DAIHATSU

ROCKY

EC

EMISSION CONTROL SYSTEM

WRU90-EC001

INTRODUCTION

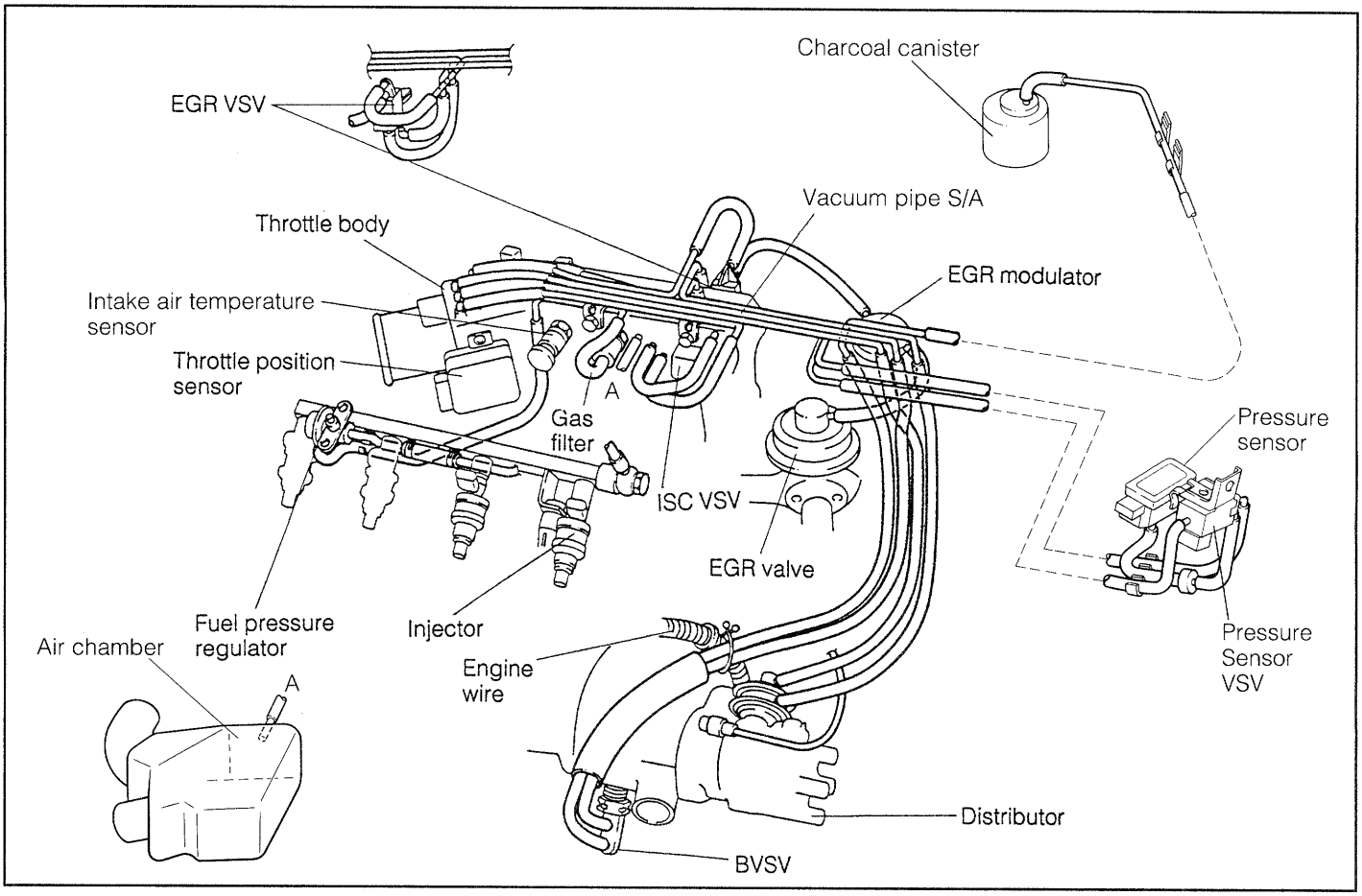
PURPOSE OF SYSTEMS

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduction of blow-by gas (HC emission)
Fuel evaporative emission control	EVAP	Reduction of evaporative HC emission
Throttle positioner	TP	Reduction of HC and CO emissions
Exhaust gas recirculation	EGR	Reduction of NOx emission
Three-way catalyst (Catalyst provided at under floor.)	TWC	Reduction of HC, CO and NOx emissions
Electronic fuel injection*	EFI	Regulation of all engine conditions for reduction of exhaust emissions

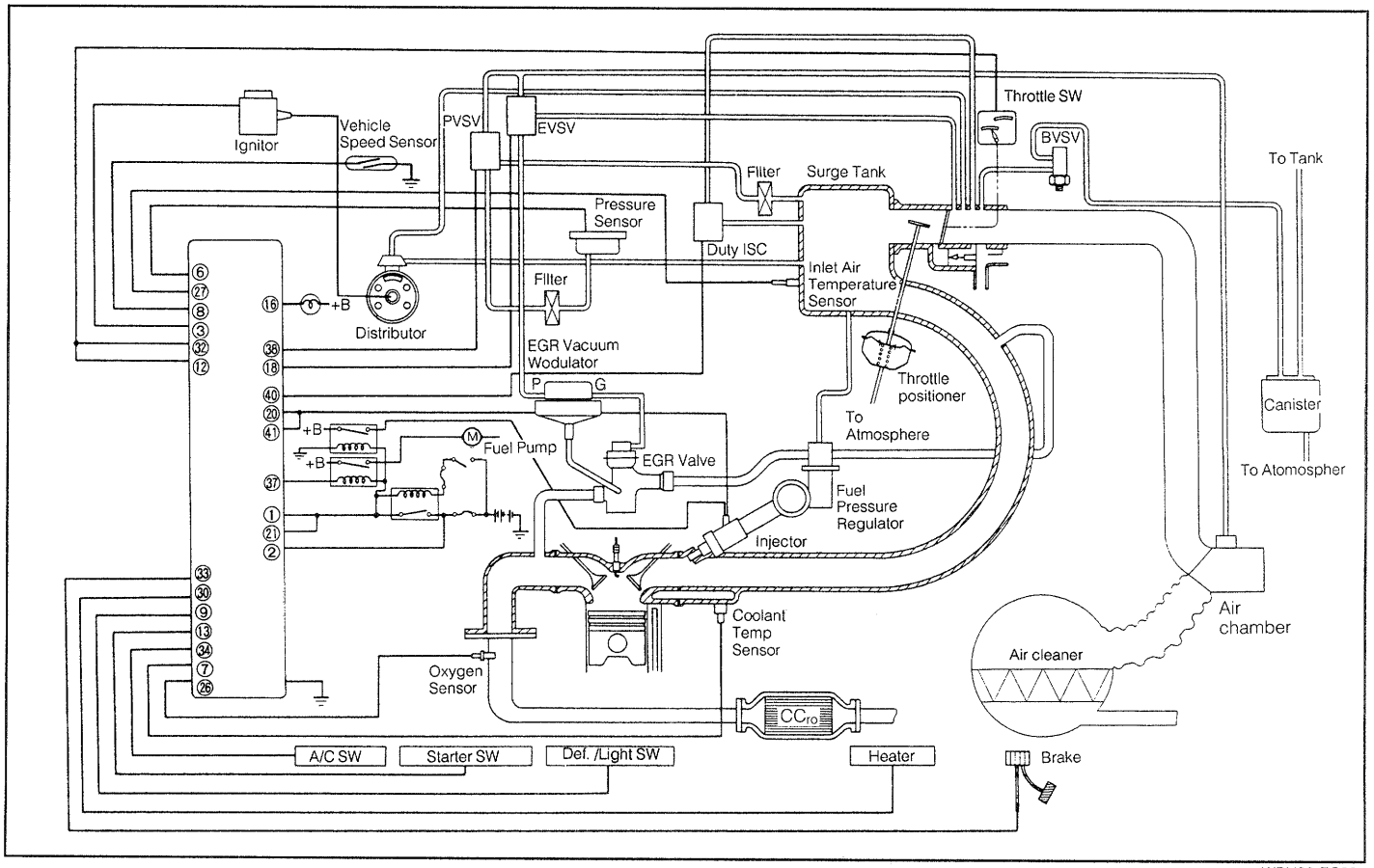
* For inspection and repairs of the EFI system, refer to the EFI section.

WRU90-EC002

COMPONENT LAYOUT & SCHEMATIC DIAGRAM



WRU90-EC003



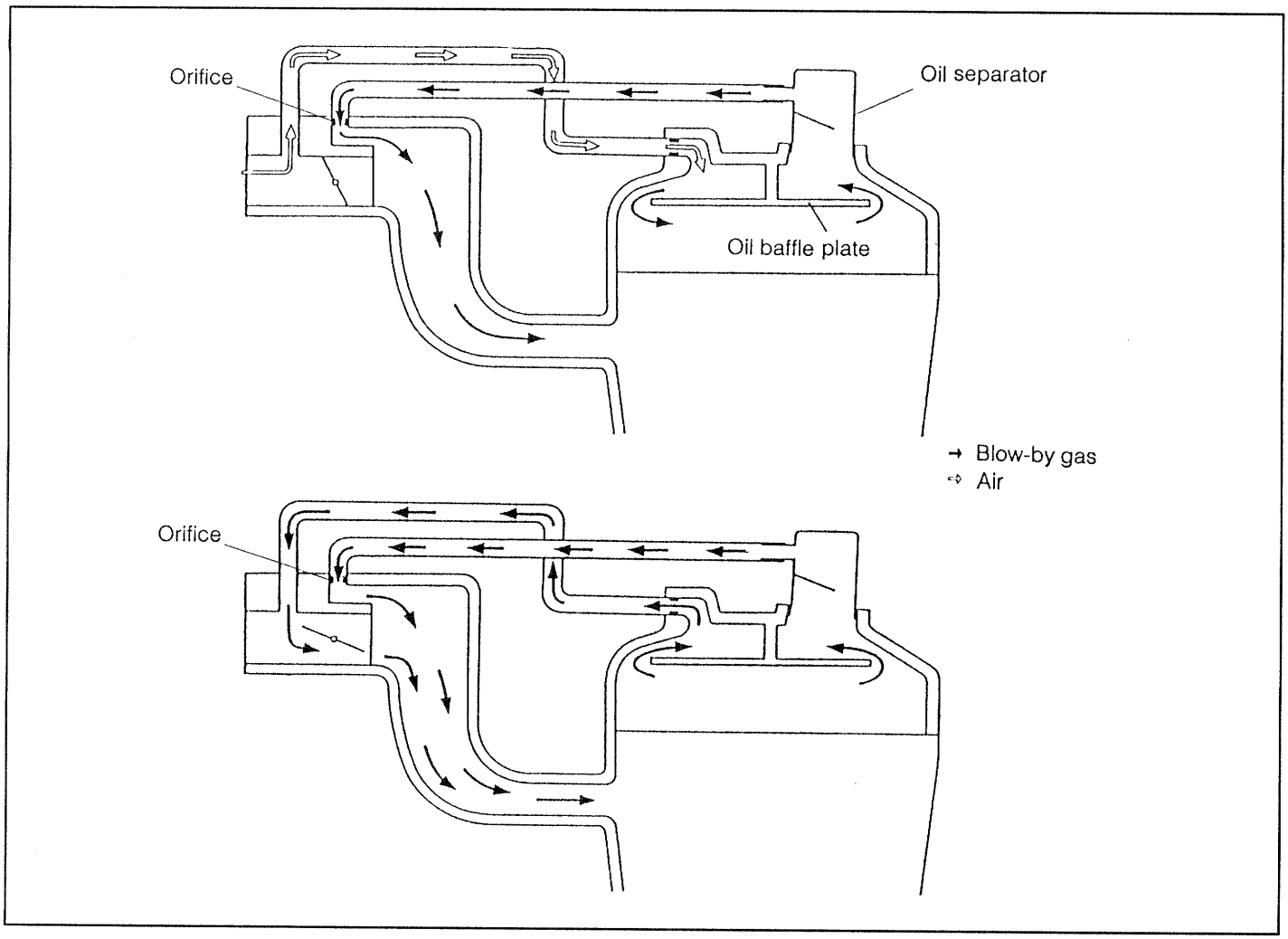
WRU90-EC004

POSITIVE CRANKCASE VENTILATION SYSTEM (PCV)

To combat air-pollution problems, the engine is equipped with a sealed type positive crankcase ventilation system in order to prevent blow-by gases generated inside the crankcase from being released into the atmosphere.

The blow-by gases generated inside the crankcase flow into the cylinder side through the gas path of the cylinder block. When the opening degree of the throttle valve is small, oil in the blow-by gases is separated by the oil separator provided at the cylinder head cover. Then, the blow-by gases are sucked into the cylinders from the throttle body to be burnt again.

Fresh air enters the cylinder head cover from the upstream path of the throttle valve. At this time, the air flow rate is regulated by a jet provided at the cylinder head cover, thus stabilizing the engine idling. When the opening degree of the throttle valve is large and/or when a large amount of blow-by gases are generated, the blow-by gases are sucked into the combustion chambers both through the upstream path and the downstream path of the throttle valve.

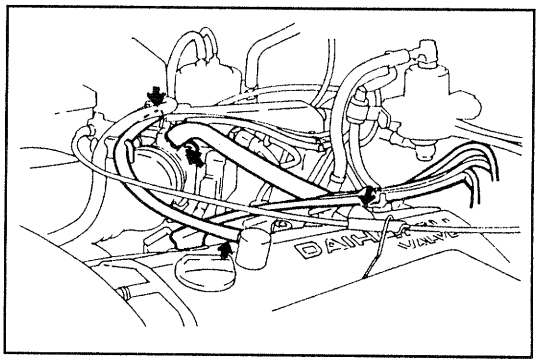


WRU90-EC005

INSPECTION OF PCV HOSE & CONNECTION

Visual inspection of hoses and connections check the hoses and connections for cracks, leakage or damage.

If any parts exhibit fault, replace or repair them, as required.

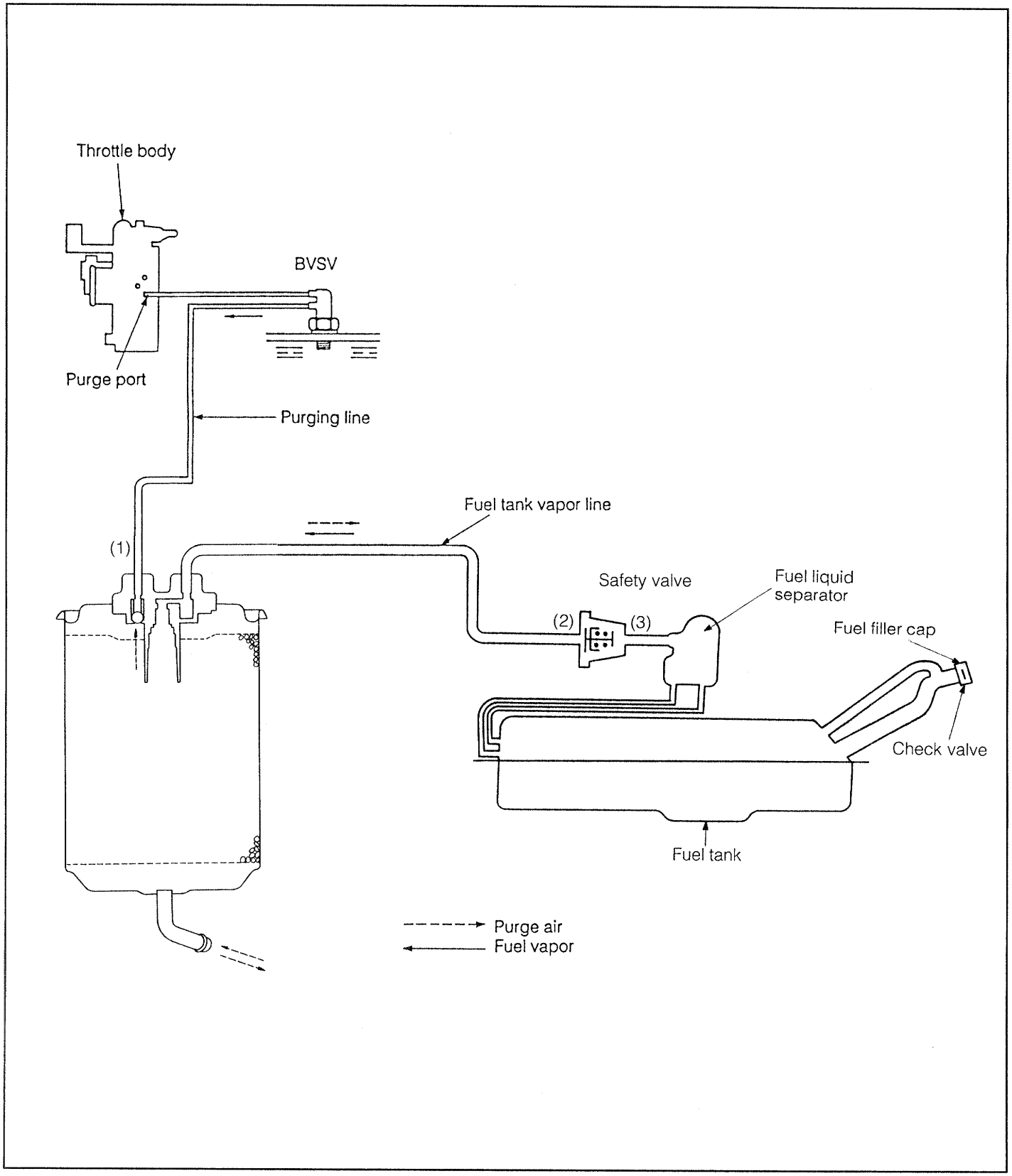


WRU90-EC006

FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM

The fuel evaporative emission control system employs the charcoal canister type. Pressure created by evaporating fuel drives the vapors into the charcoal canister which uses activated carbon to absorb HC emission.

The separated HC emission is drawn into the throttle body to be burnt together with mixture in the combustion chamber when the BVSV opens according to the engine coolant temperature.



WRU90-EC007

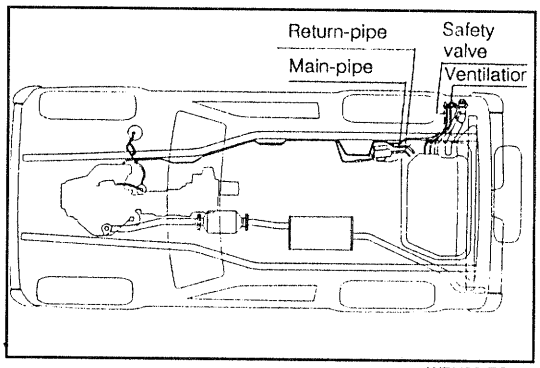
Coolant temp. or tank pressure	BVSV	Throttle valve opening position	* Check valve			Fuel filler cap check valve	Evaporated fuel (HC)
			(1)	(2)	(3)		
Below 45°C (113°F)	CLOSED	—	—	—	—	—	HC from fuel tank is absorbed by canister
Above 66°C (151°F)	OPEN	Positioned below purge port	CLOSED	—	—	—	
		Positioned above purge port	OPEN	—	—	—	HC from canister is sucked into engine
High pressure in fuel tank	—	—	—	OPEN	CLOSED	CLOSED	HC from fuel tank is absorbed by canister
High vacuum in fuel tank	—	—	—	CLOSED	OPEN	CLOSED (OPEN when excessive high vacuum)	(Air is led into fuel tank)

*:(1)...Charcoal canister, (2)...Safety valve positive side, (3)...Safety valve negative side

WRU90-EC008

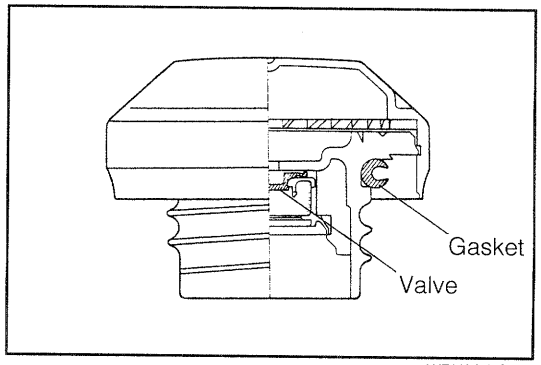
INSPECTION OF FUEL VAPOR LINES, FUEL TANK, FILLER CAP & SAFETY VALVE

1. Visual inspection of fuel vapor lines and connections
   Check the lines and connections for loose connections, kinks or damage.
2. Visual inspection of fuel tank
   Check the fuel tank for deformation, cracks or fuel leakage.



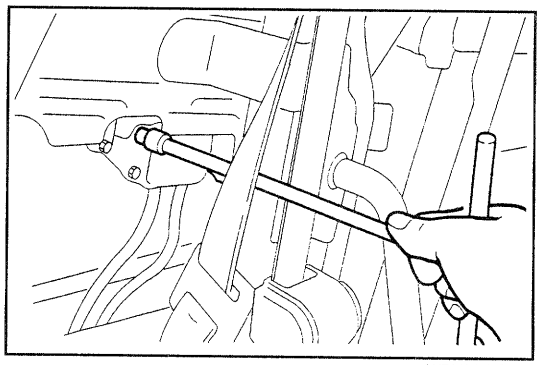
WRU90-EC009

3. Visual inspection of fuel filler cap
   Check the cap and gasket for damage or deformation.
   Repair or replace the gasket and/or cap, if necessary.



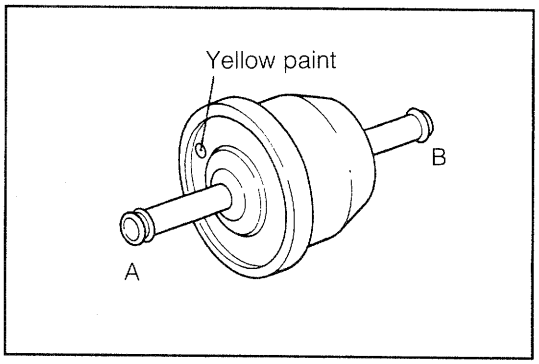
WRU90-EC010

4. Inspection of safety valve
   (1) Remove the quarter trim RH by detaching the eleven clips.
   (2) Detach the safety valve together with fuel separator.
   (3) Disconnect the hoses from the safety valve.



WRU90-EC011

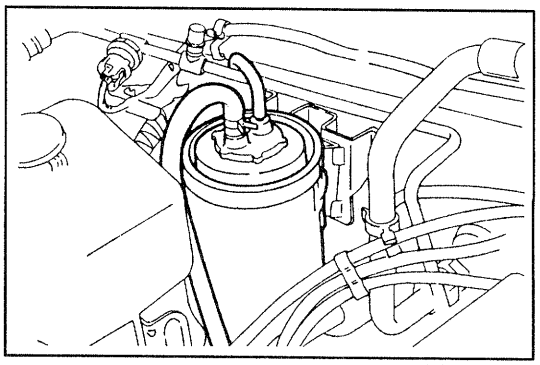
(4) Ensure that there exists resistance when you blow your breath lightly from the side A. Also, ensure that the resistance no longer exists when you blow your breath strongly.
(5) Ensure that there exists resistance when you suck air lightly from the side B. Also, ensure that the resistance no longer exists when you suck air strongly.



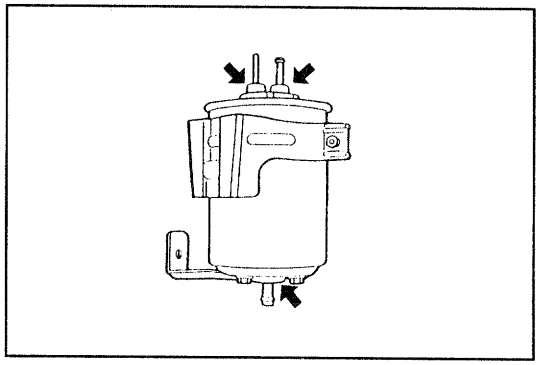
WRU90-012

INSPECTION OF CHARCOAL CANISTER

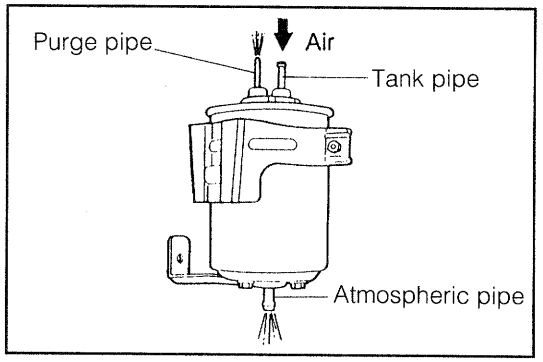
1. Disconnect the rubber hoses and remove the charcoal canister.


WRU90-EC013

2. Visual inspection of charcoal canister case
   Visually inspect the charcoal canister case for cracks or damage.

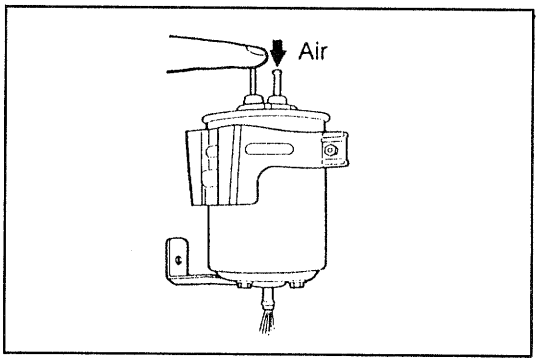

WRU90-EC014

3. Check of filter for restriction
   (1) Blow low pressure compressed air into the tank pipe. Ensure that air flows without resistance from the other pipe.
   (2) Blow air into the purge pipe. Ensure that no air flows from the other pipe.
   Replace the charcoal canister, if it exhibits any defect.



WRU90-EC015

4. Cleaning of filter in canister
   Clean the filter by blowing compressed air of 3kg/cm^2 (43 psi) into the tank pipe while holding the other upper canister pipe closed.
   NOTE:
   - Do not attempt to wash the canister.
   - No activated carbon should come out during the test.



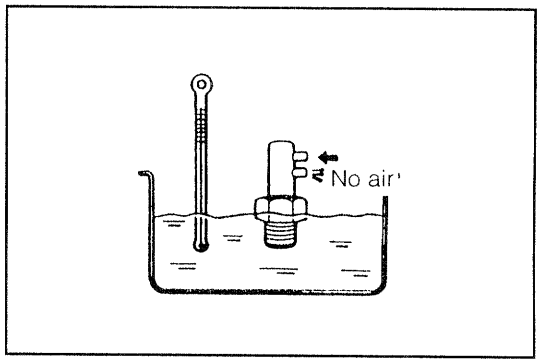
WRU90-EC016

5. Install the charcoal canister and reconnect the rubber hose.

INSPECTION OF BVSV

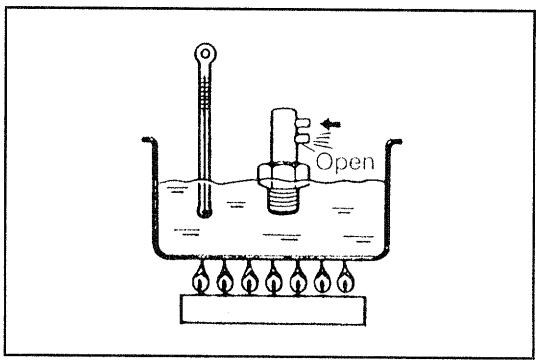
Checking of BVSV by blowing air into pipe

1. Drain the coolant from the radiator into a suitable container.
2. Remove the BVSV.
3. Cool the BVSV to below 45°C (113°F)
4. Ensure that no air continuity exists. If air continuity exists, replace the BVSV.



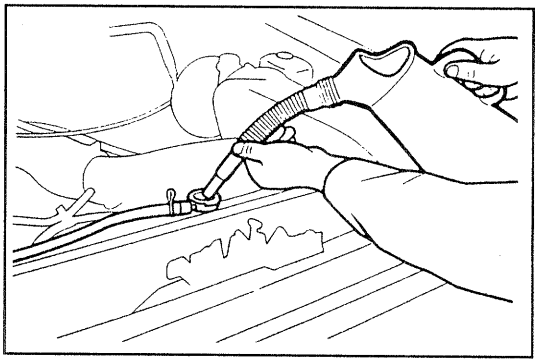
WRU90-EC017

5. Heat the BVSV to above 66°C (151°F), using hot water.
6. Ensure that air continuity exists.
   If no air continuity exists, replace the BVSV.
7. Apply liquid sealer to the threaded portion of the BVSV. Reinstall the BVSV.
   Tightening Torque: 2.5 - 3.5 kg-m
   (18.1 - 25.3 ft-lb, 24.5 - 34.3 N·m)



WRU90-EC018

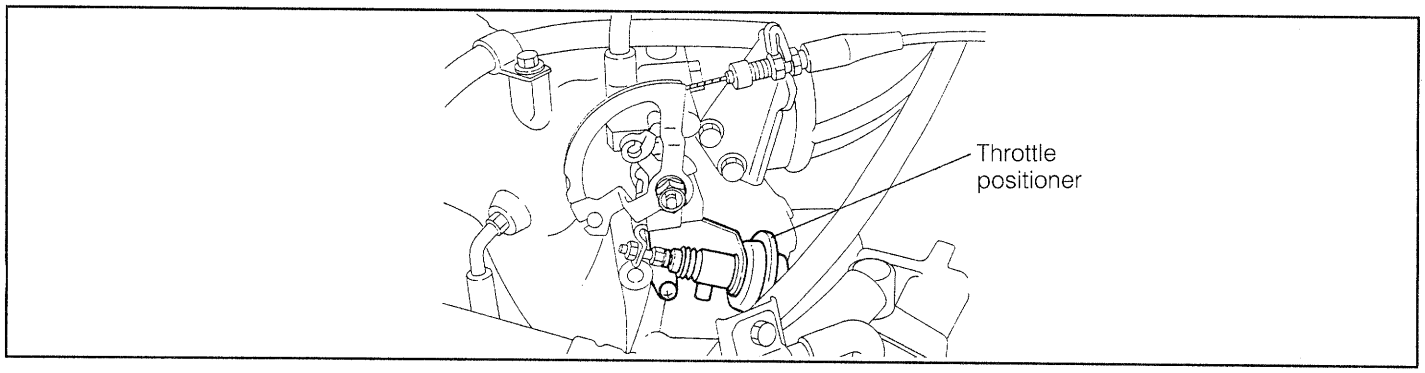
8. Fill the coolant to the radiator.
   (See page CO–4.)
9. Start the engine. Check the coolant level.
   If the coolant level is low, add the coolant.
10. Check the water leakage and/or air leakage.



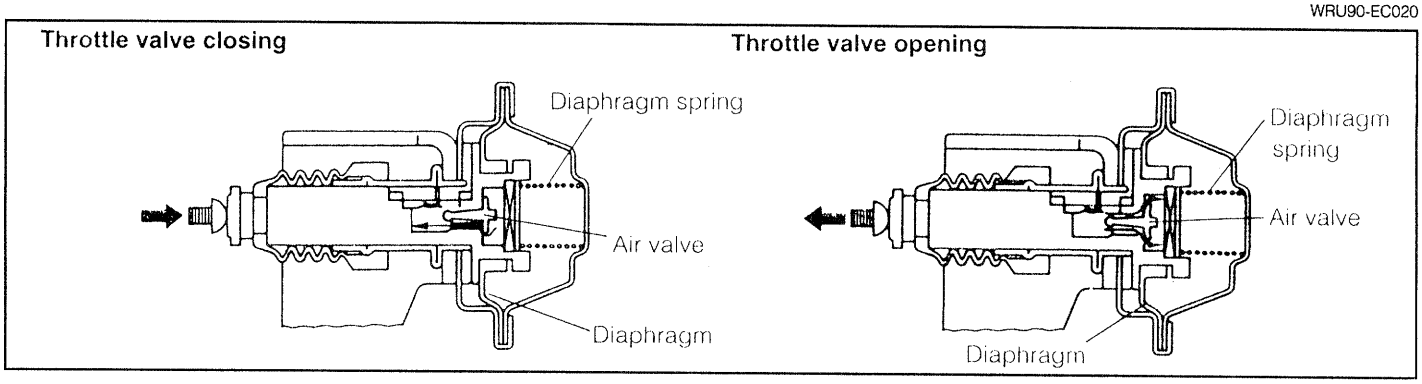
WRU90-EC019

THROTTLE POSITIONER (TP) SYSTEM

This system prevents the throttle valve from suddenly closing, thus reducing the CO and HC emissions.



WRU90-EC020



WRU90-EC021

Conditions	TP diaphragm	Throttle valve
Idling	Pushed in by return force of throttle valve	Idle speed position
Normal driving	Pushed out by diaphragm spring	Opened position
Deceleration	* Pushed in by return force of throttle valve	Slightly opens and then slowly closes to the idle position.

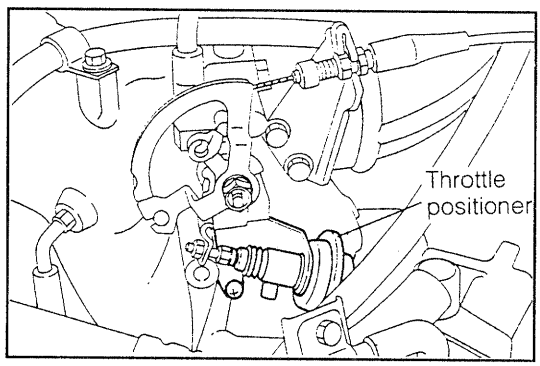
* At this point, the function of the air valve provided inside the throttle positioner diaphragm prevents the throttle valve from being closed suddenly.

WRU90-EC022

INSPECTION OF THROTTLE POSITIONER (TP) SYSTEM

1. Warm up the engine.
2. Check the idle speed. Adjust the speed, if necessary.
3. Check of TP setting speed
   (1) Raise the engine speed to approximately 3000 rpm.
   (2) Close the throttle valve slowly.
   (3) Observe the engine speed at a time when the dashpot lever comes in contact with the throttle lever.
   Engine Speed: 1600 ± 100 rpm

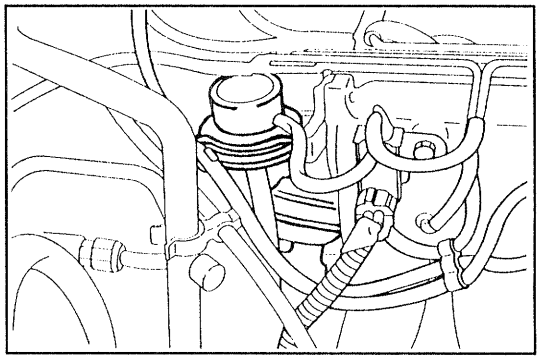
   If the engine speed does not conform to the specification, perform adjustment by turning the TP adjusting screw.



WRU90-EC023

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

The EGR system recirculates the exhaust gas into the intake manifold in an optimum amount according to driving conditions and coolant temperature.
Thus, this system retards the combustion, resulting in reduced amount of NOx emission.



WRU90-EC024

Coolant temperature	EVSV	Throttle valve opening angle	EGR vacuum modulator	EGR valve	Exhaust gas
Below 39°C (102.2°F)	Closed	—	—	Closed	Not recirculated
Above 40°C (104°F)	Open	Positioned below EGR port	Opens passage to atmosphere	Closed	Not recirculated
		* Positioned between EGR port	Opens passage to atmosphere	Closed	Not recirculated
			Closed passage to atmosphere	Open	Recirculated
		** Positioned above EGR port	Closed passage to atmosphere	Open	Recirculate volume increase

REMARKS:

* At this stage, the EGR valve repeats its opening/closing as described below, depending upon the throttle valve opening and exhaust gas pressure.

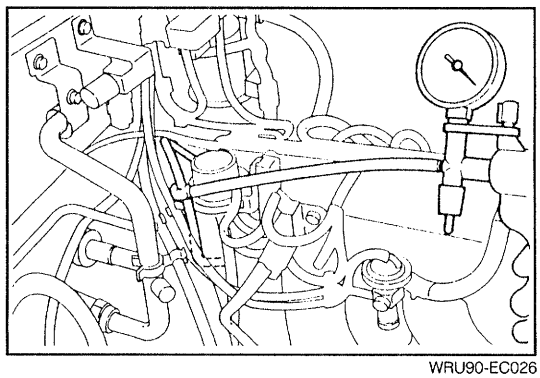
Exhaust gas pressure drops. → Modulator opens. → EGR valve closes.
↑ ↓
EGR valve opens. ← Modulator closes. ← Exhaust gas pressure increases.

** At this stage, the EGR valve remains open because of a negative pressure being applied to the EGR port, even when the modulator opens to the atmosphere.

WRU90-EC025

INSPECTION OF EGR SYSTEM

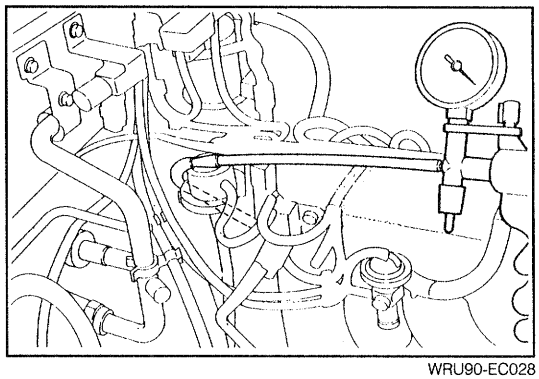
1. Preparation
   Using a three-way connector, connect a vacuum gauge to the hose between the EGR valve and the EGR vacuum modulator.



WRU90-EC026

2. Check of EGR valve seating
   Start the engine. Ensure that the engine starts and runs smoothly at the idle speed.
   If the engine will not idle smoothly, perform the unit inspection of the EGR valve.
3. Check of EGR VSV with engine in cold state
   Ensure that no vacuum is applied to the vacuum gauge even if the engine is raced when the coolant temperature is below 39°C (102.2°F)
   If a negative pressure is applied to the vacuum gauge, check the EGR VSV and/or the water temperature sensor.
4. Check of EGR VSV with engine in hot state
   (1) Warm up the engine.
   (2) Run the engine at a speed of about 3000 rpm. Ensure that a negative pressure is applied to the vacuum gauge.
5. Check of EGR valve
   (1) Connect a MityVac directly to the EGR valve.
   (2) Apply a negative pressure to the EGR valve while the engine is idling. Ensure that the engine runs roughly or stalls.
   (3) Reconnect the vacuum hoses to original location.
   If no problem is found during this inspection, the system is functioning properly. If any problem is found, check and remedy the part concerned.

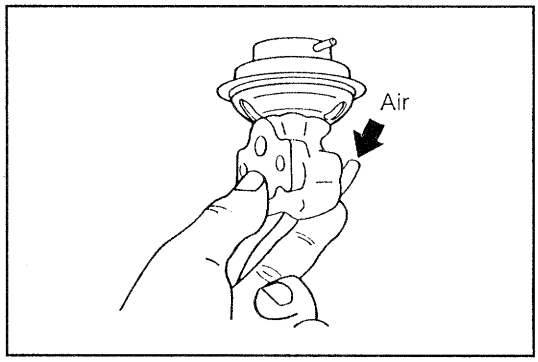
WRU90-EC027



WRU90-EC028

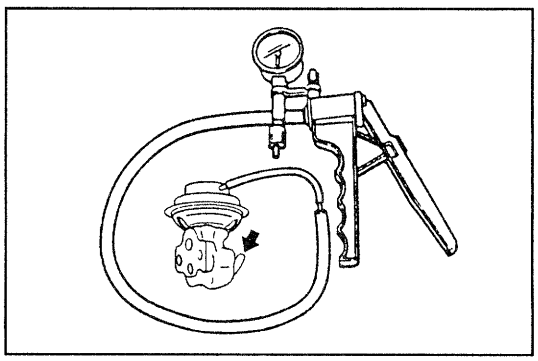
INSPECTION OF EGR VALVE

1. Remove the EGR valve.
2. Check of EGR valve
   (1) Blow air into the EGR valve through its pipe section with the bypass hole of the EGR valve plugged by your finger, as indicated in the right figure. Under this state, ensure that no air continuity is present.
   If air continuity exists, replace the EGR valve.



WRU90-EC029

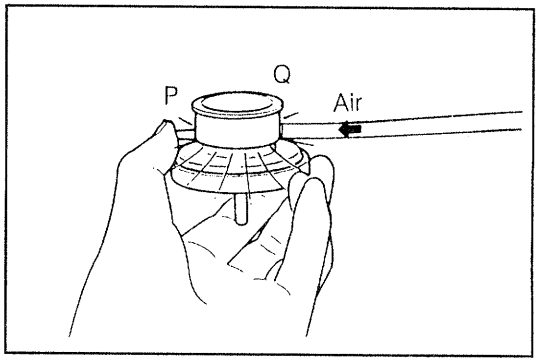
   (2) Apply a negative pressure of 150 mmHg (5.9 inchHg) to the EGR valve.
   Under this setting, blow air into the EGR valve through its pipe section with the bypass hole of the EGR valve plugged by your finger, as indicated in the right figure. Ensure that air continuity exists.
   If no air continuity exists, replace the EGR valve.
3. Install the EGR valve on the intake manifold with a new gasket interposed. Connect the rubber hose.



WRU90-EC030

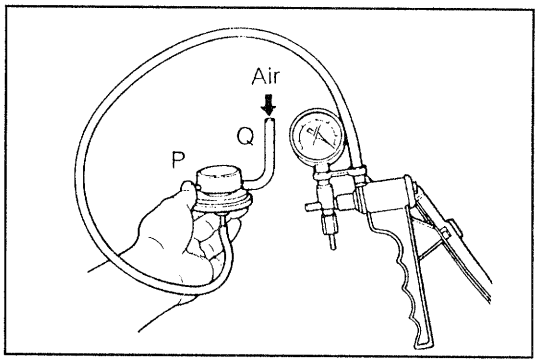
INSPECTION OF EGR VACUUM MODULATOR

1. Remove the EGR vacuum modulator.
2. Plug the port P with your finger. Blow air into the port Q. Ensure that air continuity exists.
   If no air continuity exists, replace the modulator.



WRU90-EC031

3. Apply a pressure 0.2 kg/cm^2 (2.8 lb/inch^2) to the pressure discharge port of the modulator, using a MityVac.
   Under this setting, blow air into the modulator through the port Q with the port P plugged by your finger. Ensure that no air continuity exists.
   If air continuity exists, replace the modulator.



WRU90-EC032

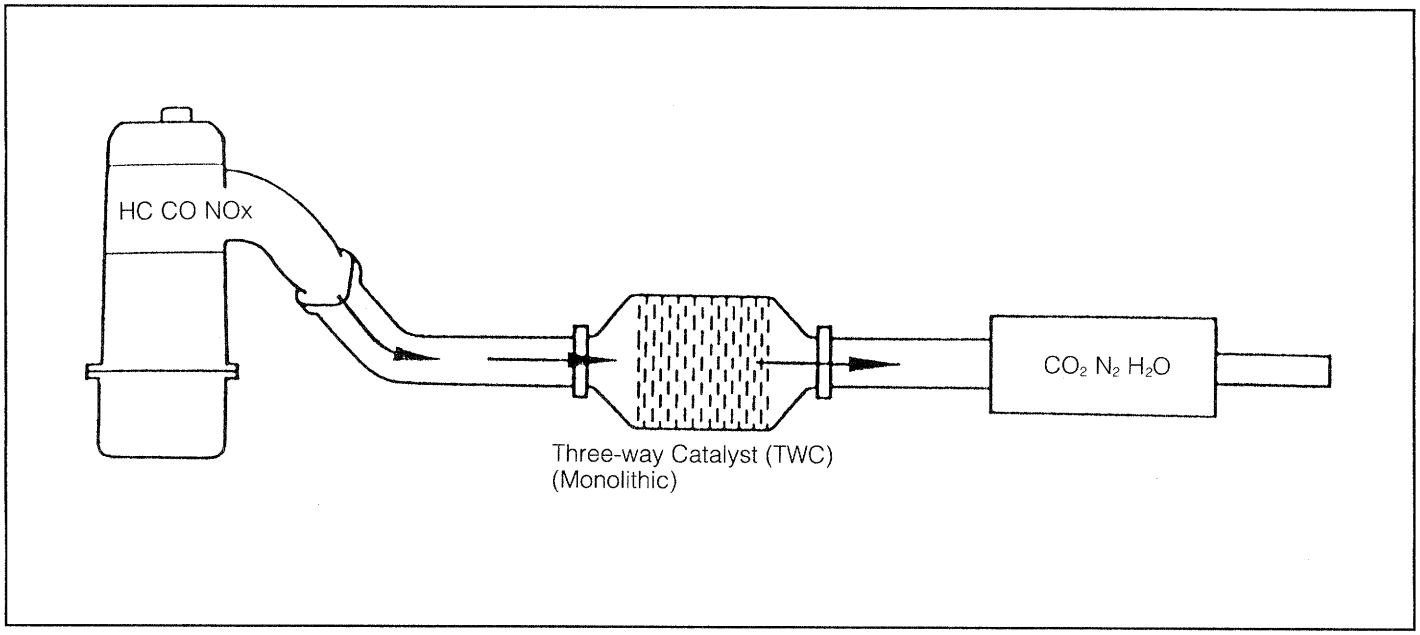
INSPECTION OF EGR VSV

(See page EF–76.)

WRU90-EC033

THREE-WAY CATALYST (TWC) SYSTEM

If this three-way catalyst, the oxidation of carbon monoxide (CO) and the reduction of nitrogen oxides (NOx) contained in exhaust gas can take place simultaneously. Thus, the three-way catalyst purifies the exhaust gas by converting its harmful components gas into harmless carbon dioxide (CO_2), water vapor (H_2O) and nitrogen (N_2).



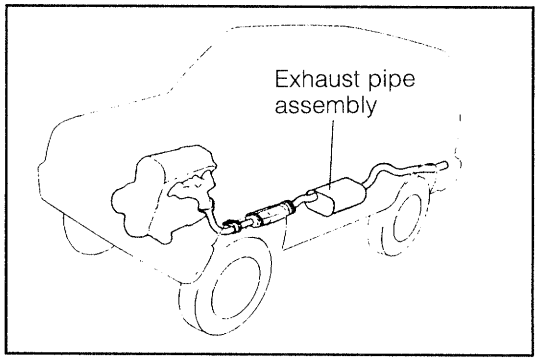
WRU90-EC034

Exhaust gas component	TWC	Exhaust gas
HC, CO and NOx	Oxidation and reduction	CO_2, H_2O and N_2

WRU90-EC035

Inspection of exhaust pipe assembly

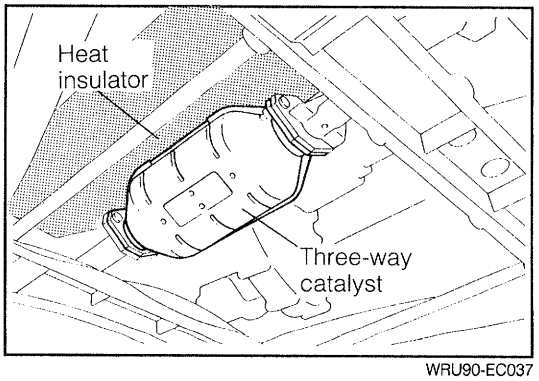
1. Check the connections for looseness or damage.
2. Check the clamps for weakness, bend or damage.



WRU90-EC036

Inspection of heat insulator

1. Check heat insulator for damage.
2. Check for adequate clearance between the three-way catalyst and heat insulator.

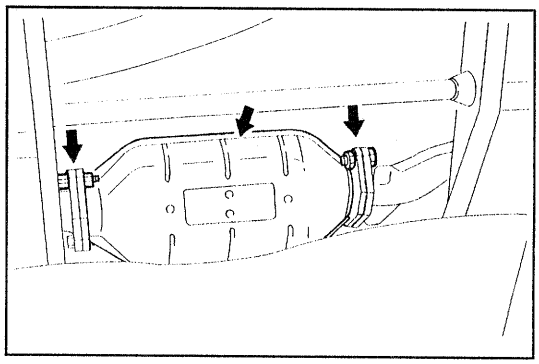


WRU90-EC037

THREE-WAY CATALYST

INSPECTION

1. Check the connections for looseness or damage.
2. Check the three-way catalyst for dents or damage.



WRU90-EC038

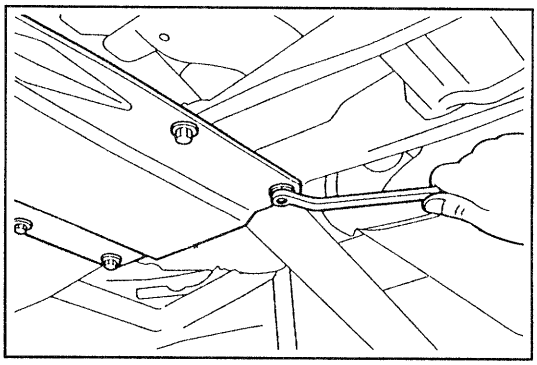
REMOVAL

WARNING:
Do not perform any operation while the exhaust pipe is still hot.

1. Jack up the vehicle and support it with safety stands (See page GI–13).

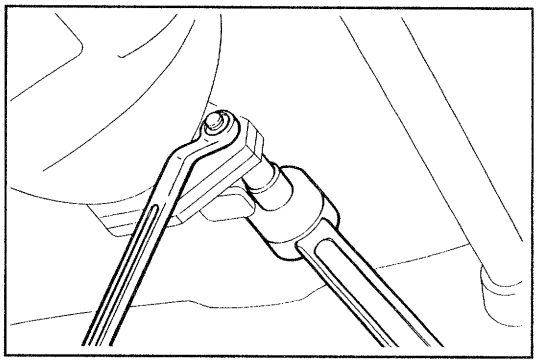
WRU90-EC039

2. Remove the transmission undercover by removing the eight attaching bolts.



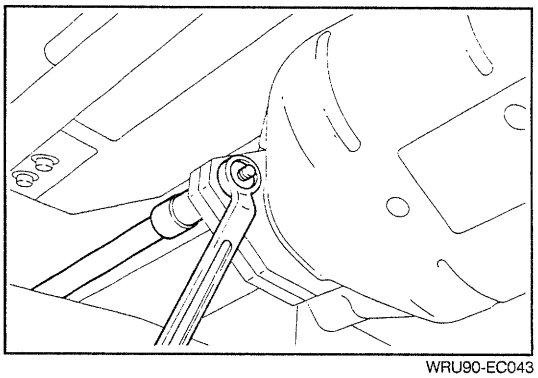
WRU90-EC041

3. Separate the tail pipe assembly from the three-way catalyst assembly by removing the two bolts and nuts.



WRU90-EC042

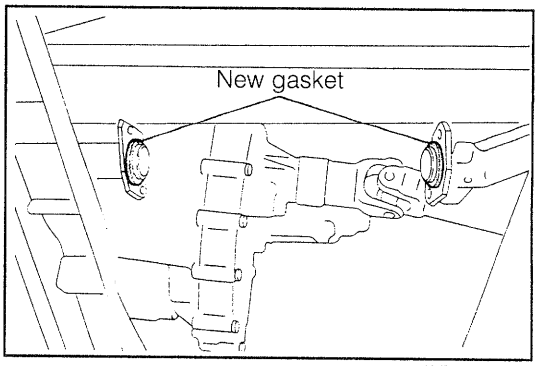
4. Separate the three-way catalyst assembly from the front exhaust pipe assembly by removing the two bolts and nuts.
5. Remove the three-way catalyst while pushing the tail pipe assembly rearward.



WRU90-EC043

INSTALLATION

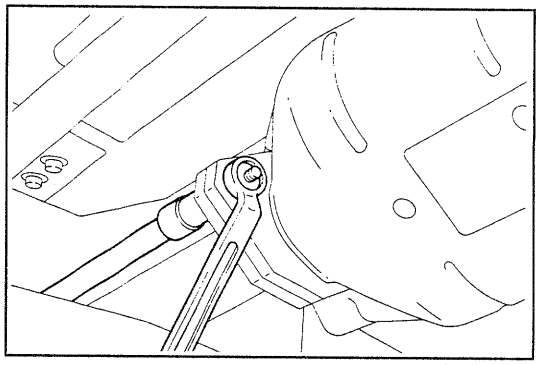
1. Install a new gasket to the front exhaust pipe and tail pipe.



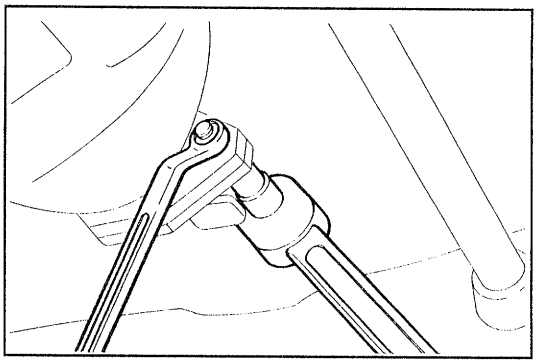
WRU90-EC044

2. Install the three-way catalyst assembly to the front exhaust pipe assembly.
   Tightening Torque:
   4.5 - 5.5 kg-m (32.5 - 39.8 ft-lb, 44.1 - 53.9 N·m)

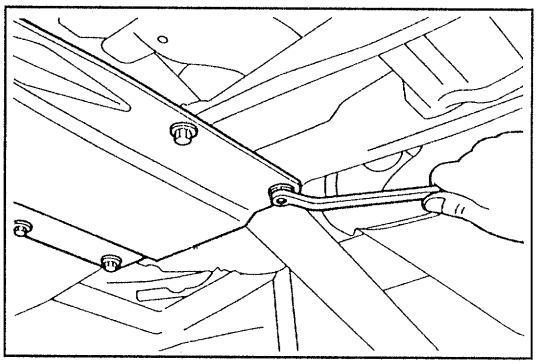
   NOTE:
   Make sure that the front mark is located at front side.


WRU90-EC045

3. Tighten the attaching bolts and nuts for the three-way catalyst at the tail pipe side.
   Tightening Torque:
   4.5 - 5.5 kg-m (32.5 - 39.8 ft-lb, 44.1 - 53.9 N·m)


WRU90-EC046

4. Install the transmission under cover by attaching the eight bolts.
   Tightening Torque:
   1.6 - 2.4 kg-m (11.6 - 17.4 ft-lb, 15.7 - 23.5 N·m)


WRU90-EC047