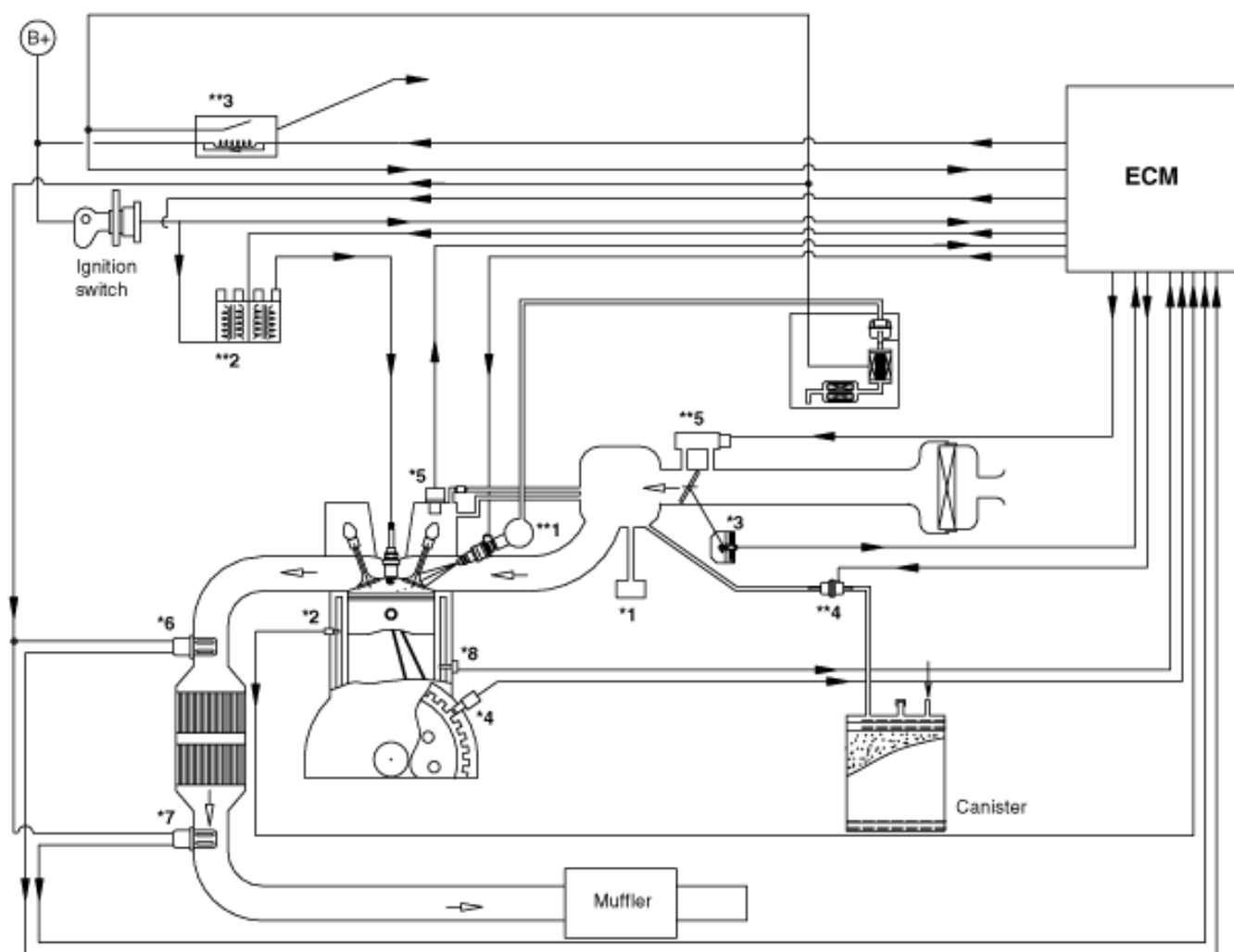
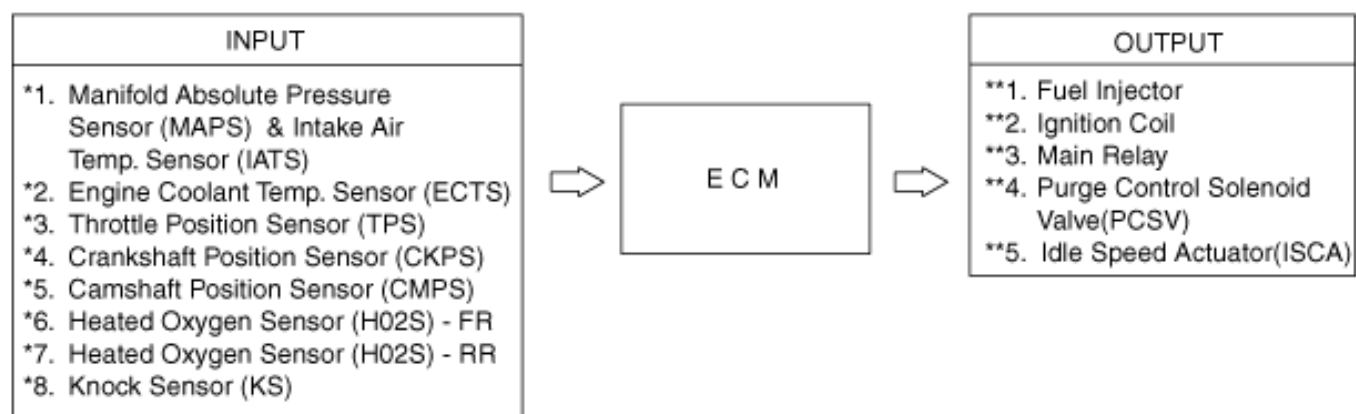
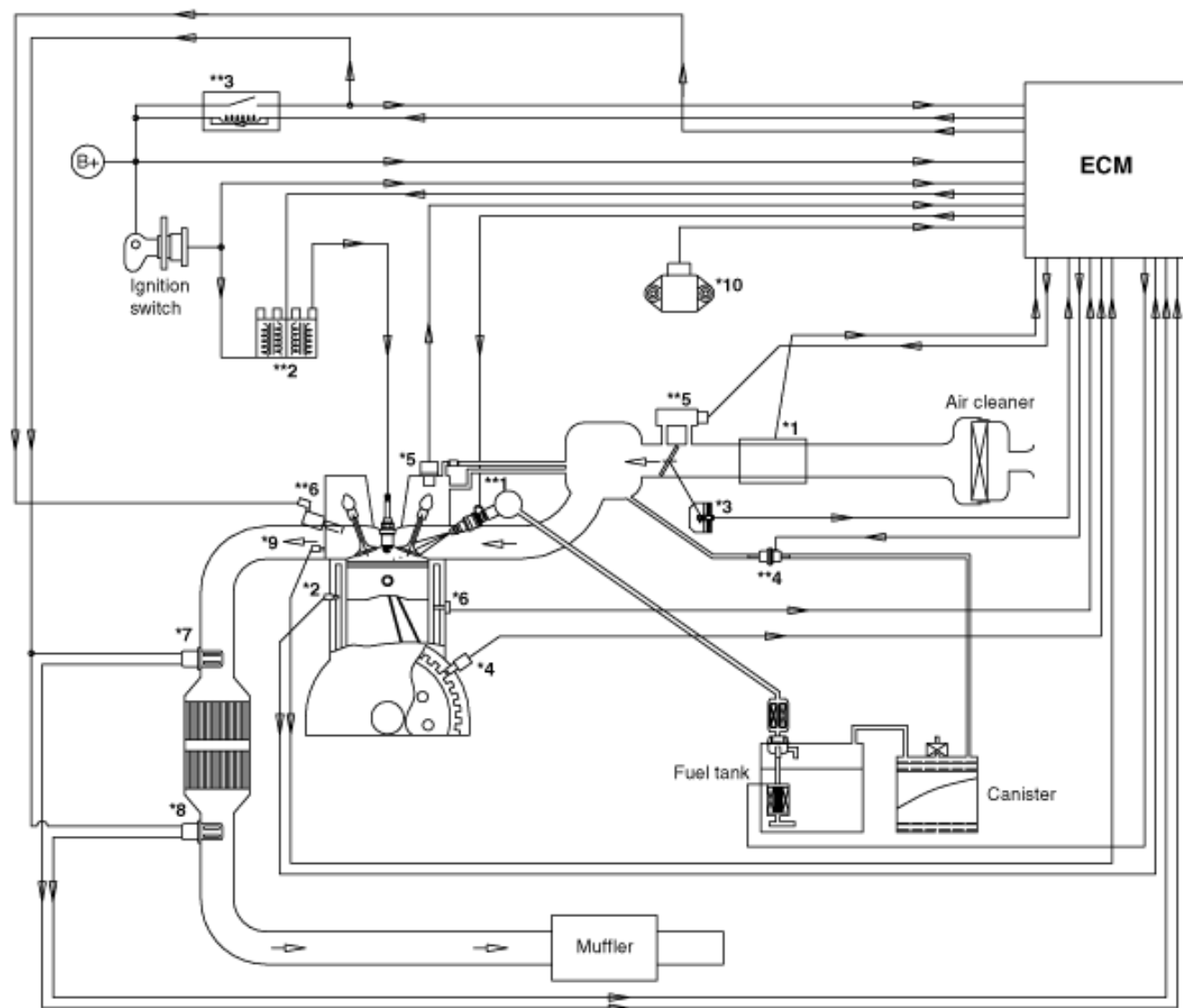
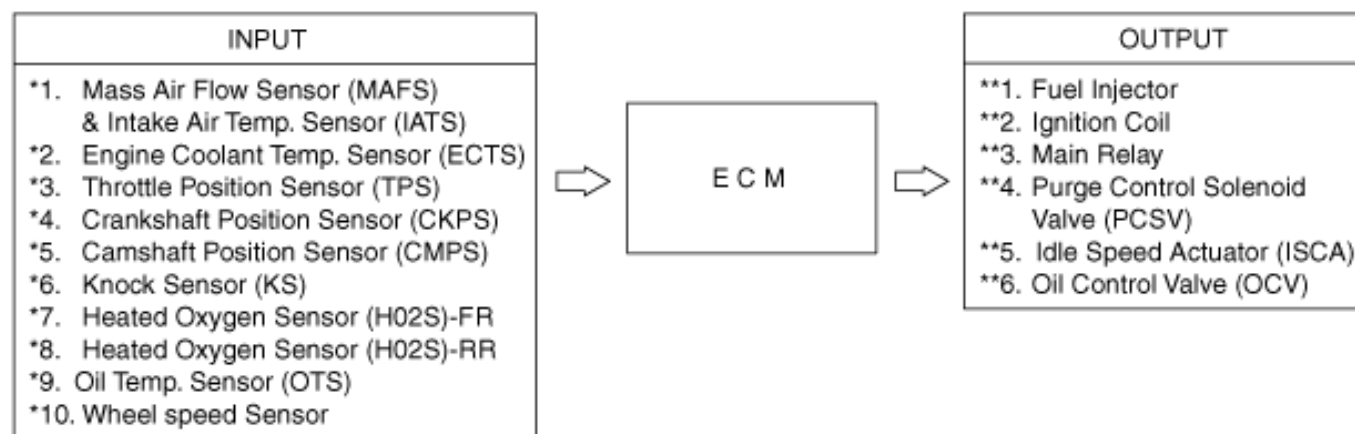


示意图

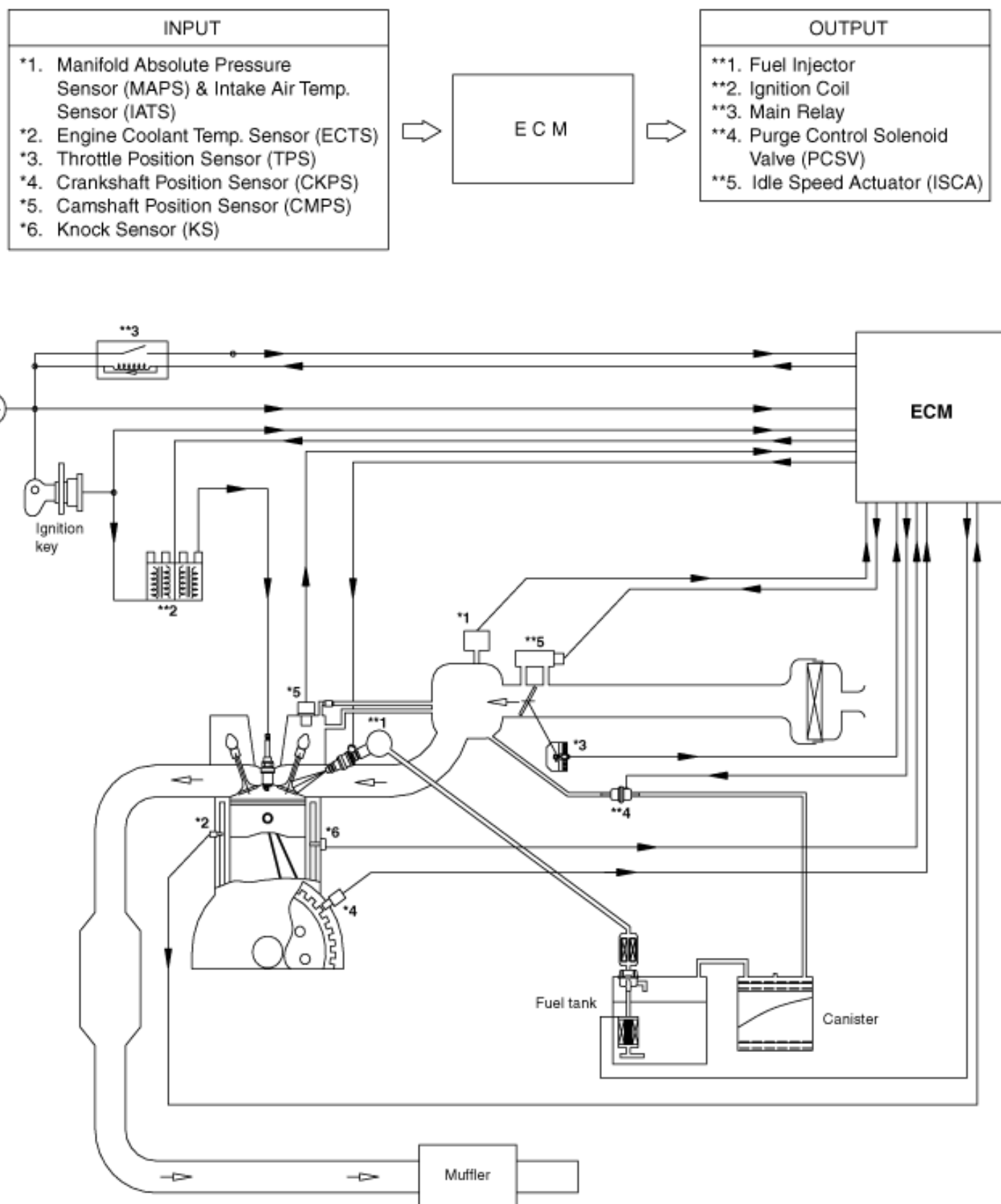
[1.6 DOHC]



[2.0 DOHC,无铅]



[2.0 DOHC,含铅]



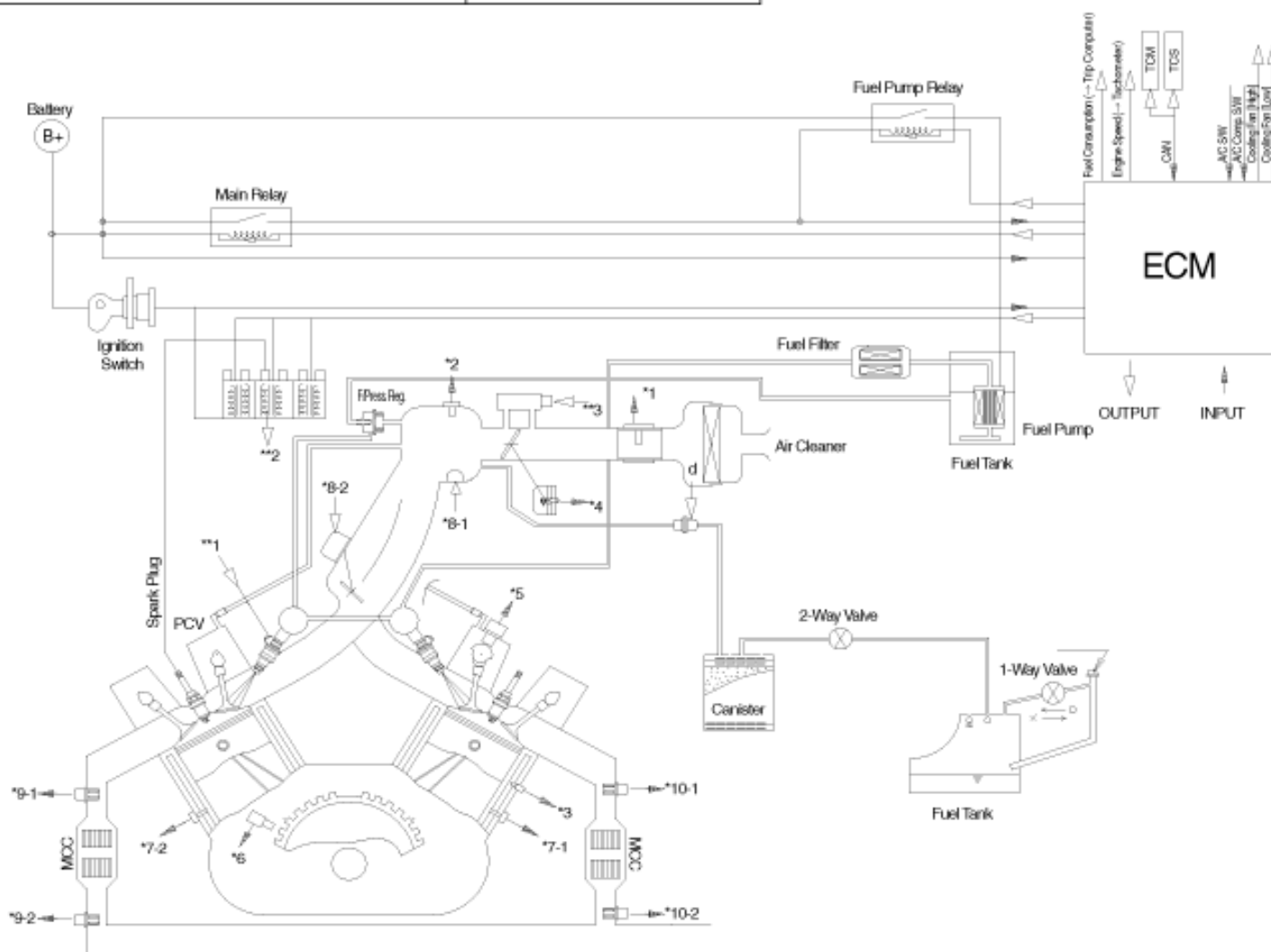
[2.7 V6,无铅]

- *1. Mass Air Flow Sensor (MAFS)
- *2. Intake Air Temperature Sensor (IATS)
- *3. Engine Coolant Temperature Sensor (ECTS)
- *4. Throttle Position Sensor (TPS)
- *5. Camshaft Position Sensor (CMPS)
- *6. Crankshaft Position Sensor (CKPS)
- *7-1. Knock Sensor (KS) #1
- *7-2. Knock Sensor (KS) #2
- *8-1. Intake Manifold Tuning Valve #1
(Surge Tank Side)
- *8-2. Intake Manifold Tuning Valve #2
(Intake Manifold Side)
- *9-1. Heated Oxygen Sensor (HO2S) [B1/S1]
- *9-2. Heated Oxygen Sensor (HO2S) [B1/S2]
- *10-1. Heated Oxygen Sensor (HO2S) [B2/S1]
- *10-2. Heated Oxygen Sensor (HO2S) [B2/S2]

- Ignition Switch
- Battery Voltage
- Vehicle Speed Sensor
- Coolant Load Signal
- "PNP" Switch (A/T only)
- Fuel Pump Relay Signal



- **1. Fuel Injector
- **2. Ignition Coil
- **3. Idle Speed Control Actuator (ISCA)
- **4. Purge Control Solenoid Valve (PCSV)
- Fuel Pump Control
- Main Relay
- Cooler Relay
- Ignition Timing Control
- Diagnosis

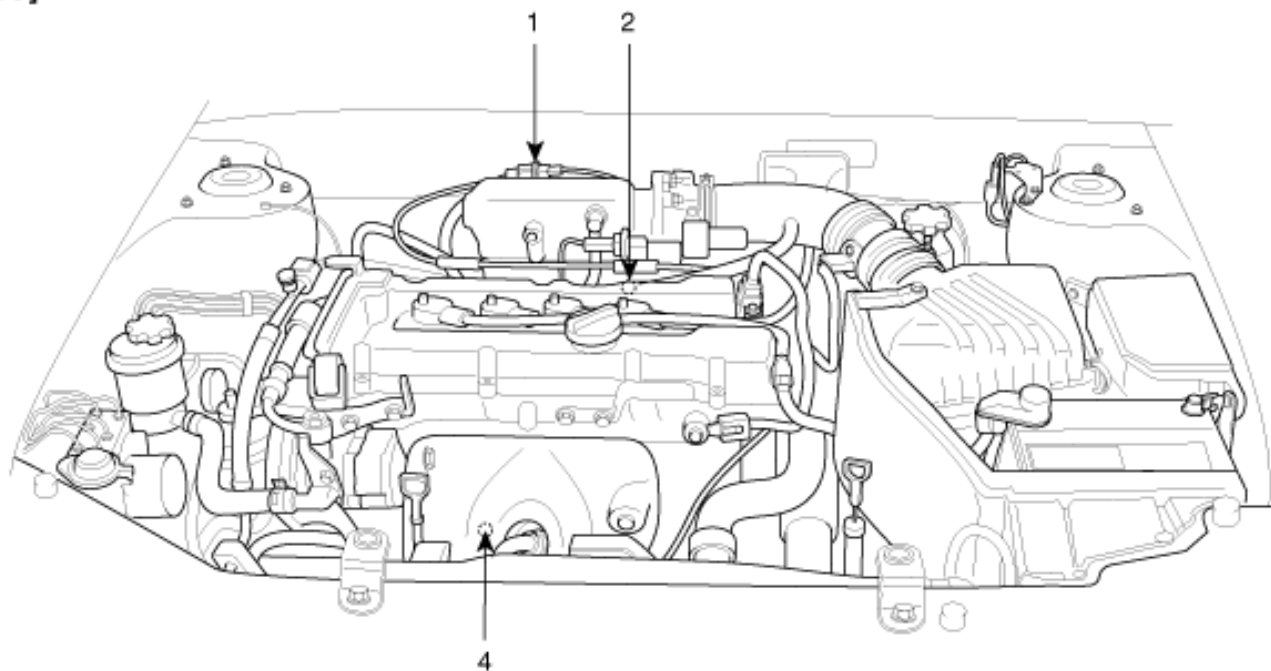


结构图

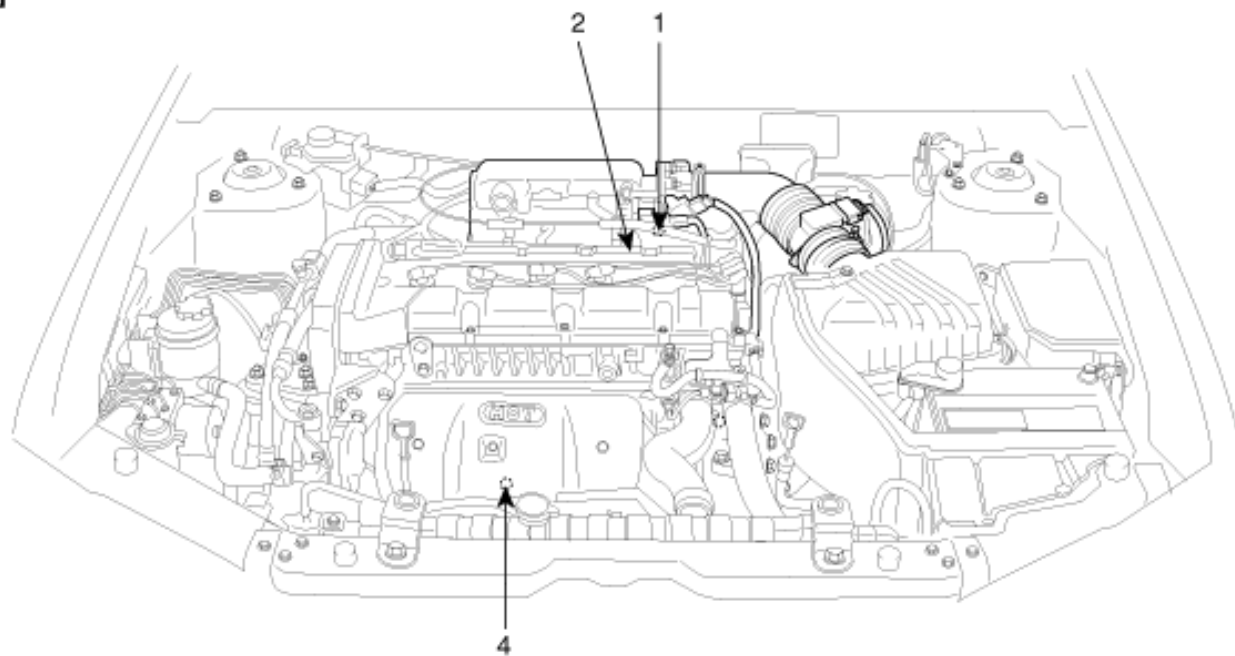
结构图	功能	备注
曲轴箱排放系统 -曲轴箱强制通风阀(PCV)	减少HC	可变流量控制型
蒸发气体控制系统 -蒸发气体活性炭罐 -清除控制电磁阀(PCSV)	减少HC 减少HC	占空比控制电磁阀
排气净化控制系统 -MFI系统(空燃比控制设备) -三元催化转化器	CO,HC,Nox还原作用 CO,HC,Nox还原作用	加热式氧传感器反馈类型 单片式

部件和部件位置

[1.6 DOHC]



[2.0 DOHC]



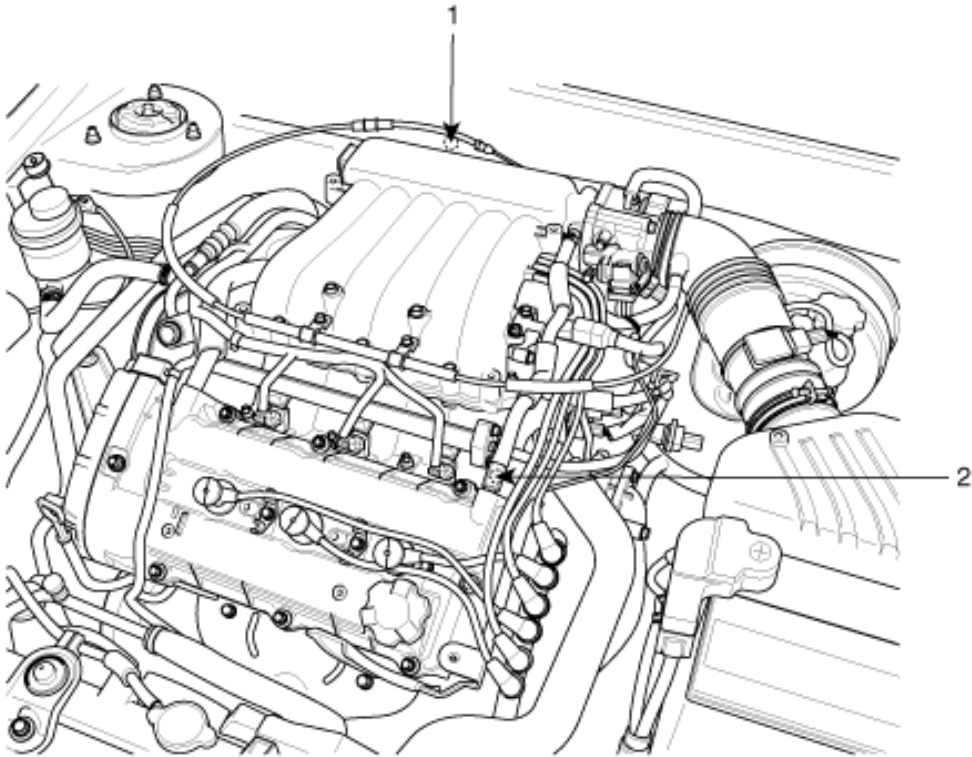
1. Purge Control Solenoid Valve (PCSV)

2. PCV Valve

3. Canister

4. Catalytic Converter

[2.7 V6]

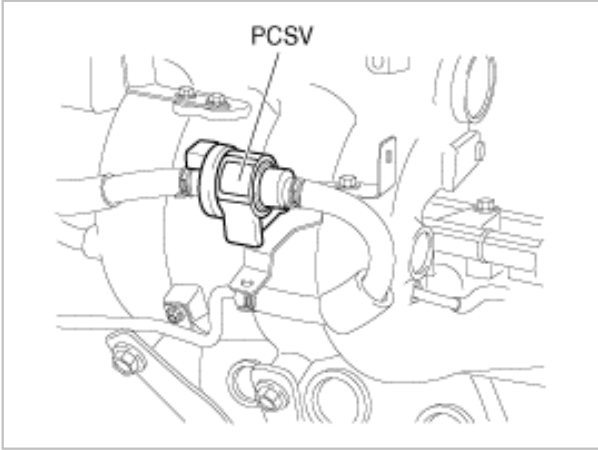
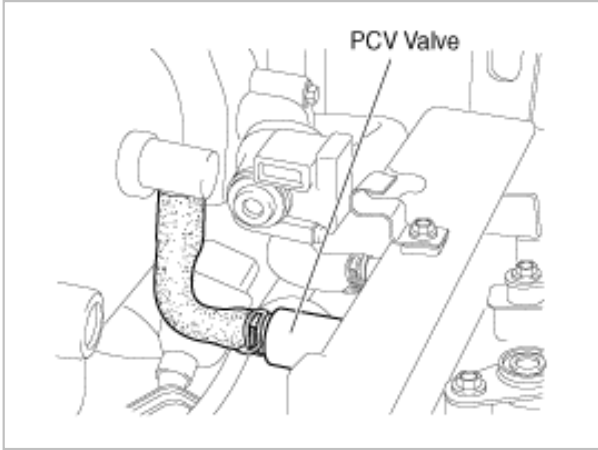


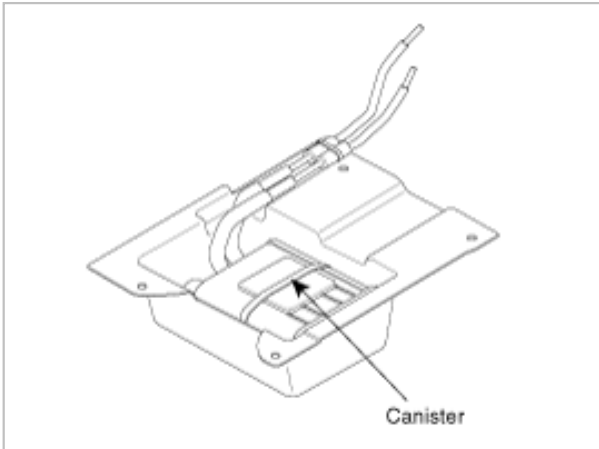
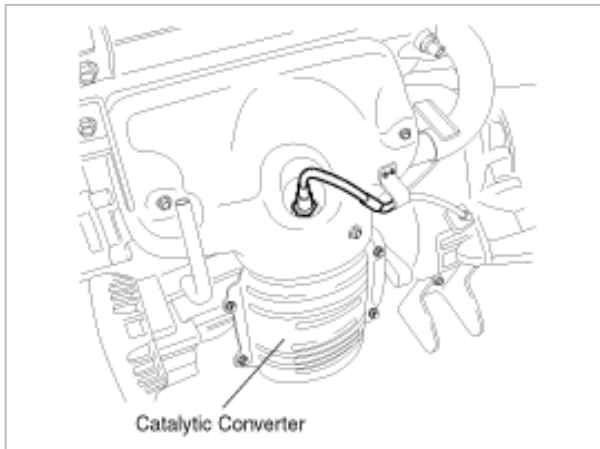
1. Purge Control Solenoid Valve (PCSV)

2. PCV Valve
3. Canister

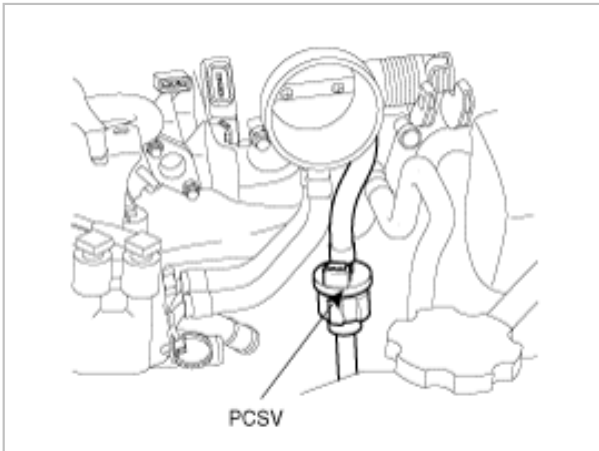
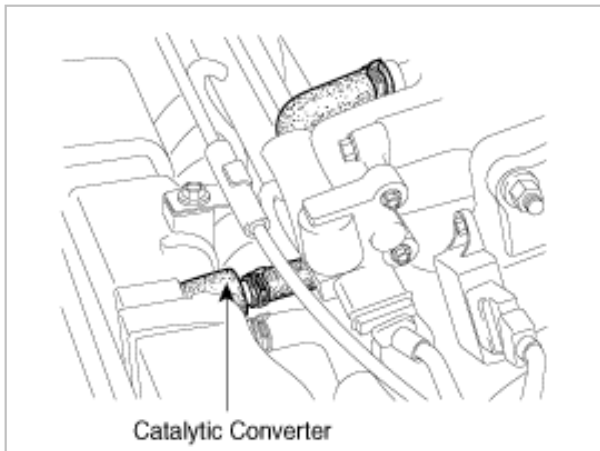
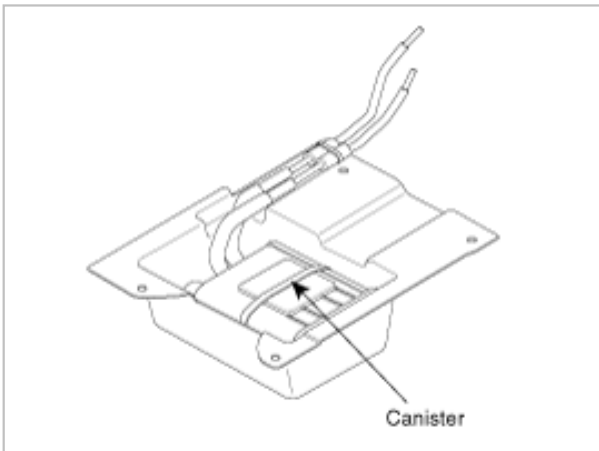
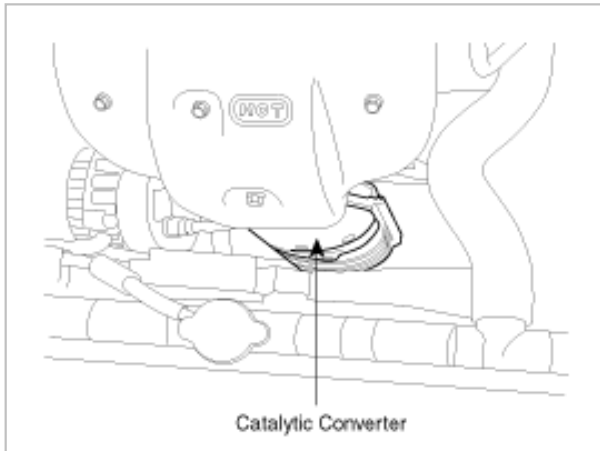
4. Catalytic Converter

[1.6 DOHC]

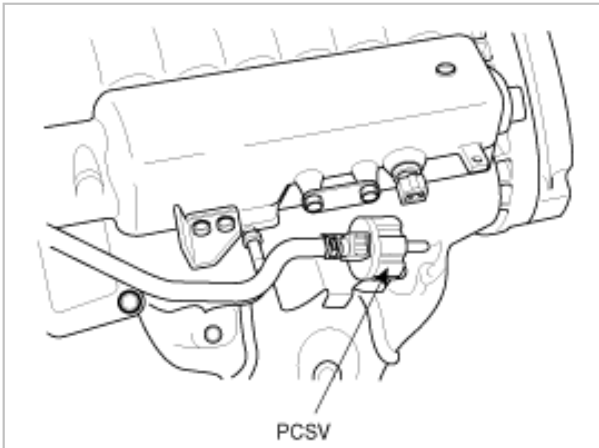
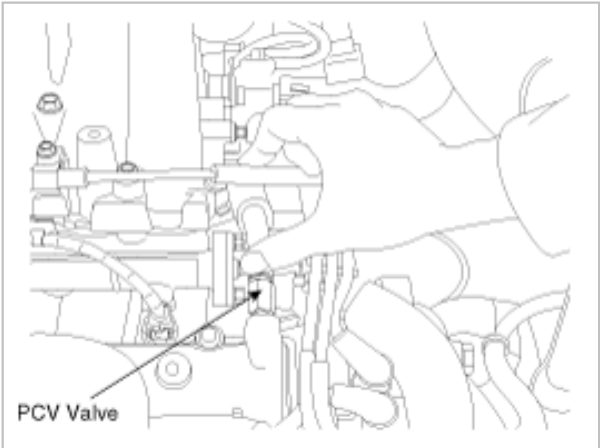
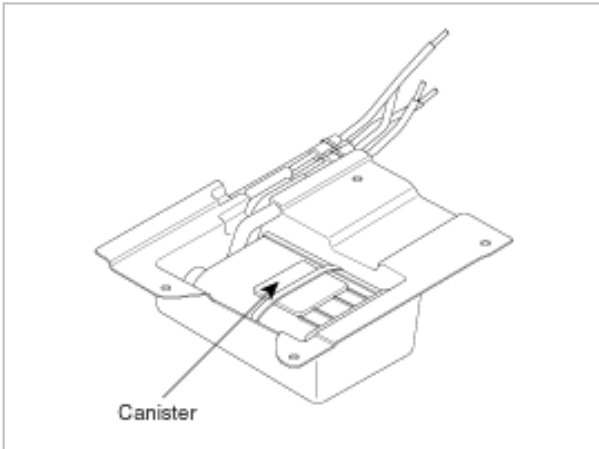
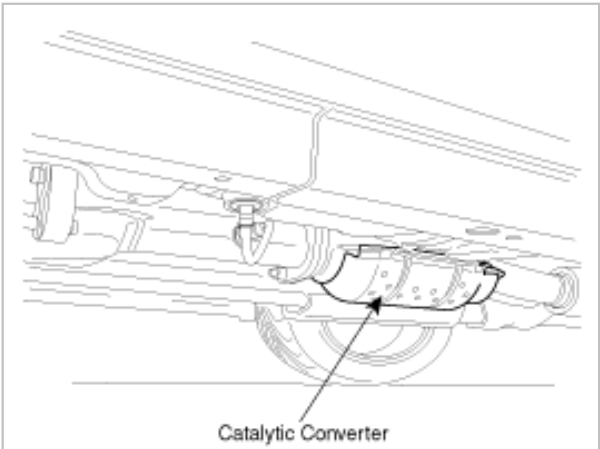
1	清除控制 电磁阀 (PCSV)	2	PCV阀
			
3	碳罐	4	催化转化 器

	
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[2.0 DOHC]

1	清除控制 电磁阀 (PCSV)	2	PCV阀
			
3	碳罐	4	催化转化 器
			

[2.7 V6]

1	清除控制 电磁阀 (PCSV)	2	PCV阀
 <p>PCSV</p>		 <p>PCV Valve</p>	
3	碳罐	4	催化转化 器
 <p>Canister</p>		 <p>Catalytic Converter</p>	

故障检修

现象	故障原因	措施
发动机不能起动或起动困难	真空管脱落或损坏	维修或更换
	蒸发器罐清除电磁阀故障	维修或更换
怠速不稳或发动机失速	真空管脱落或损坏	维修或更换
	PCV阀故障	更换
	蒸发气体活性炭罐清除系统故障	检查系统;如果存在故障,检查相关部件
机油消耗过多	曲轴箱强制通风管路堵塞	检查曲轴箱强制通风系统

规格

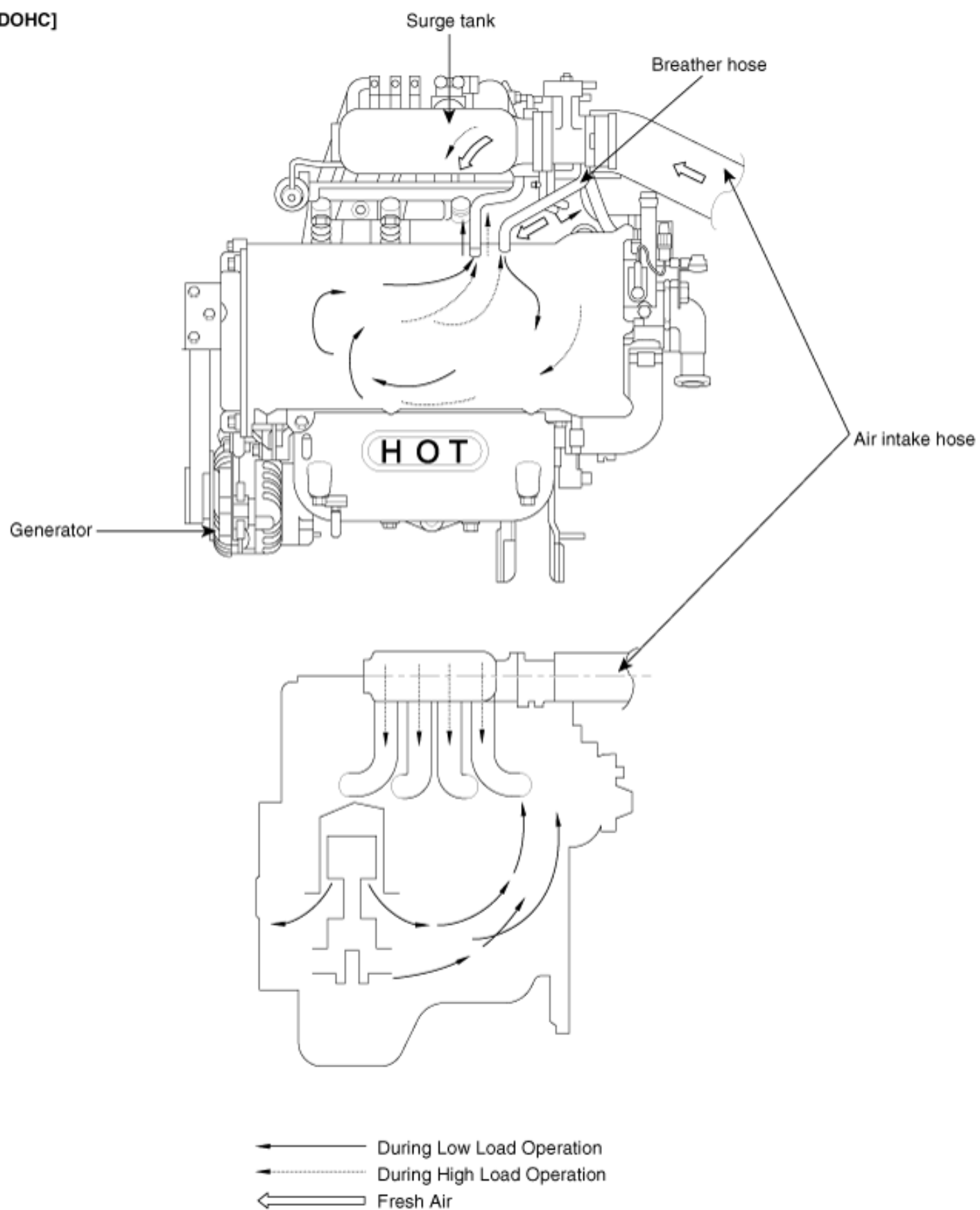
项目	规定值	
清除控制电磁阀(PCSV)	类型	占空比控制类型
	电阻[k Ω]	20 °C(68 °F)时24.5~27.5

规定扭矩

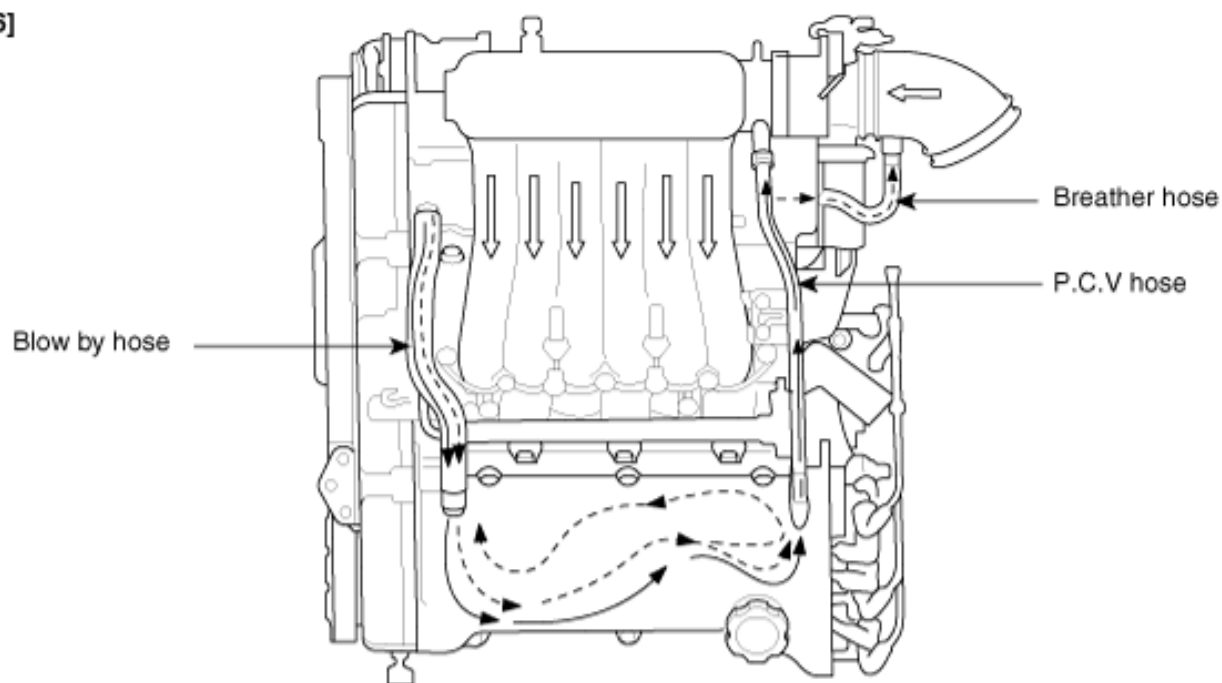
项目	N·m	kgf·cm	lbf·ft
曲轴箱强制通风阀	7.8~11.8	0.8~1.2	5.8-8.7

结构图

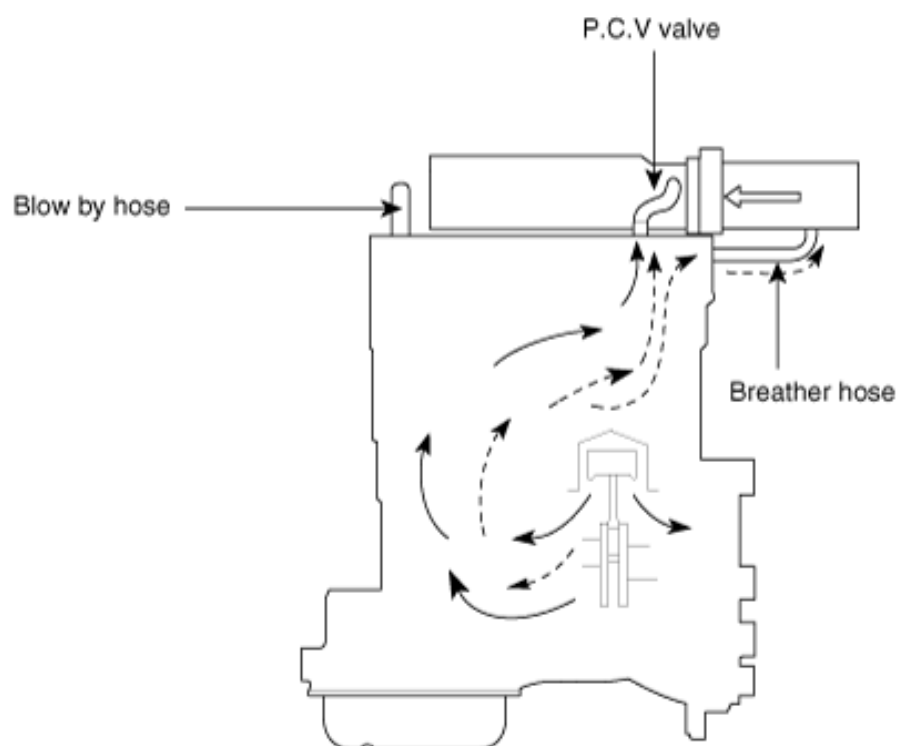
[DOHC]



[V6]



<Front>



<Rear>

- ← During low load operation
- During high load operation
- ← Fresh air

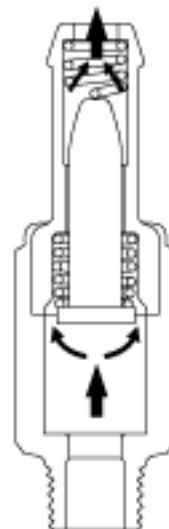
工作

Intake manifold side (No vacuum)



Rocker cover side

Intake manifold side (High vacuum)



Rocker cover side

发动机状态

不运转

PCV阀

不工作

真空通道

受限制

发动机状态

怠速或减速

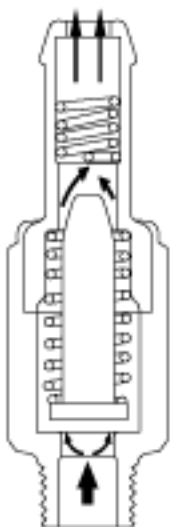
PCV阀

完全工作

真空通道

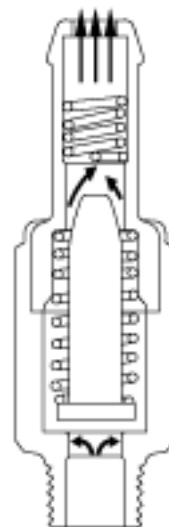
小

Intake manifold side (Moderate vacuum)



Rocker cover side

Intake manifold side (Low vacuum)



Rocker cover side

发动机状态

正常工作

发动机状态

加速或大负荷

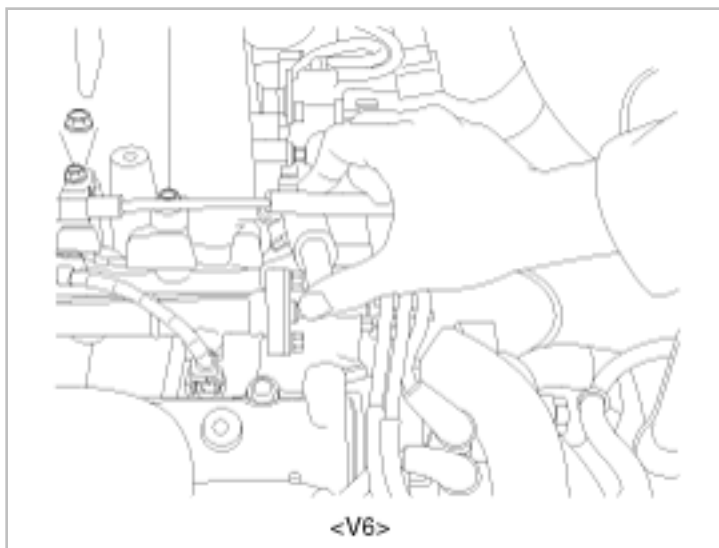
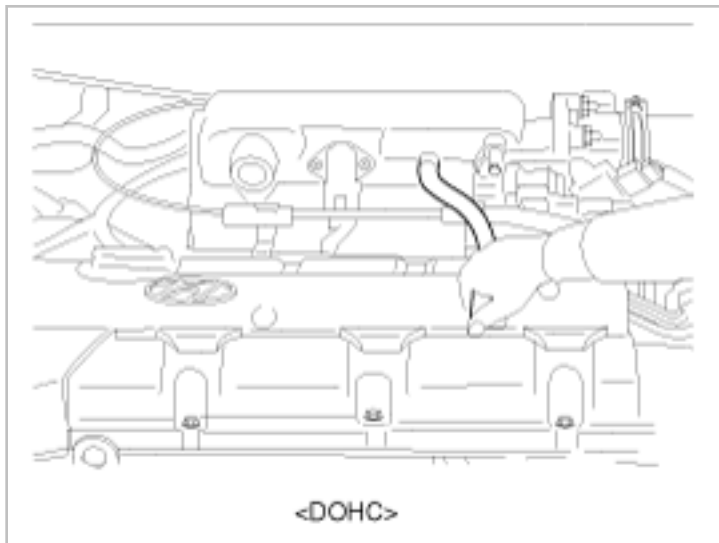
PCV阀	适当的工作	PCV阀	轻微的工作
真空通道	大	真空通道	最大

拆卸

1. 从曲轴箱强制通风阀(PCV)处分离通风软管。从气门室盖处拆卸PCV阀并重新把它连接到通风软管处。
2. 使发动机怠速运转并把一根手指放到PCV阀开口端,确定能感受到进气歧管真空。

参考

PCV阀内侧的柱塞将前、后移动。



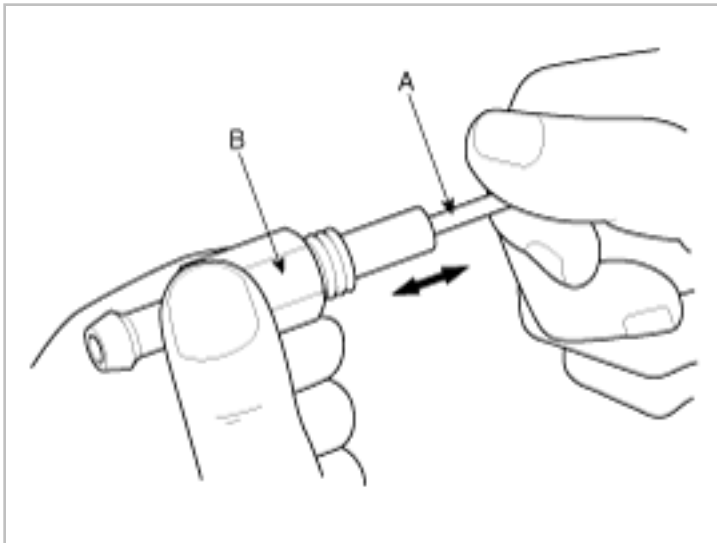
安装

安装PCV阀后按规定扭矩拧紧。

检查

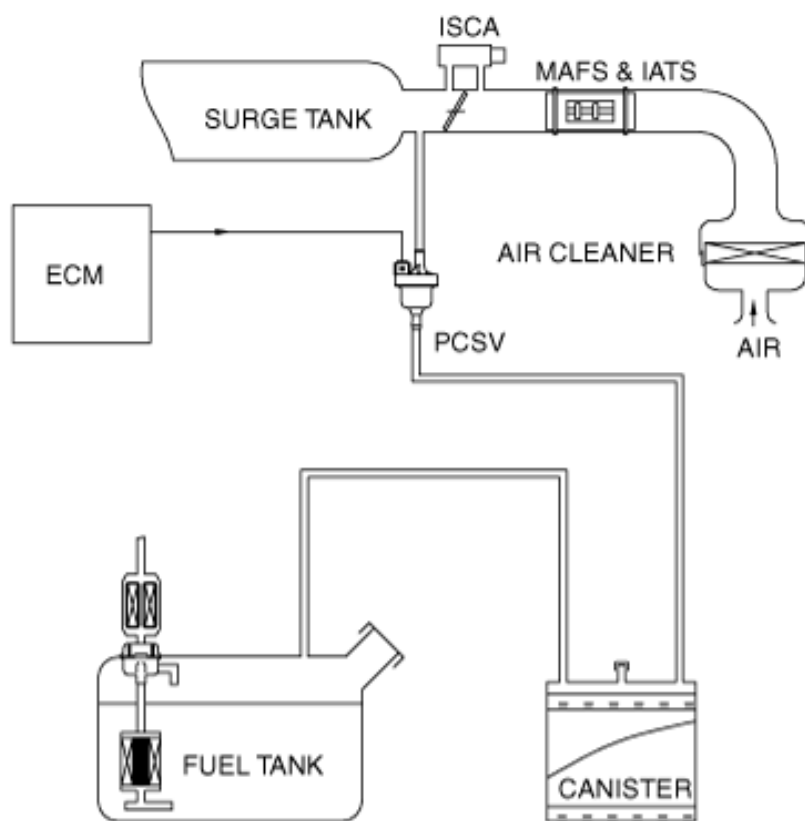
1. 拆卸PCV阀。
2. 将细杆(A)从螺纹侧插入PCV阀(B),检查柱塞移动。

3. 若PCV阀柱塞没有移动,则说明PCV阀已堵住。应清洁或更换。

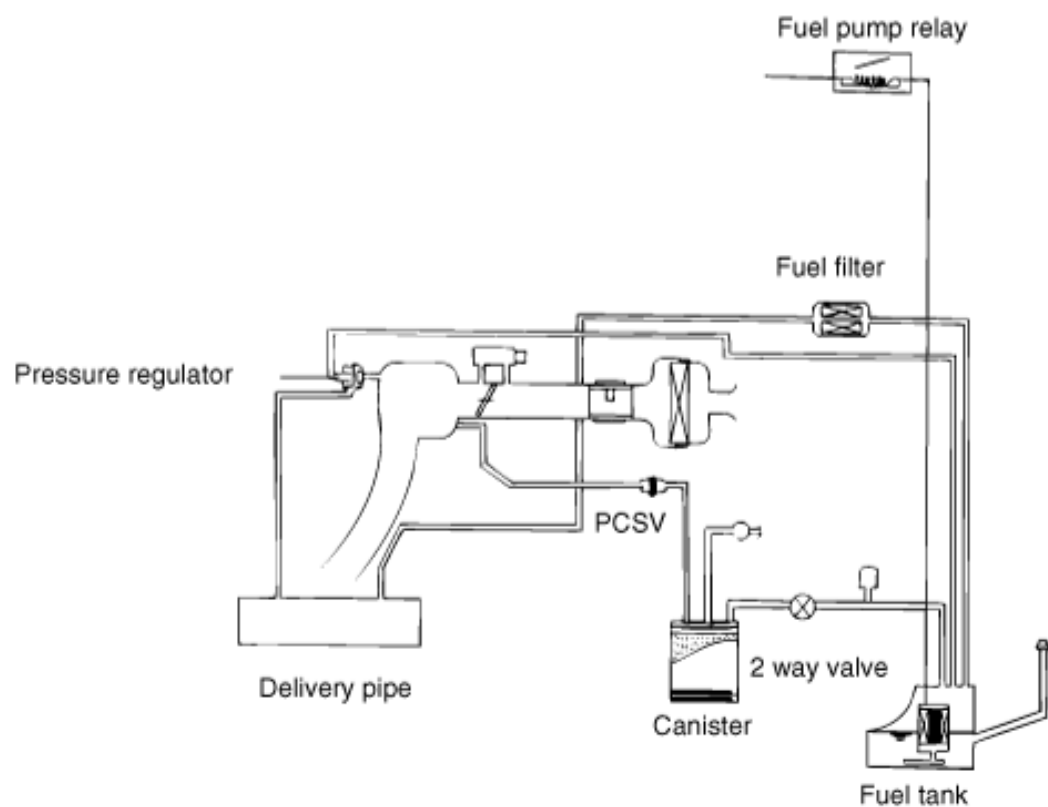


结构图

[DOHC]



[V6]



检查

1. 从节气门处分离真空软管并在真空软管处连接一个真空泵。
2. 当发动机冷机[发动机冷却水温度60°C(140°F)或以下]和发动机暖机时[发动机冷却水温度80°C(176°F)或以上],检查下列要点。

发动机冷机时

发动机工作状态	提供真空	结果
怠速	50 kPa (7.3psi)	保持真空
3,000rpm		

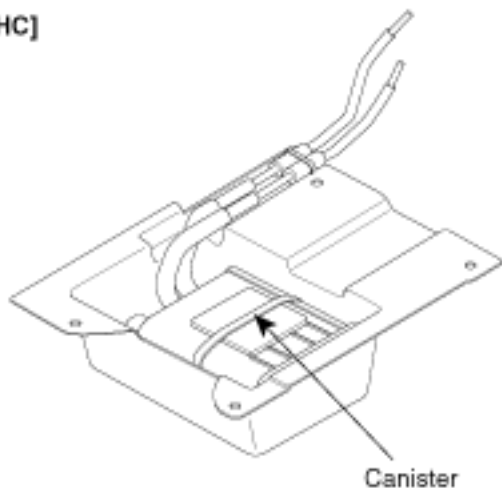
发动机暖机时

发动机工作状态	提供真空	结果
怠速	50 kPa (7.3psi)	保持真空
发动机以3,000rpm的转速起动后3分钟内	尝试提供真空	真空释放
发动机以3,000rpm的速度旋转3分钟后	50 kPa (7.3psi)	暂时保持真空,稍后即释放真空

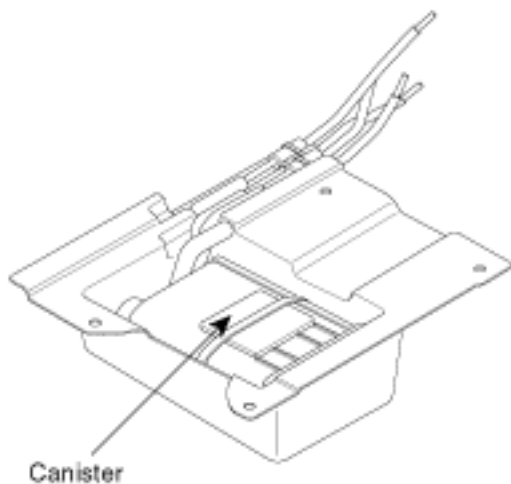
检查

1. 观察连接部分是否松动,蒸发气体软管是否有明显弯曲和损坏。
2. 检查是否变形、裂纹或漏油。
3. 拆卸EVAP活性炭罐后,检查是否破裂或损坏。

[DOHC]



[V6]



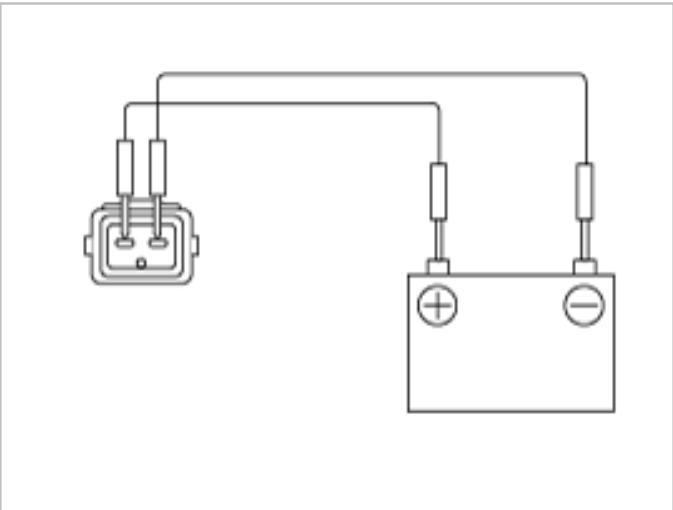
检查

参考

分离真空软管时做好识别标记以便能把真空软管重新连接到原来的位置。

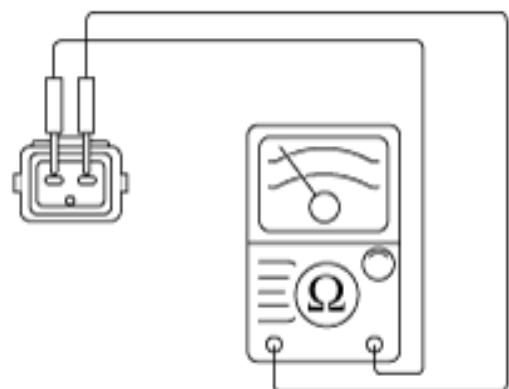
- 1. 从电磁阀处分离真空软管。
- 2. 分离线束连接器。
- 3. 将真空泵连接到连接带有红条的真空软管的管嘴上。
- 4. 电压供应到PCSV时和电压不连接时,提供真空和检查。

蓄电池电压	正常状态
通电	真空释放
断电	维持真空



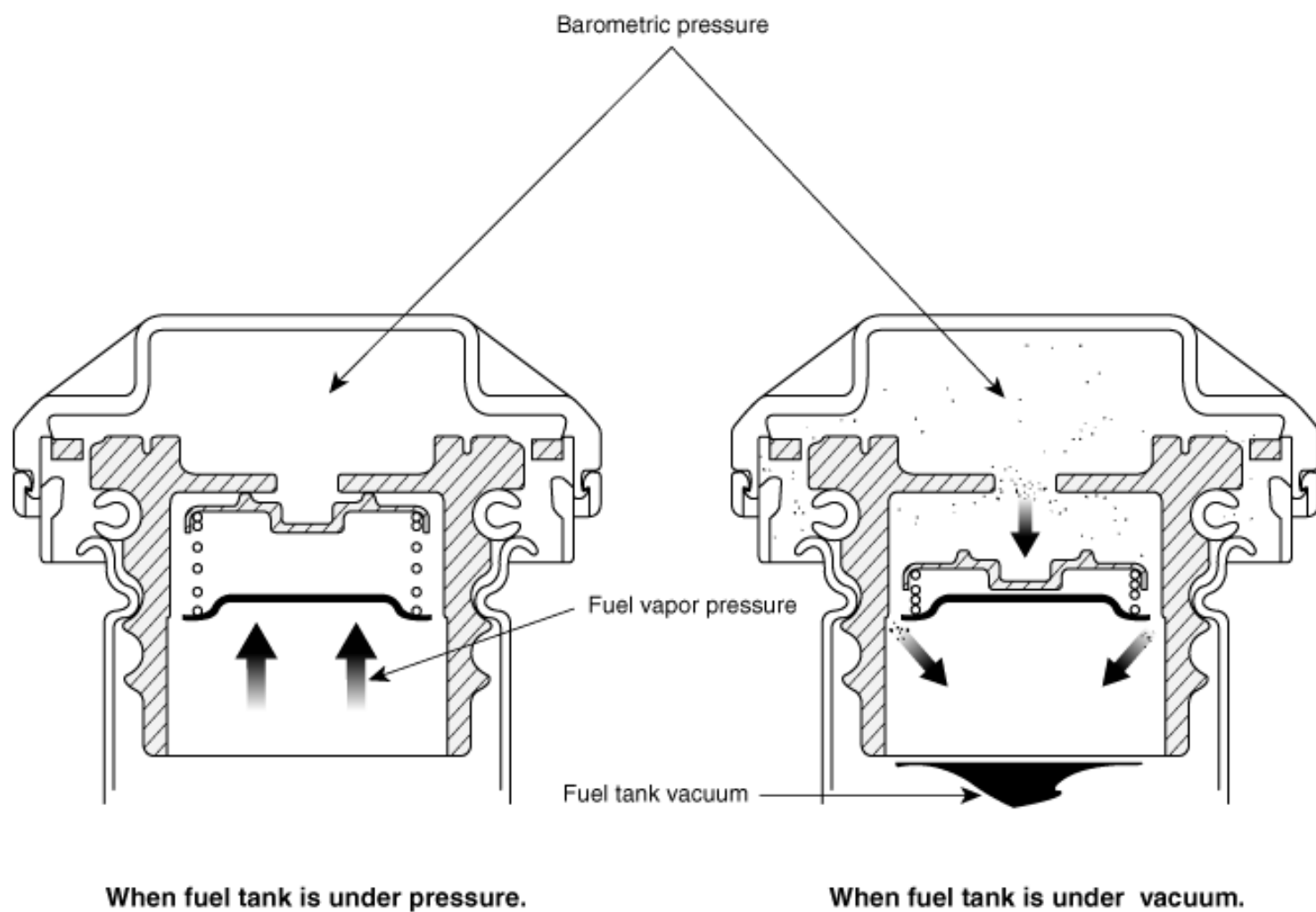
- 5. 检测电磁阀端子之间的电阻。

PCSV 线圈电阻():
20°C(68°F)时24.5~27.5



说明

燃油加油口盖装配了一个棘轮拧紧装置,减少了错误安装的可能性,并密封燃油加油口。在加油口盖和加油管管颈彼此接触后,棘轮发出响亮的卡嗒声表明密封已设定。



说明

通过组合发动机修正及添加特殊控制部件来控制废气排放(CO,HC,NO_x)。
进气歧管、凸轮轴、点火系统和燃烧室的改良形成了基本控制系统。
这些系统结合成能在保持车辆性能、燃油经济性的情况下控制废气排放的高效系统。

空气/燃油混合比控制系统[多点燃油喷射(MFI)系统]

MFI系统是利用热氧传感器的信号起动和控制安装在各气缸进气歧管的喷油器的工作的系统,精确的控制调节空气/燃料的混合比,减少废气产生。

另外为了使发动机产生适当成分的排放气体,允许使用三元催化器。三元催化器能把三种有害物(1)炭氢化合物(HC),(2)一氧化碳(CO)和(3)氮氧化合物(NO_x)转化为无毒物质,在MFI系统中有两种操作模式:

1. 空气/燃油混合比开环控制是由ECM根据各种输入信号来控制。
2. 空气/燃油混合比闭环控制是由ECM依据氧传感器提供的信息为基础,调整空气/燃油混合比。

说明[2.0 DOHC,配备CVVT]

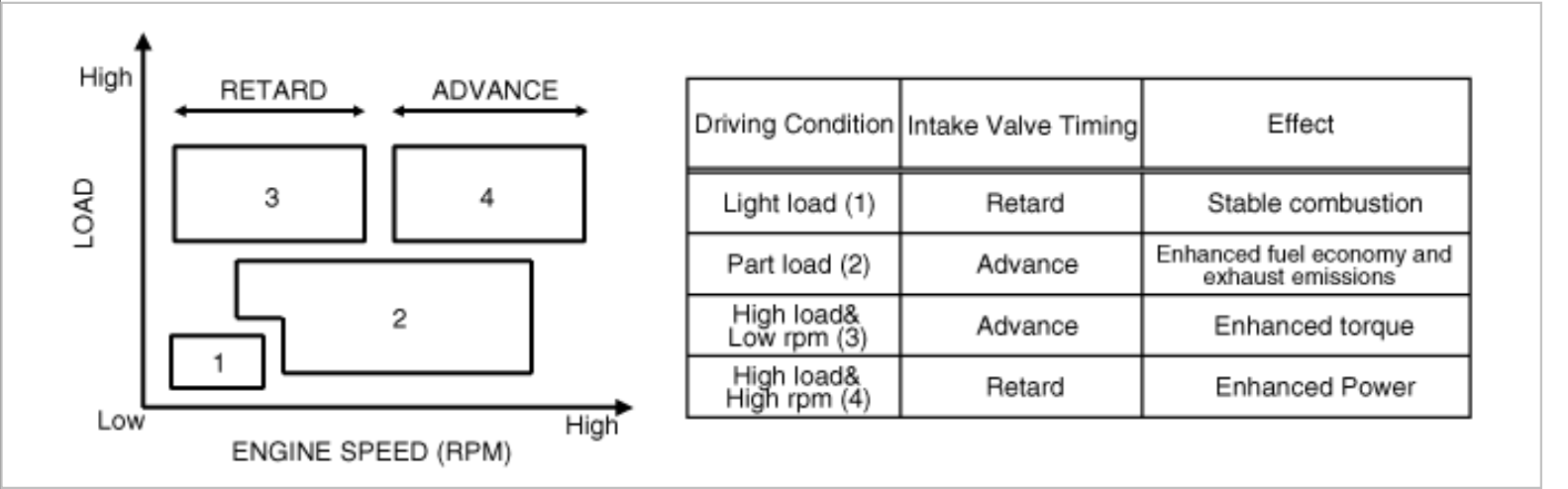
安装在排气凸轮轴上的CVVT(连续可变气门正时)控制进气门打开和关闭正时,以提供发动机性能。

由CVVT系统根据发动机转速最佳化进气门正时。

因为气门重叠最佳化,此CVVT系统在各种发动机转速,车速和受EGR影响的各种发动机负荷下提高燃料效率及降低Nox排放。

通过机油压力,CVVT改变了进气凸轮轴的相位。

它持续变化进气门正时



操作[2.0 DOHC,配备CVVT]

CVVT系统根据操作条件持续使进气门正时变化。

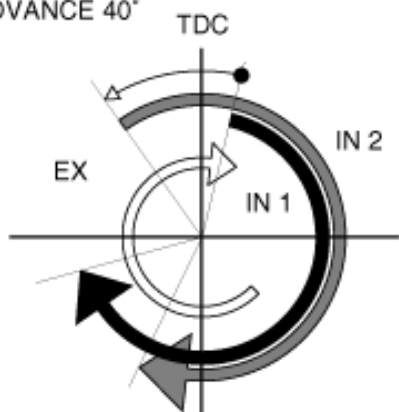
优化进气门正时以便发动机产生最大动力。

凸轮工作角增加,以获得EGR效应及降低泵送损失。进气门迅速关闭,减少进入进气孔的空气/燃油混合物和改善变化效应。

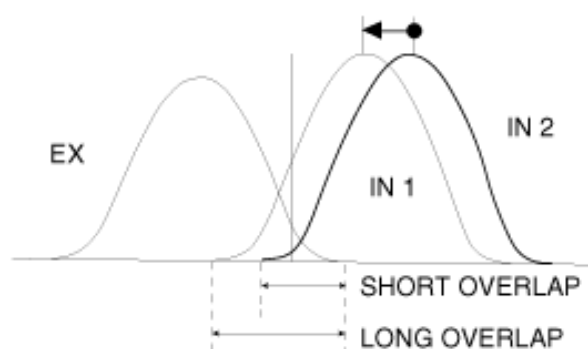
缩短怠速时凸轮提前量,稳定燃烧并降低发动机速度。

如果出现故障,禁止CVVT系统控制,阀正时固定在完全延迟的位置。

MAXIMUM ADVANCE 40°



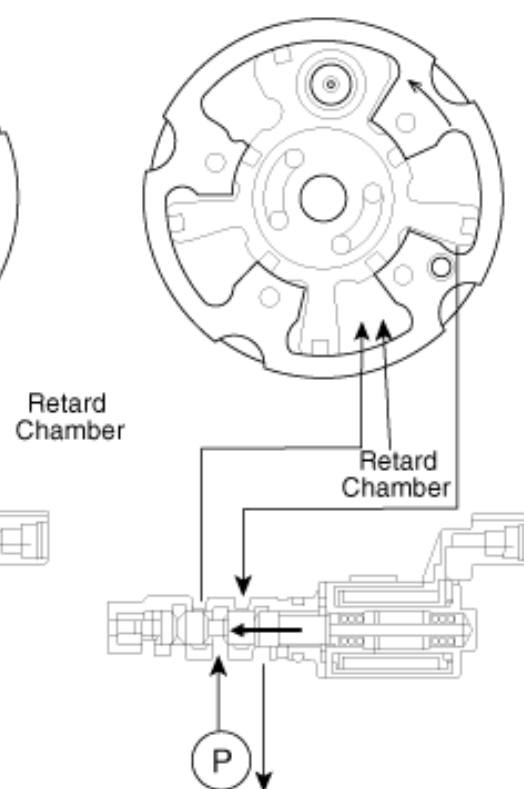
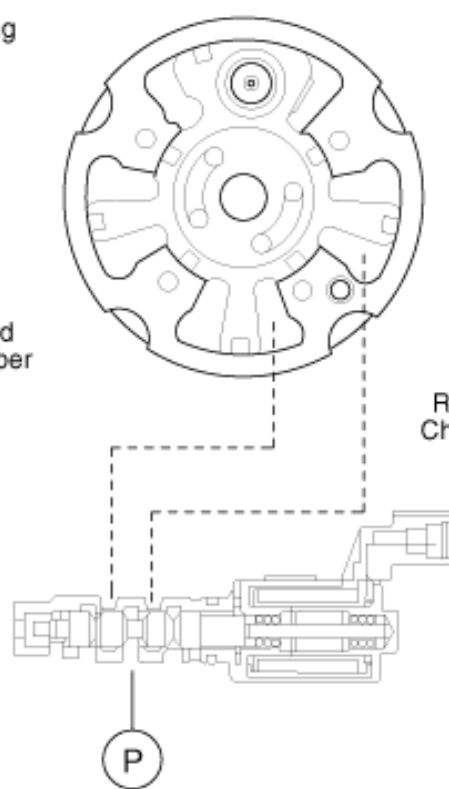
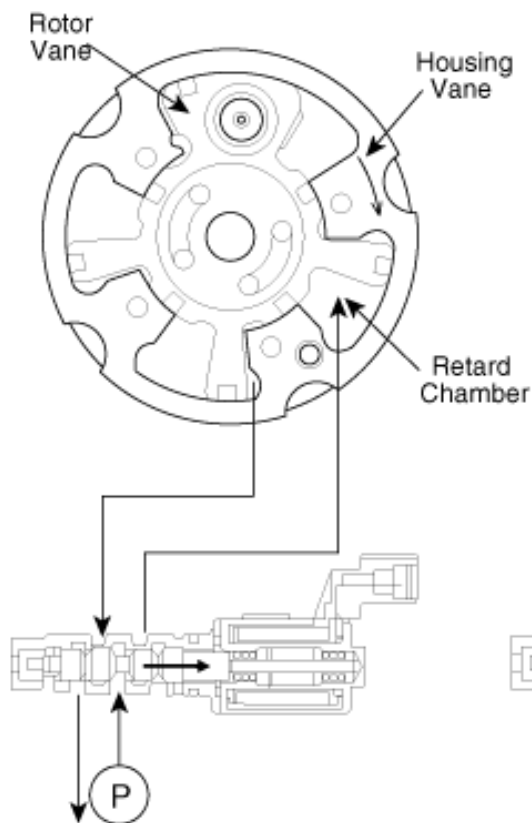
MAXIMUM ADVANCE 40°



RETARD

HOLD

ADVANCE



1. 上面图显示壳叶片相对于转子叶片的操作结构。

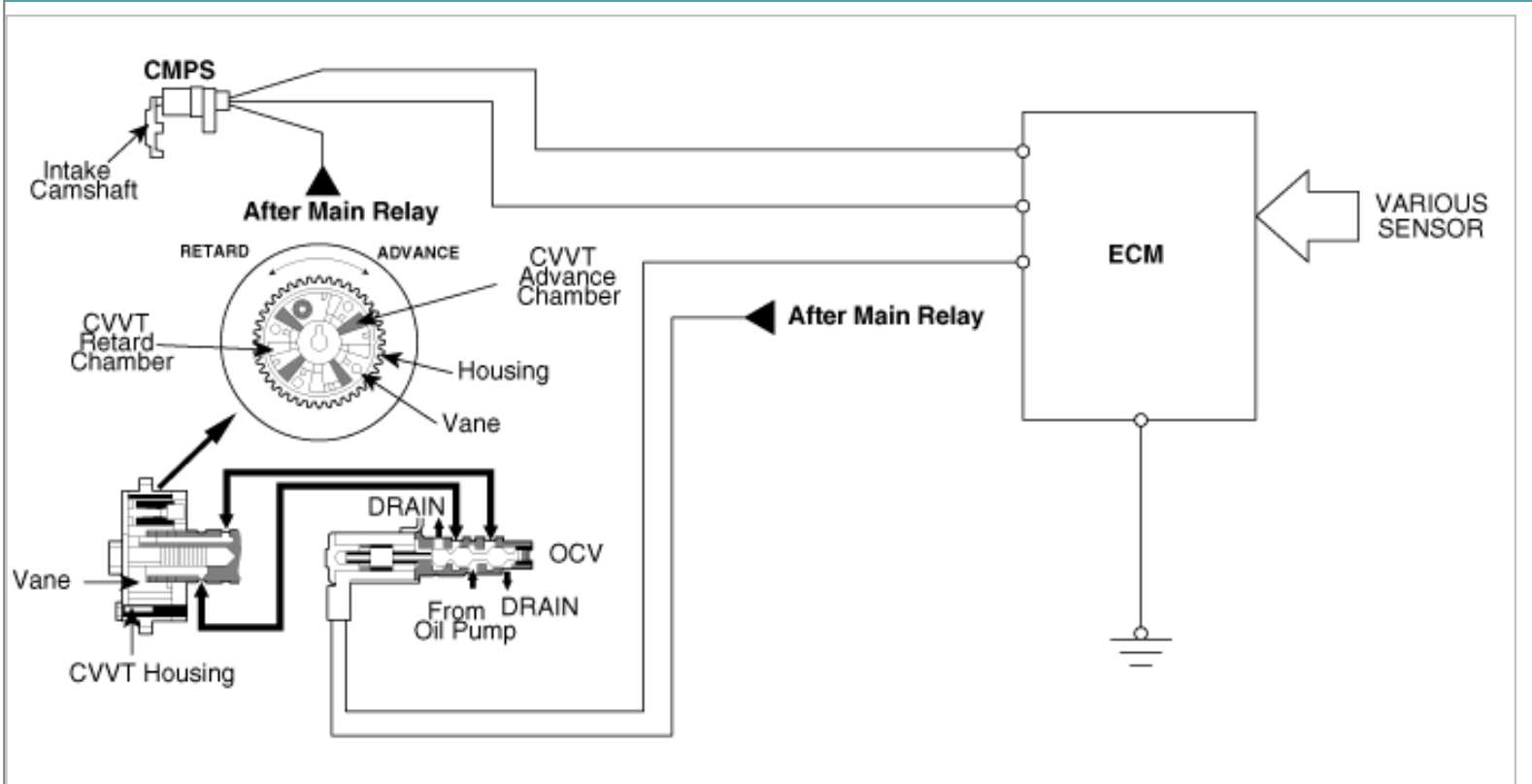
2. 如果CVVT固定在一定控制角度,为了保持此状态,填充油(与油泵泄漏出去的油容量差不多)

此时OCV(机油控制阀)线轴位置如下。

油泵 提前油室(逐渐打开至提前油室的流入口) 几乎关闭排放口

根据发动机运行状态(转速,油温,油压)确保位置上有差异。

结构图[2.0 DOHC,配备CVVT]



DTC故障检修

故障代码	P0420	催化器效率低于界限(1排)
	P0430	催化剂系统效率低于界限(2排)

说明

ECM使用2个氧传感器信号监控歧管催化器(加热式催化器)的效率。通过检测催化器的氧储藏量,可以间接地计算出催化器效率。上部(前)HO2S用于检测进入催化器之前排气中氧的含量。输出电压低表明氧含量高(混合气稀),输出电压高表明氧含量低(混合气浓)。当催化器效率下降时,没有化学反应,意味着催化器前、后氧含量趋于相同。后HO2S的输出电压拷贝前HO2S的输出电压。要监测系统,计算前HO2S和后HO2S的稀浓转换。使用后HO2S稀浓转换与前HO2S稀浓转换比率确定催化器是否正常工作。高效催化器的后HO2S稀浓转换比前HO2S稀浓转换小得多,即比值接近零。

DTC检测条件

1.DTC详述

ECM计算能体现催化转换性能的后HO2S信号振幅。根据此振幅将判定是否由于燃油含铅或缺火导致催化器老化或者中毒而使催化转换性能下降。在一定期间内如果计算的后HO2S信号振幅平均值高于标准界限,ECM记录DTC P0420(1排)或P0430(2排)。如果在下个驱动周期内记录相同的故障代码,ECM点亮MIL。

2.确定DTC的条件

故障代码	检测条件和失效保护	可能原因
P0420 P0430	<p>检测条件</p> <ul style="list-style-type: none"> •DTC策略 -根据储氧能力 •诊断条件 -催化剂温度:340~600 °C(644~1,112°F) -发动机水温> 70°C(158°F) -发动机转速:800~2500rpm -空气流量< 250mg/冲程 -空燃比控制在其极限范围内 -没有检测到失火 -非暂时条件 •临界值 -171个空燃比控制周期中负荷与速度范围内前HO2S和后HO2S信号比率> 0.7 <p>失效保护功能</p> <ul style="list-style-type: none"> •无 	<ul style="list-style-type: none"> •漏气 •HO2S •燃油供给系统 •喷油嘴 •催化转化器 •ECM

检查程序

1. CHECK DTC RELEVANT TO HO2S/FUEL TRIM/MISFIRE

1. Connect Hi-Scan (Pro) to data link connector.
2. Turn ignition switch to ON and monitor any other DTCs relating to HO2S, fuel trim, or misfire.

Are any other DTCs also set?

No

Yes

Do all repairs associated with those codes before going to next step.

2. CHECK AIR LEAKAGE

1. Check air leakage in exhaust system.

Is there any air leakage in exhasut system?

No

Yes

Repair or replace it.

3. CHECK CATALYST CONVERTER AND HO2S FOR CONDITIONS

1. Thoroughly check catalyst and HO2S for contamination, deterioration or damage.

Is Catalyst converter or HO2S contaminated, deteriorated or damaged?

No

Yes

Repair or replace it.

4. CHECK HO2S

1. Check front and rear HO2S for normal operation.
 - Refer to "DTC P0130 ~ P0160" for a detailed procedure.

Is front and rear HO2S normal?

Yes

No

Repair it.

5. CHECK INJECTOR FOR NORMAL OPERATION

1. Start engine and check RPM decrease when disconnecting each injector connector in sequence.
2. Measure the decreasing engine RPM of all cylinders.

Is there any cylinder with no change in RPM or only a small RPM change?

No

Yes

Repair or replace the injector of failed cylinder.

6. CHECK FUEL LINE PRESSURE

1. Reconnect the ignition coils and spark plug connectors.
2. Release the fuel pressure and attach the fuel pressure gage to the delivery pipe.
 - To release the fuel pressure, refer to "FUEL DELIVERY SYSTEM" section.
3. Start the engine and warm it up to normal operating temperature.
4. Check fuel line pressure at idle.
 - Specification (Fuel Pressure): 350 kpa (3.5 kg/cm², 49.8 psi)

Is fuel line pressure within specification?

Yes

No

Check fuel delivery system.
(Refer to "FUEL DELIVERY SYSTEM" section)

7. CHECK SIGNAL PATTERN OF FRONT AND REAR HO2S

1. Start engine and warm it up to normal operating temperature.
2. Using Hi-Scan (Pro), monitor both front HO2S and rear HO2S signals.

Do both signals of front and rear HO2S switch lean to rich or rich to lean similarly?

No

Yes

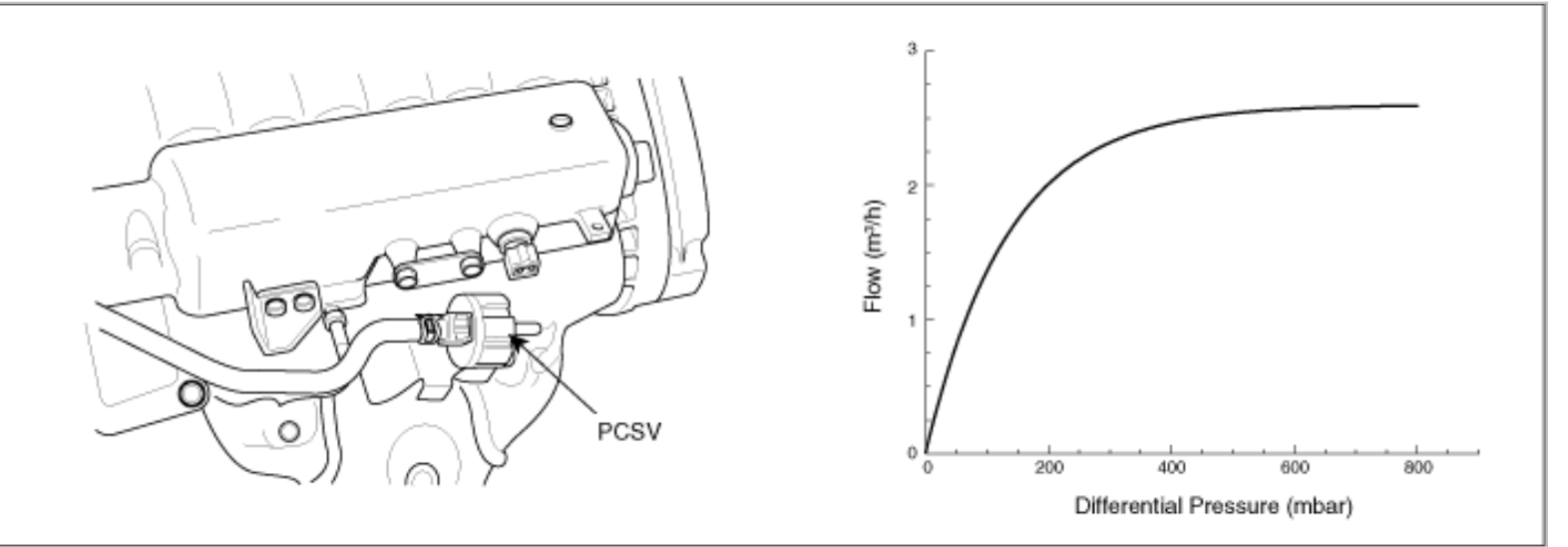
Replace manifold catalytic convert.

Proceed with "ECM PROBLEM INSPECTION PROCEDURE" in BASIC INSPECTION PROCEDURE.

DTC故障检修

故障代码	P0444	蒸发排放控制系统-净化控制阀电路断路
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部件位置



说明

蒸发排放控制系统把燃油蒸气收集到活性炭罐内,防止燃油箱中溢出的碳氢化合物(HC)蒸发进入大气中形成光化学烟雾污染环境。ECM控制净化控制电磁阀(PCSV),净化活性炭罐中收集到的蒸气,使之进入发动机进行燃烧。使用ECM的净化控制信号激活净化控制电磁阀,把燃油蒸气从活性炭罐引入进气歧管。

DTC检测条件

- 1.DTC详述
- 如果ECM检测到PCSV控制电路断路,ECM记录DTC P0444。
- 2.确定DTC的条件

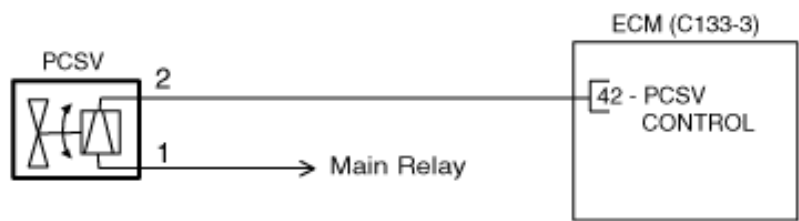
故障代码	检测条件和失效保护	可能原因
P0444	<div>检测条件<ul style="list-style-type: none">•DTC策略-驱动级检查•诊断条件-蓄电池电压 10V•界限-PCSV控制电路断路3秒钟</div>	<div><ul style="list-style-type: none">•PCSV电路断路•PCSV•ECM</div>

规定值

- PCSV电阻:24.5~27.5 ,20°C(68°F)时

示意图

[CIRCUIT DIAGRAM]



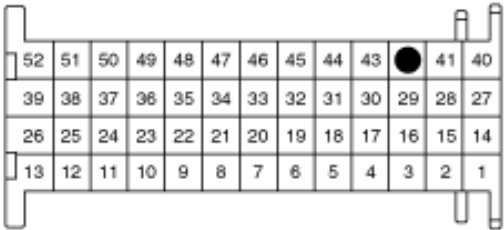
[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	Main Relay	Battery Voltage
2	ECM C133-3 (42)	PCSV Operation

[HARNESS CONNECTORS]

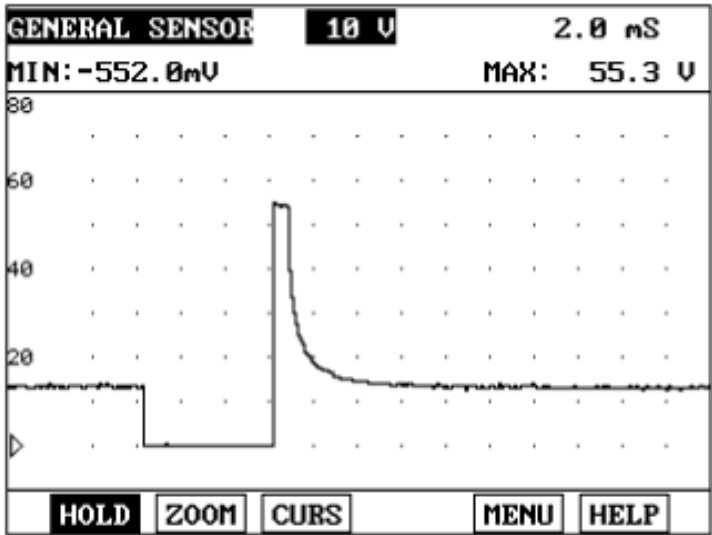


C121
PCSV



C133-3
ECM

信号波形



In normal operation, the PCSV opens and closes, depending on throttle angle and intake manifold vacuum. When it opens, fuel vapor is flushed from the canister and drawn into the intake manifold. To avoid a vacuum build-up in the canister, the canister close valve is normally held open to allow fresh air to replace the vapors drawn into the intake manifold. The given data is the signal waveform when PCSV operates normally. Note that the PCSV will not operate until the engine has reached normal operating temperature.

检查程序

1. CHECK PCSV AND ECM CONNECTORS

1. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
 - Refer to "CONNECTOR INSPECTION PROCEDURE" in BASIC INSPECTION PROCEDURE.

Are all connectors good?

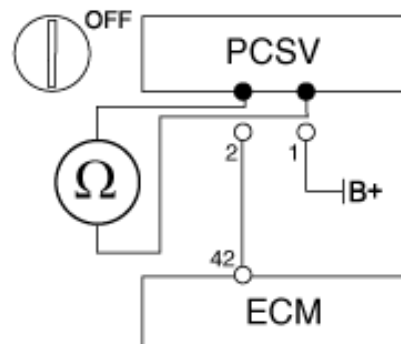
Yes

No

Repair or replace it.

2. CHECK PCSV RESISTANCE

1. Turn ignition switch to OFF and disconnect PCSV connector.
2. Measure resistance between the terminal 1 and 2 of PCSV connector.
 - **Specification (PCSV resistance):** 24.5 ~ 27.5 Ω at 20°C (68°F)



Is resistance within specification?

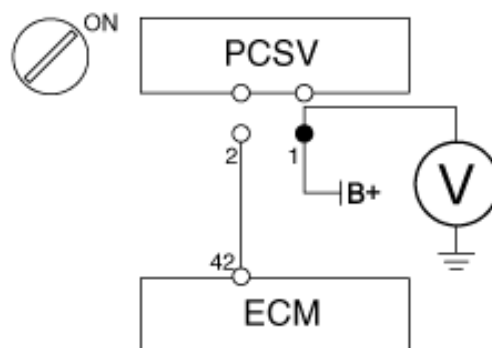
Yes

No

Replace PCSV.

3. CHECK POWER TO PCSV

1. Turn ignition switch to OFF position and disconnect PCSV connector.
2. Turn ignition switch to ON position.
3. Measure voltage between terminal 1 of the PCSV harness connector and chassis ground.
 - **Specification (Voltage):** approximately B+



Is voltage within specification?

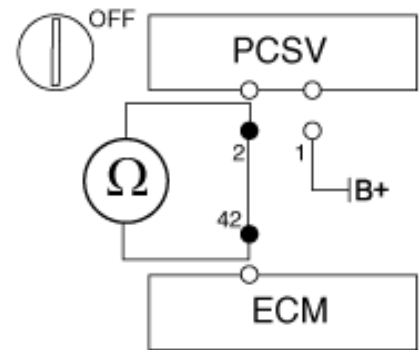
Yes

No

Repair open or short to chassis ground in harness.

4. CHECK FOR OPEN IN HARNESS

1. Turn ignition to OFF position, and then disconnect PCSV and ECM connector.
2. Measure resistance between terminal 2 of the PCSV harness connector and 42 of the ECM harness connector (C133-3).
 - **Specification (Resistance): below 1Ω**



Does each resistance indicate continuity?

Yes

No

Repair open in harness.

Proceed with "ECM PROBLEM INSPECTION PROCEDURE" in BASIC INSPECTION PROCEDURE.

DTC故障检修

故障代码	P0445	蒸发排放控制系统-净化控制阀电路短路
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说明

参考DTC P0444

DTC检测条件

- 1.DTC详述
如果ECM检测到PCSV控制电路与搭铁电路短路或与电源电路短路,ECM记录DTC P0445。
- 2.确定DTC的条件

故障代码	检测条件和失效保护	可能原因
P0445	<div>检测条件</div> <ul style="list-style-type: none">•DTC策略-驱动级检查•诊断条件-蓄电池电压 10V•界限-PCSV控制电路与搭铁电路短路或与电源电路短路3秒钟	<ul style="list-style-type: none">•PCSV电路与搭铁电路短路或与电源电路短路•PCSV•ECM

规定值

参考DTC P0444

示意图

参考DTC P0444

信号波形

参考DTC P0444

检查程序

1. CHECK PCSV AND ECM CONNECTORS

1. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
 - Refer to "CONNECTOR INSPECTION PROCEDURE" in BASIC INSPECTION PROCEDURE.

Are all connectors good?

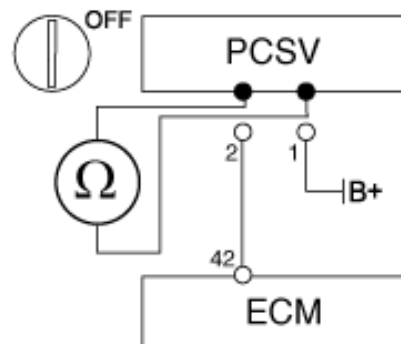
Yes

No

Repair or replace it.

2. CHECK PCSV RESISTANCE

1. Turn ignition switch to OFF and disconnect PCSV connector.
2. Measure resistance between the terminal 1 and 2 of PCSV connector.
 - **Specification (PCSV resistance):** 24.5 ~ 27.5 Ω at 20°C (68°F)



Is resistance within specification?

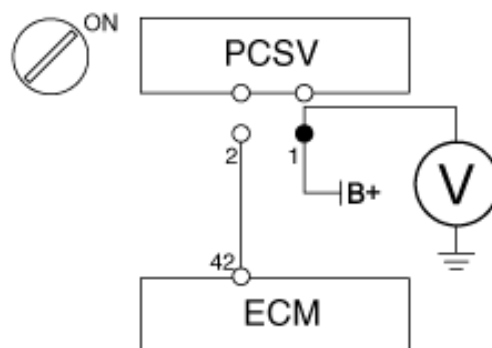
Yes

No

Replace PCSV.

3. CHECK POWER TO PCSV

1. Turn ignition switch to OFF position and disconnect PCSV connector.
2. Turn ignition switch to ON position.
3. Measure voltage between terminal 1 of the PCSV harness connector and chassis ground.
 - **Specification (Voltage):** approximately B+



Is voltage within specification?

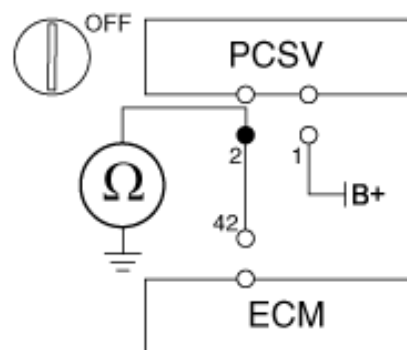
Yes

No

Repair open or short to chassis ground in harness.

4. CHECK FOR SHORT TO GROUND IN HARNESS

1. Turn ignition switch to OFF position, and then disconnect PCSV and ECM connectors.
2. Measure resistance between terminal 2 of the PCSV harness connector and chassis ground.
 - **Specification (Resistance): infinite**



Does the resistance indicate open?

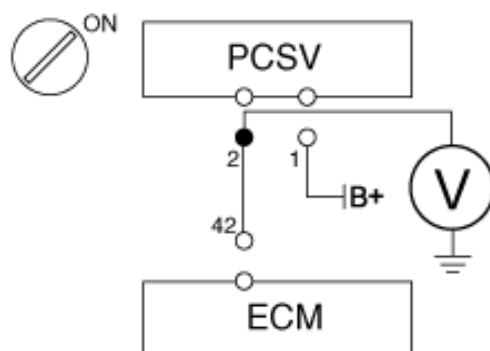
Yes

No

Repair short or short to chassis ground in harness.

5. CHECK FOR SHORT TO POWER IN HARNESS

1. Turn ignition switch to OFF position, and then disconnect PCSV and ECM connectors.
2. Turn ignition switch to ON position.
3. Measure voltage between terminal 2 of the PCSV harness connector and chassis ground.
 - **Specification (Voltage): below 0.5V**



Is voltage within specification?

Yes

No

Repair short to power in harness.

Proceed with "ECM PROBLEM INSPECTION PROCEDURE" in BASIC INSPECTION PROCEDURE.