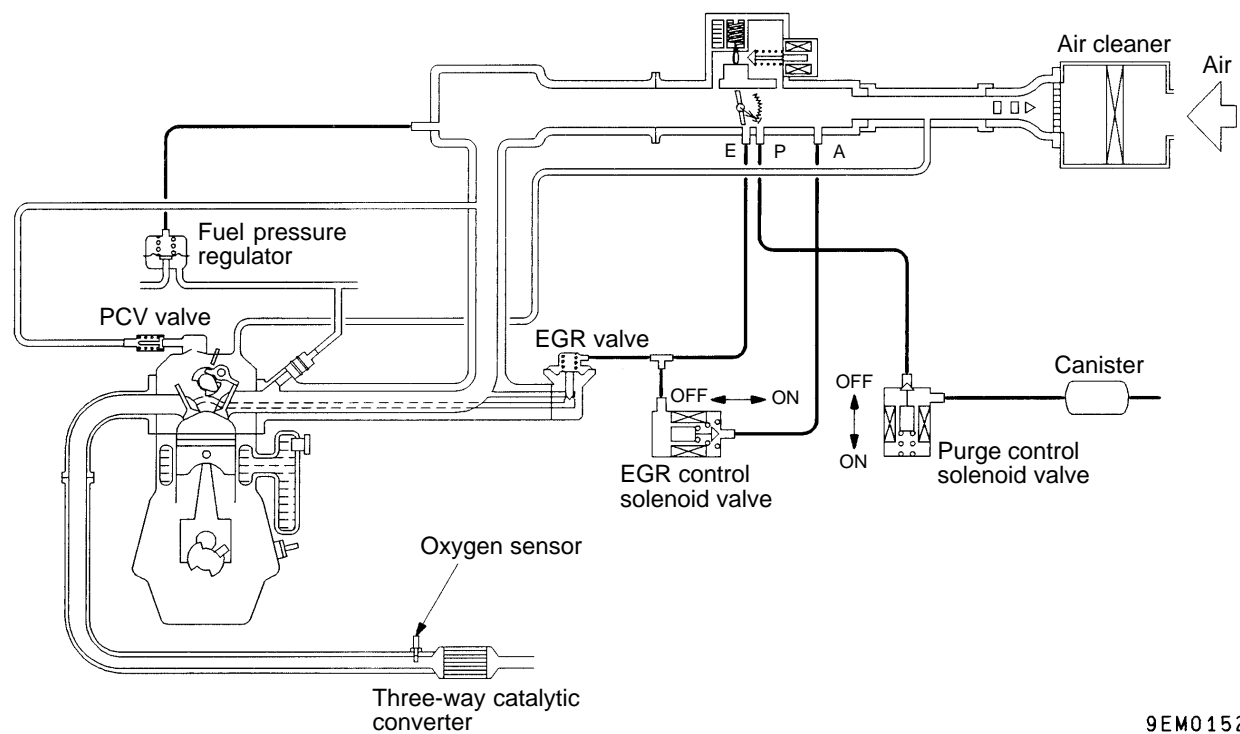
VACUUM HOSE

VACUUM HOSE PIPING DIAGRAM

<4G1>

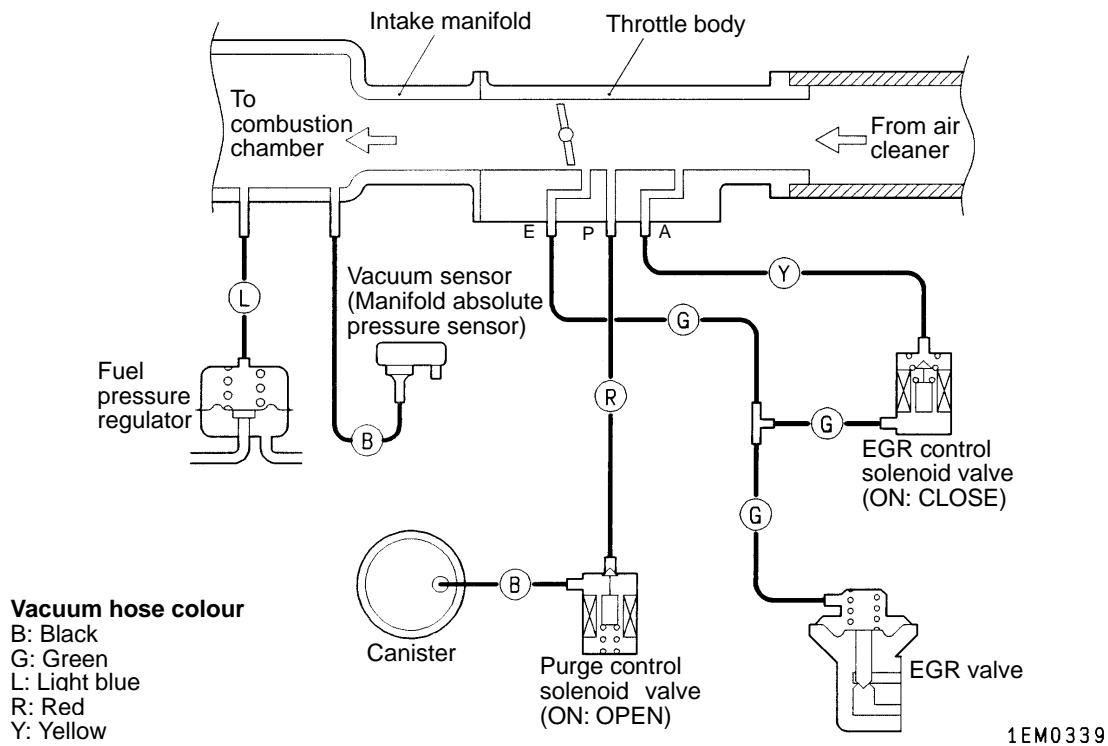


<4G9>

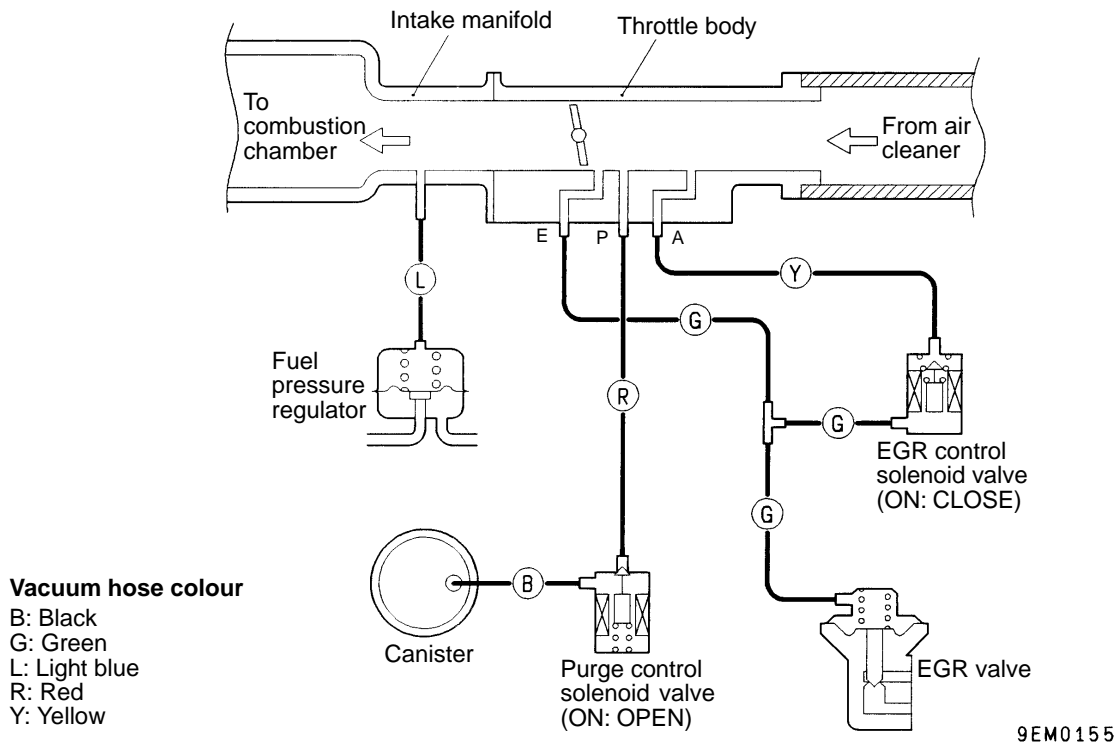


VACUUM CIRCUIT DIAGRAM

<4G1>



<4G9>

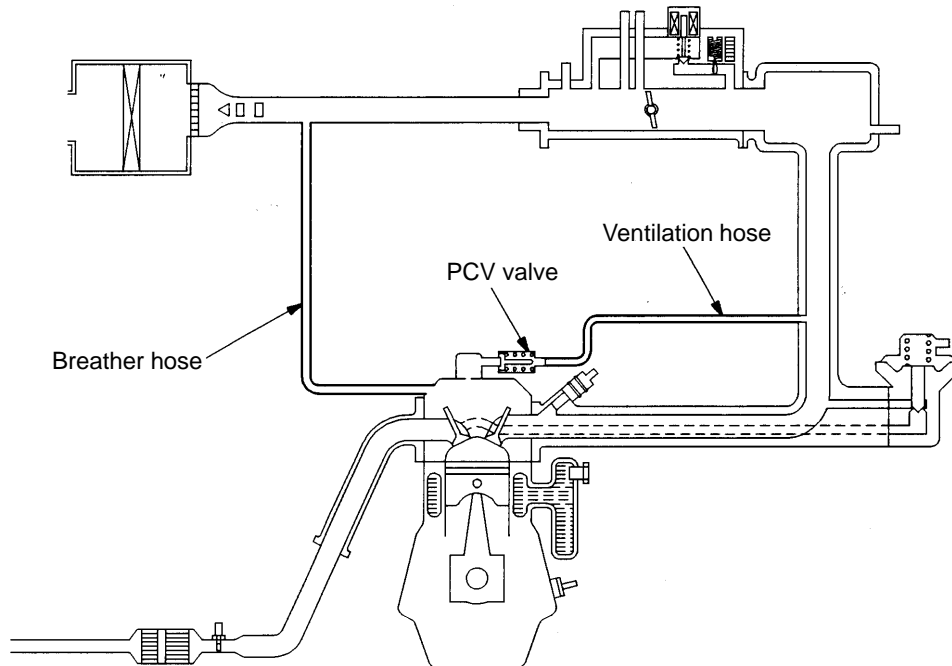


VACUUM HOSE CHECK

1. Using the piping diagram as a guide, check to be sure that the vacuum hoses are correctly connected.
2. Check the connection condition of the vacuum hoses, (removed, loose, etc.) and check to be sure that there are no bends or damage.

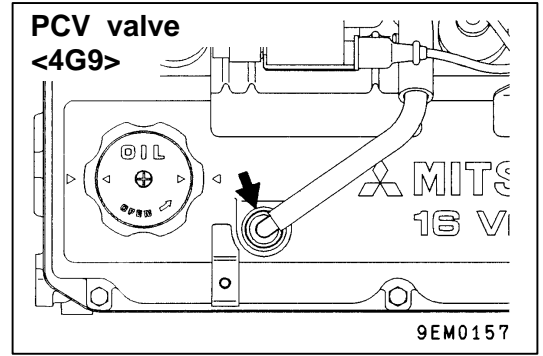
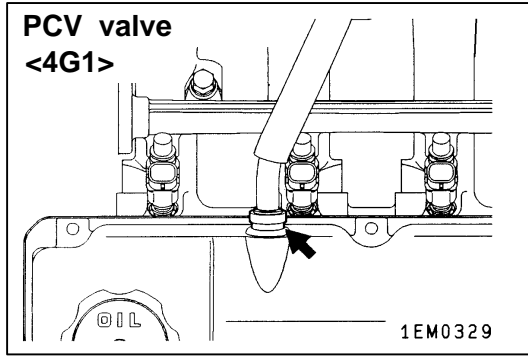
VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the vacuum hose piping diagram as a guide.

CRANKCASE EMISSION CONTROL SYSTEM**GENERAL INFORMATION****SYSTEM DIAGRAM**

9EM0133

COMPONENT LOCATION



MAIN

Group
17

1996

POSITIVE CRANKCASE VENTILATION SYSTEM CHECK

PCV VALVE CHECK

EVAPORATIVE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The evaporative emission control system prevents fuel vapours generated in the fuel tank from escaping into the atmosphere.

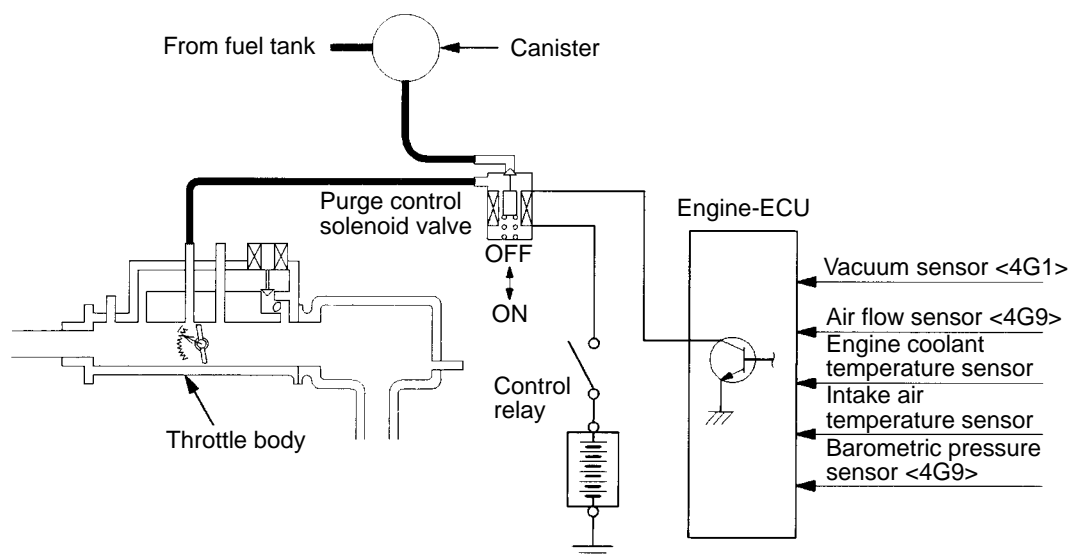
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in the canister flow through the purge solenoid and purge port and go into the intake manifold to be

sent to the combustion chamber.

When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle, for example), the engine control unit turns the purge solenoid off to shut off the fuel vapour flow to the intake manifold.

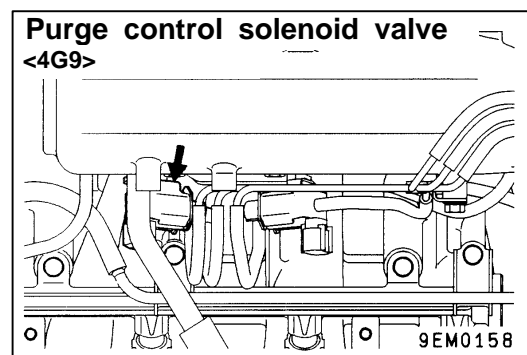
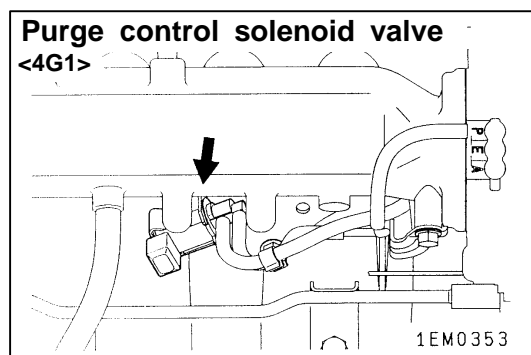
This does not only insure the driveability when the engine is cold or running under low load but also stabilize the emission level.

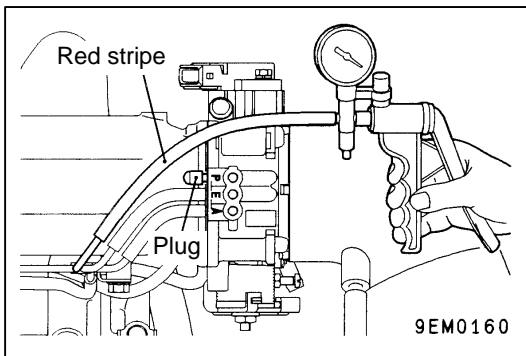
SYSTEM DIAGRAM



9EM0167

COMPONENT LOCATION





PURGE CONTROL SYSTEM CHECK

1. Disconnect the vacuum hose (red stripe) from the throttle body and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum while the engine is idling, and check the condition of the engine and the vacuum.

When engine is cold

(Engine coolant temperature: 40°C or less)

Vacuum	Engine condition	Normal condition
53 kPa	3,000 r/min	Vacuum is maintained

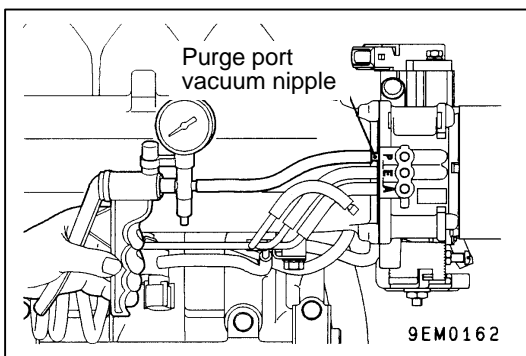
When engine is hot

(Engine coolant temperature: 80°C or higher)

Vacuum	Engine condition	Normal condition
53 kPa	At idle	Vacuum is maintained
	3,000 r/min	Vacuum will leak for approximately 3 minutes after the engine is started. After 3 minutes have passed, the vacuum will be maintained momentarily, after which it will again leak.*

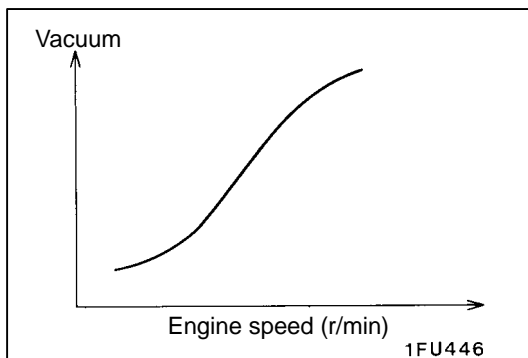
NOTE

*: The vacuum will leak continuously if the atmospheric pressure is approximately 77 kPa or less, or the temperature of the intake air is approximately 50°C or higher.



PURGE PORT VACUUM CHECK

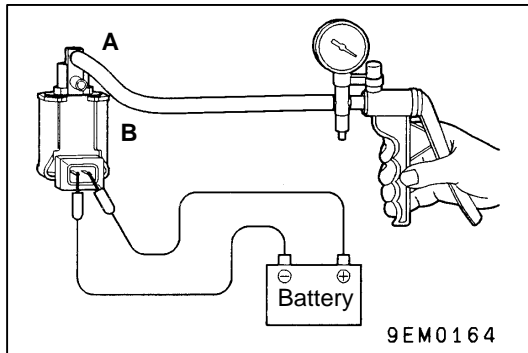
1. Disconnect the vacuum hose (red stripe) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.



2. Start the engine and check that, after raising the engine speed by racing the engine, purge vacuum raises according to engine speed.

NOTE

If there is a problem with the change in vacuum, the throttle body purge port may be clogged and require cleaning.

**PURGE CONTROL SOLENOID VALVE CHECK****NOTE**

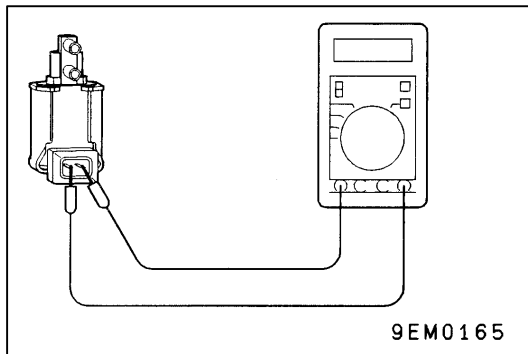
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose (black stripe, red stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44 Ω (at 20°C)



EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NOx) is generated in the combustion chamber. Therefore, this system recirculates part of emission gas from

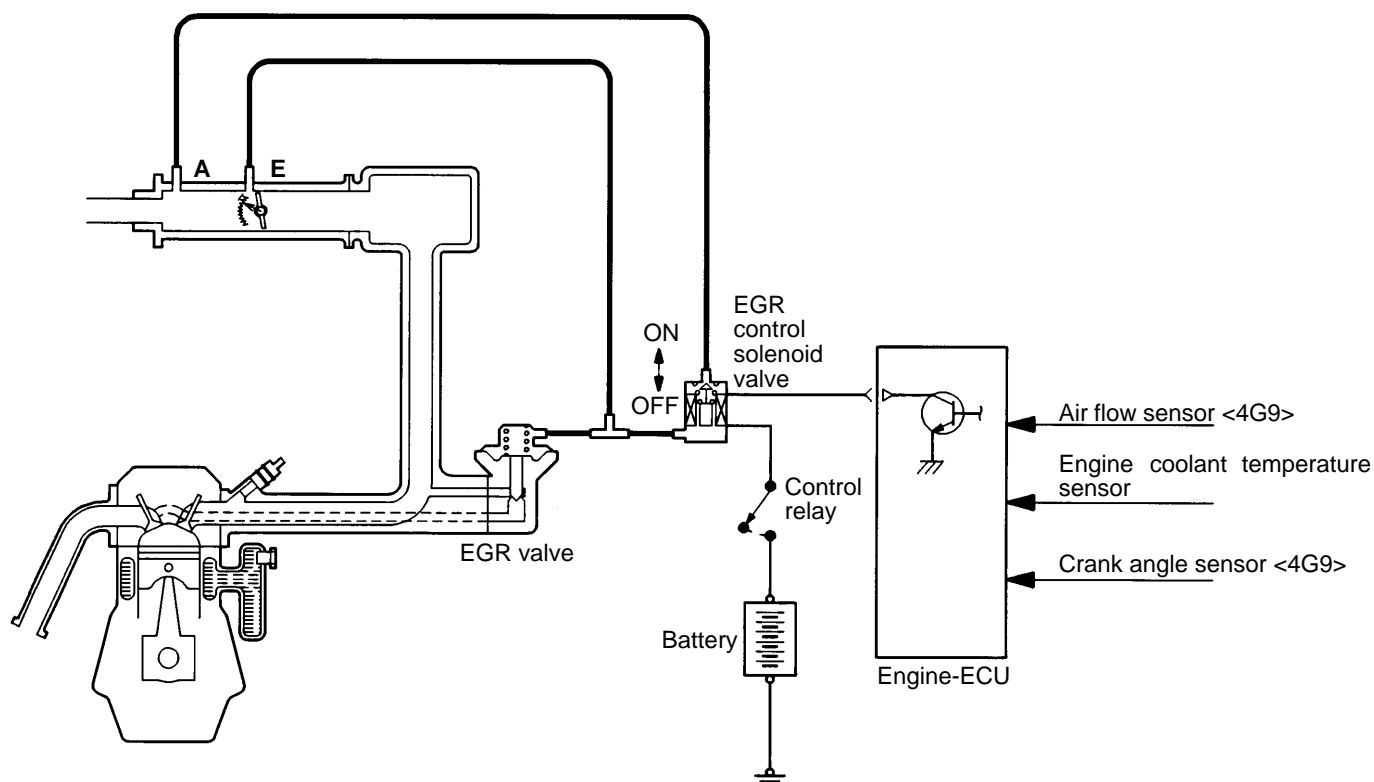
the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NOx. The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION

The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

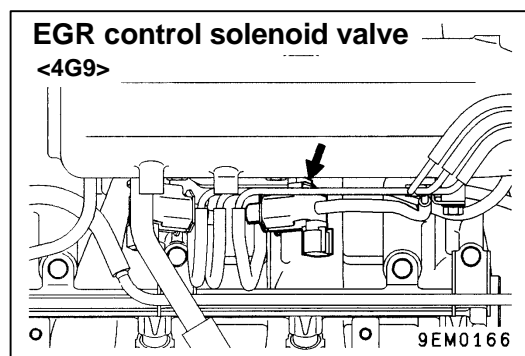
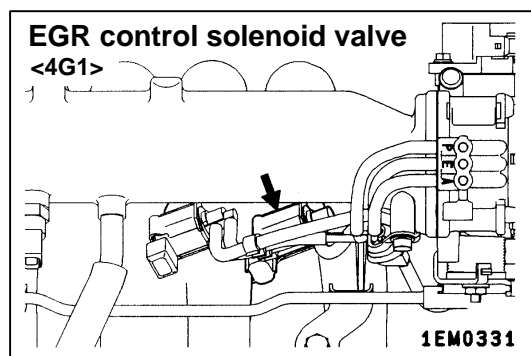
- The engine coolant temperature is low.
- The engine is at idle.
- The throttle valve is widely opened.

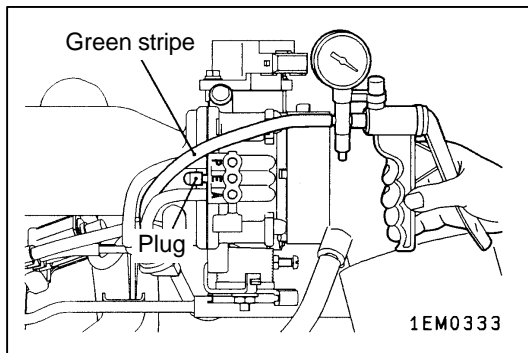
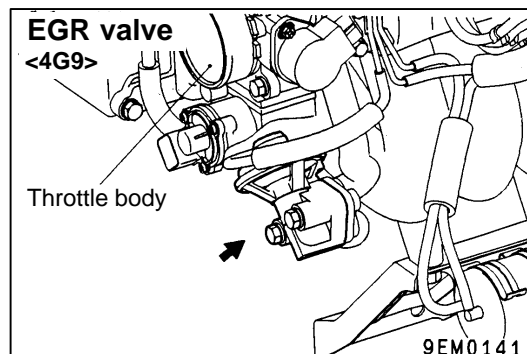
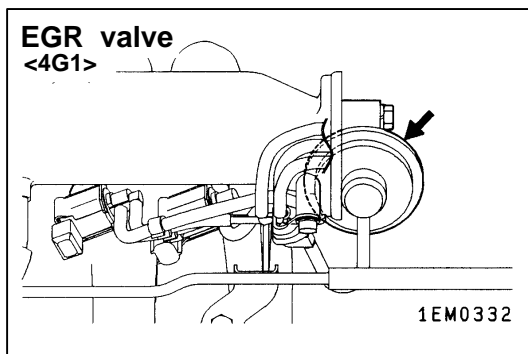
SYSTEM DIAGRAM



9EM0130

COMPONENT LOCATION





EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK <4G1>

1. Disconnect the vacuum hose (green stripe) from the throttle body, and connect a hand vacuum pump to the vacuum hose.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold and hot, apply a vacuum while the engine is idling, and check the condition of the engine and the vacuum.

When engine is cold

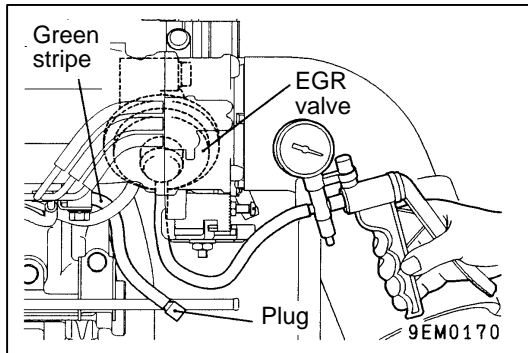
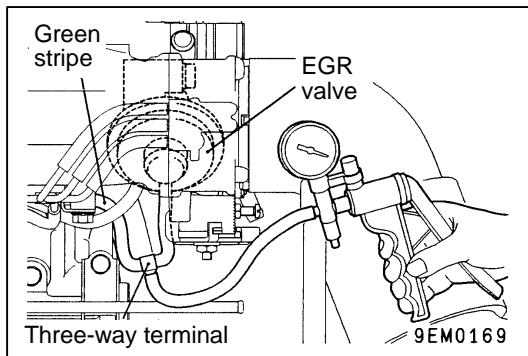
(Engine coolant temperature: 40°C or less)

Hand vacuum pump	Normal engine condition	Normal vacuum condition
Vacuum is applied	No change	Vacuum leaks

When engine is hot

(Engine coolant temperature: 80°C or higher)

Hand vacuum pump	Normal engine condition	Normal vacuum condition
5.3 kPa	No change	Vacuum is maintained
27 kPa	Idling becomes slightly unstable or engine stalls.	Vacuum is maintained



EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK <4G9>

1. Disconnect the vacuum hose (green stripe) from the EGR valve, and then connect a hand vacuum pump via the three-way terminal.
2. When the engine is hot or cold, check the condition of vacuum by racing the engine.

When engine is cold

(Engine coolant temperature: 20°C or less)

Throttle valve	Normal vacuum condition
Open quickly	No vacuum will generate (the same as barometric pressure.)

When engine is hot

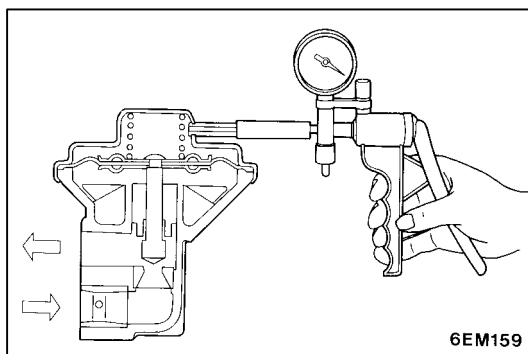
(Engine coolant temperature: 80°C or higher)

Throttle valve	Normal vacuum condition
Open quickly	It will momentarily rise over 13 kPa

3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump to the EGR valve.
5. Check whether the engine stalls or the idling is unstable when a vacuum of 30 kPa or higher is applied during idling.

EGR VALVE CHECK

1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.

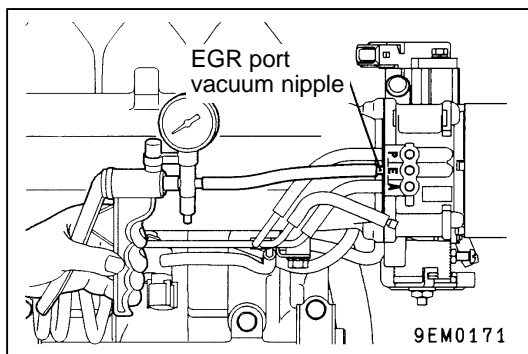


4. Apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

Vacuum	Passage of air
5.3 kPa or less	Air is not blown out
27 kPa or more	Air is blown out

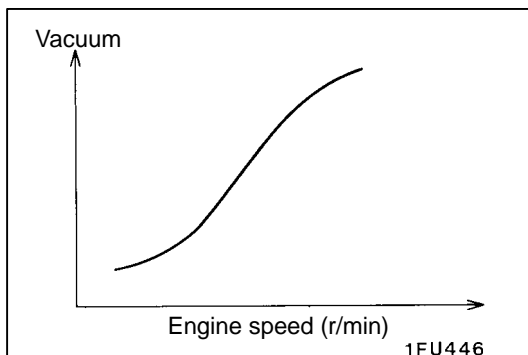
5. Replace the gasket, and tighten to the specified torque.

Specified torque: 22 Nm



EGR PORT VACUUM CHECK

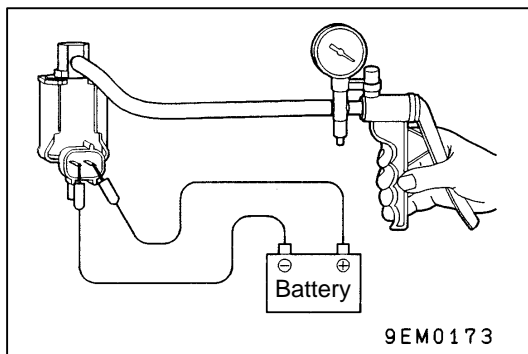
1. Disconnect the vacuum hose (green stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.



2. Start the engine and check to see that, after raising the engine speed by racing the engine, EGR vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body EGR port may be clogged and require cleaning.



EGR CONTROL SOLENOID VALVE CHECK

NOTE

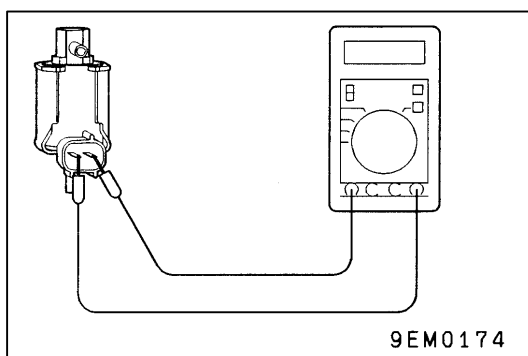
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose (yellow stripe, green stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Not applied	Vacuum leaks
Applied	Vacuum maintained

5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44Ω (at 20°C)



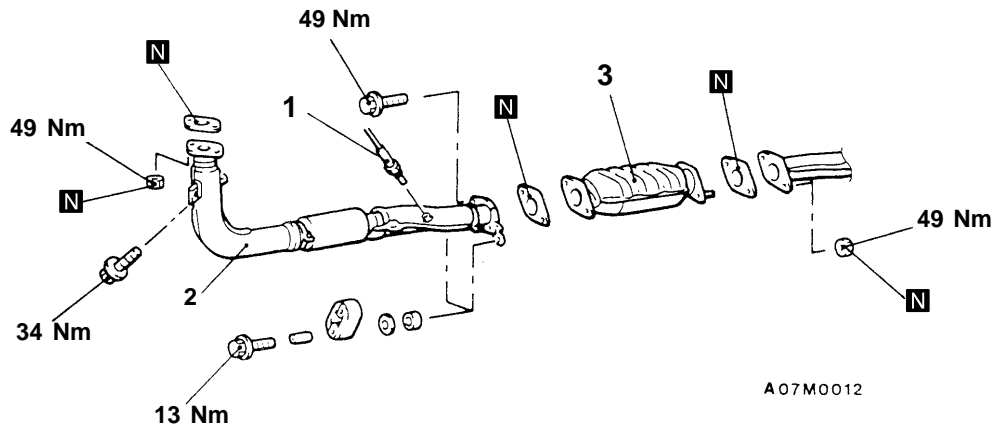
CATALYTIC CONVERTER

GENERAL INFORMATION

The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

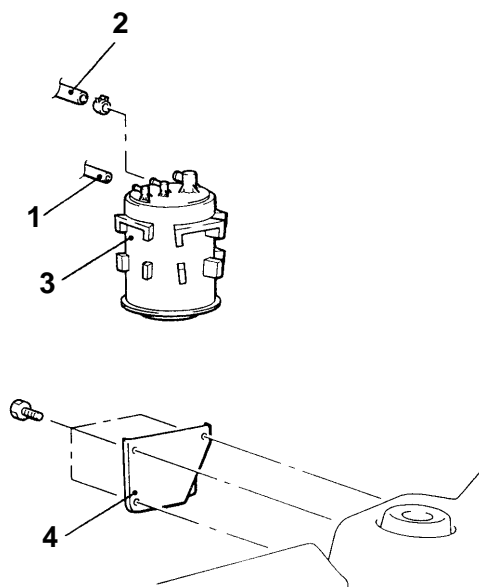
REMOVAL AND INSTALLATION



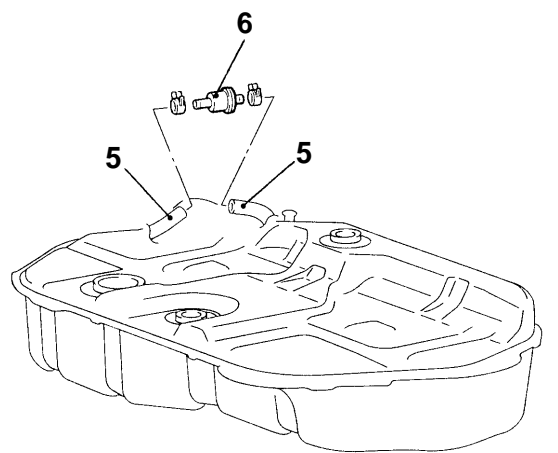
Removal steps

1. Oxygen sensor
(Refer to [GROUP 15](#) – Exhaust Pipe and Main Muffler.)
2. Front exhaust pipe
3. Catalytic converter

CANISTER AND TWO-WAY VALVE REMOVAL AND INSTALLATION



03M0013

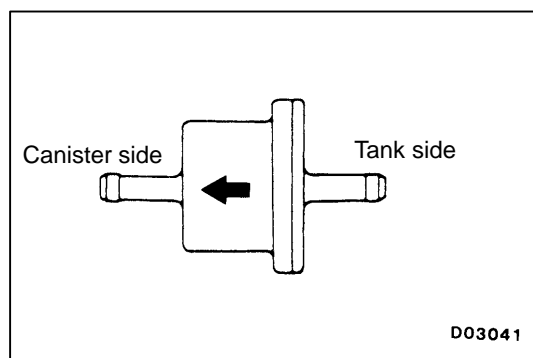
03M0015
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Canister removal steps

1. Vapour hose
2. Purge hose
3. Canister
4. Canister bracket

Two-way valve removal steps

- Fuel tank
(Refer to [GROUP 13F](#) – Fuel tank.)
- 5. Vapour hose
- 6. Two-way valve

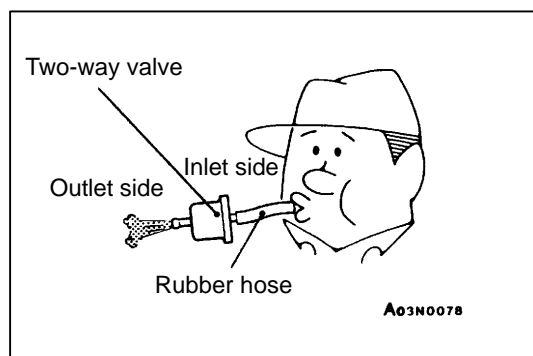


D03041

INSTALLATION SERVICE POINT

►A◄ TWO-WAY VALVE INSTALLATION

Be careful about the installation direction of the two-way valve.



A03N0078

INSPECTION

TWO-WAY VALVE SIMPLE CHECK

Attach a clean hose and check the operation of the two-way valve.

Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance.
Lightly blow from outlet side.	Air passes through.