FOREWORD

To assist you in your sales and service activities, this manual explains the main characteristics of the 2004 model year vehicles, in particular providing a technical explanation of the construction and operation of new mechanisms and new technology used.

CAUTION, NOTICE, ***REFERENCE*** and **NOTE** are used in the following ways:

CAUTION	A potentially hazardous situation which could result in injury if instructions are ignored.
NOTICE	Damage to the vehicle or components may occur if instructions are ignored.
REFERENCE	Explains the theory behind mechanisms and techniques.
NOTE	Notes or comments not included under the above 3 titles.

All information contained herein is the most up-to-date at the time of publication. We reserve the right to make changes without prior notice.

TOYOTA MOTOR CORPORATION

First Printing: Jul. 30, 2003 01-030730-00

CAMRY

OUTLINE OF NEW FEATURES

The following changes have been made for the 2004 model year.

1. Model Code

The model with 3MZ-FE engine model has been added as follows:
MCV31L-AEASKA has been added.

2. 2AZ-FE Engine

- ▶ The TOYOTA genuine Super Long Life Coolant (SLLC) has been adopted. As result, the maintenance interval has been extended.
- ▶ A segment conductor type generator has been adopted.
- ▶ The flat type knock sensor has been adopted.
- ▶ The throttle position sensor has been changed from the linear type to the hall element type in order to improve wear resistance.
- ▶ A fuel cut control is adopted to stop the fuel pump when the airbag is deployed during front or side collision.
- ▶ System construction and control logic have been made to comply with LEV-II evaporative emission regulation.

3. 1MZ-FE Engine

- ▶ The TOYOTA genuine Super Long Life Coolant (SLLC) has been adopted. As result, the maintenance interval has been extended.
- ▶ The fin pitch of the radiator has been changed from 2.25 mm (0.09 in.) to 2.5 mm (0.10 in.).
- ▶ A segment conductor type generator has been adopted.
- ▶ The planar type air fuel ratio sensor has been adopted.
- ▶ A fuel cut control is adopted to stop the fuel pump when the airbag is deployed during front or side collision.
- ▶ System construction and control logic have been made to comply with LEV-II evaporative emission regulation.

4. 3MZ-FE Engine

The 3MZ-FE engine has been newly added on ’04 Camry.

5. Clutch

The clutch accumulator has been added.

6. Shift Control Mechanism

The operating instruction of the L gate type shift on vehicles equipped with 5 speed automatic transaxle has been partly changed.

7. Brake

▶A new brake actuator has been adopted on the all models.

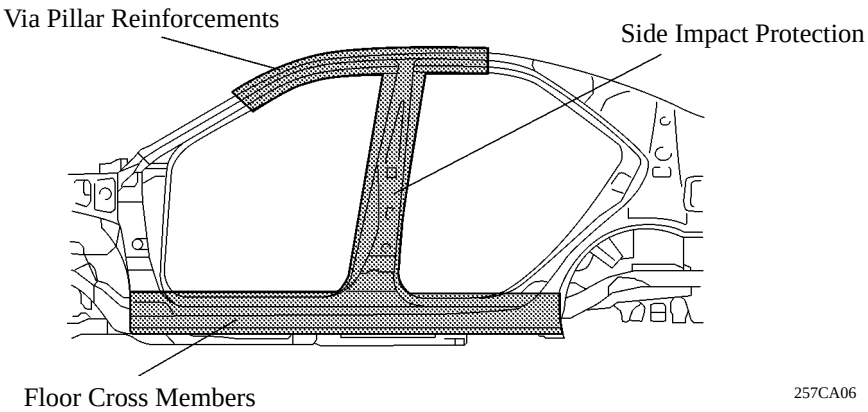
▶The brake control system (ABS with EBD, brake assist, TRAC and VSC system) uses the CAN (Controller Area Network) communication.

8. Steering

The steering column lower bracket has been changed the stroke of extend energy absorbing.

9. Impact Absorbing Structure

Reinforcements have been added to the via pillar reinforcements, side impact protection beams, and floor cross members in order to strengthen the vehicle against side collision.



10. Seat

▶New frame structure has been adopted for the front seat to realize light weight.

▶Pocket behind the front seats is standard equipment.

▶The power seat has been adopted for driver seat on all models and the power seat has been adopted for passenger seat on XLE grade model as optional equipment.

▶The power lumber support has been adopted in the driver seat and the passenger seat on all models as standard equipment.

11. Multiplex Communication

CAN (Controller Area Network) communication has been adopted for the brake control system on the models equipped with ABS with EBD, brake assist, TRAC.

12. Combination Meter

▶The design of combination meter for 3MZ-FE Engine model has been adopted.

▶The Oil Replacement Reminder Light is standard equipment on the U.S.A. models.

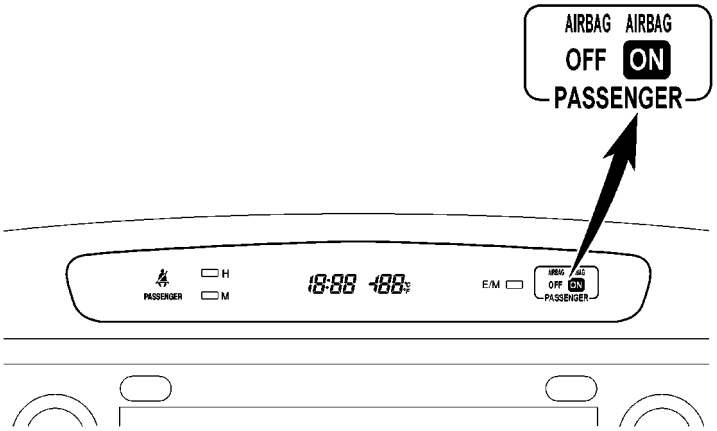
13. SRS Airbag System

▶This system has adopted a fuel cut control that stops the fuel pump when the airbag is deployed.

▶A front passenger occupant classification system has been adopted.

14. Multi-information Display

An airbag ON/OFF indicator for the passenger seat has been added to the multi-information display. The airbag ON/OFF indicator has been located in the center of the instrument panel to improve its visibility.



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15. Engine Immobilizer System

▶This system has been provided as standard equipment on 3MZ-FE model, 1MZ-FE model and 2AZ-FE engine model for the XLE grade.

▶On previous models, the ECM controlled the engine immobilizer system. On the ’04 Camry models, the transponder key ECU controls the engine immobilizer system by communicating with the ECM. Also the encoding of the ID in the ignition key and the ID stored in the transponder key ECU has been changed from the conventional fixed encoding to an encrypted encoding type. As a result, the theft deterrence performance has been improved.

Service Tip

In case of making new ignition key, it is necessary to register it ID code. Refer to the 2004 Camry Repair Manual (Pub. No. RM1063U).

MODEL CODE

ACV30 L - A E M N K A

1 2 3 4 5 6 7 8

	BASIC MODEL CODE
1	ACV30 : With 2AZ-FE Engine MCV30 : With 1MZ-FE Engine MCV31 : With 3MZ-FE Engine

	STEERING WHEEL POSITION
2	L : Left-Hand Drive

	MODEL NAME
3	A : Camry (Produced TMC *1) C : Camry (Produced TMMK *2)

	BODY TYPEE: 4-Door Sedan
4	E : 4-Door Sedan

	GEAR SHIFT TYPE
5	M : 5-Speed Manual P : 4-Speed Automatic A : 5-Speed Automatic

	GRADE
6	N : LE G : XLE S : SE

	ENGINE SPECIFICATION
7	K : DOHC and SFI

	DESTINATION
8	A : U.S.A. and Canada

*1 TMC: Toyota Motor Corporation
*2 TMMK: Toyota Motor Manufacturing, kentucky, Inc.

MODEL LINE-UP

DESTINATION	ENGINE	BODY TYPE	GRADE	TRANSAXLE		
				5-Speed Manual	4-Speed Automatic	5-Speed Automatic
				E351	U241E	U151E
U.S.A. and Canada	2AZ-FE	4-Door Sedan	LE	ACV30L-AEMNKA	ACV30L-AEPNKA ACV30L-CEPNKA	—
			XLE	—	ACV30L-AEPGKA ACV30L-CEPGKA	—
			SE	ACV30L-AEMSKA	ACV30L-AEPSKA ACV30L-CEPSKA	—
	1MZ-FE		LE	—	—	MCV30L-AEANKA MCV30L-CEANKA
			XLE	—	—	MCV30L-AEAGKA MCV30L-CEAGKA
	3MZ-FE		SE	—	—	MCV31L-AEASKA

NEW FEATURES

2AZ-FE ENGINE

1. Cooling System

The TOYOTA genuine Super Long Life Coolant (SLLC) has been adopted. As result, the maintenance interval has been extended.

▶ Specifications ◀

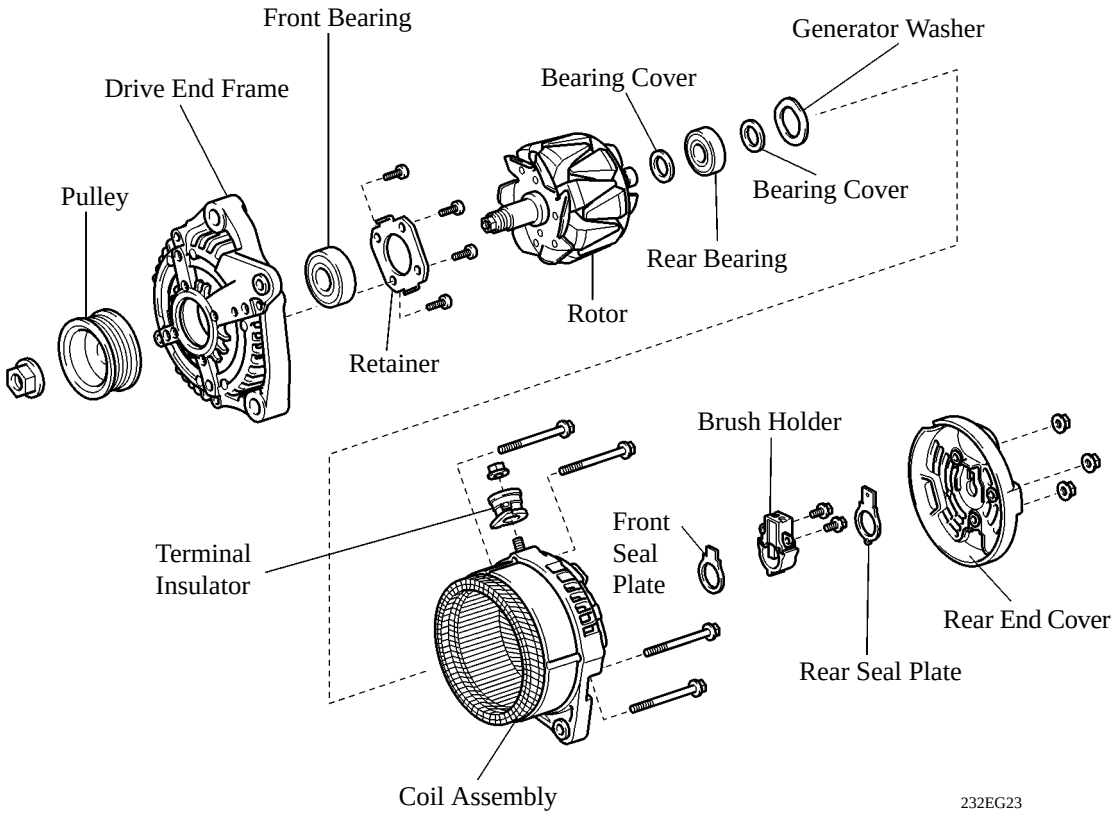
Model			'04 Camry	'03 Camry
Engine Coolant	Capacity litter (US pts, Imp. qts)		6.2 (6.6, 5.5)	→
	Type		TOYOTA Genuine (SLLC)	TOYOTA Genuine (LLC)
	Color		Pink	Red
	Maintenance Intervals	First time	100,000 mile (160,000 Km)	Every 30,000 mile (U.S.A.), 32,000 km (CANADA) or 24 months Whichever comes first
		Subsequent	Every 50,000 mile (80,000 km)	
Thermostat	Operating Temperature °C (°F)		80 - 84 (176 - 183)	→

- SLLC is pre-mixed (50% coolant and 50% distilled water), so no dilution is needed when adding or replacing SLLC in the vehicle.
- If LLC is mixed with SLLC, the interval for LLC (every 30,000 mile (U.S.A.), 32,000 km (CANADA) or 24 months) should be used.
- You can also apply the new maintenance interval (every 50,000 mile (80,000 km)) to vehicles initially filled with LLC (red-colored), if you use SLLC (pink-colored) for the coolant change.

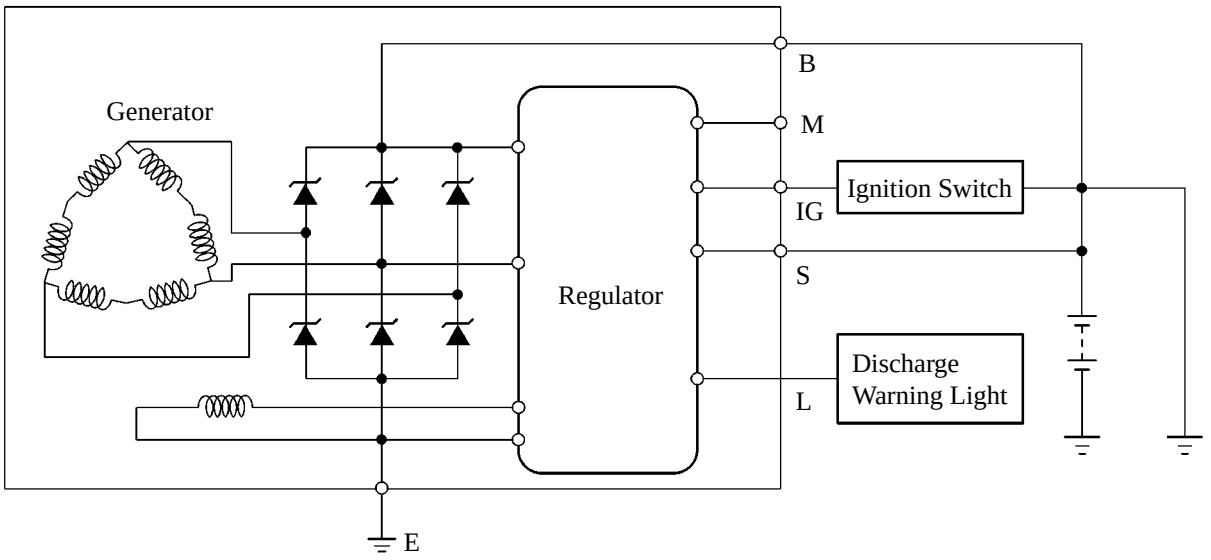
2. Charging System

A compact and lightweight Segment Conductor type generator that generates high amperage output in a highly efficient manner has been adopted on optional equipment.

▶ Component of Segment Conductor Type Generator ◀



▶ Wiring Diagram ◀



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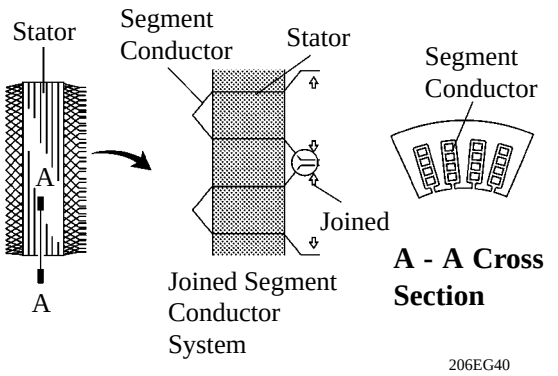
Construction and Operation

■ This generator has a joined segment conductor system, in which multiple segment conductors are welded together to form the stator. Compared to the conventional winding system, the electrical resistance is reduced due to the shape of the segment conductors, and their arrangement helps to make the generator more compact.



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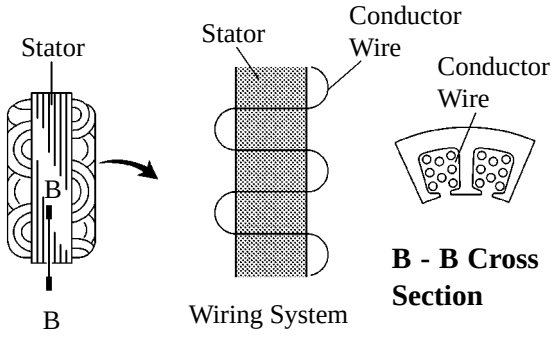
Segment Conductor Type Generator



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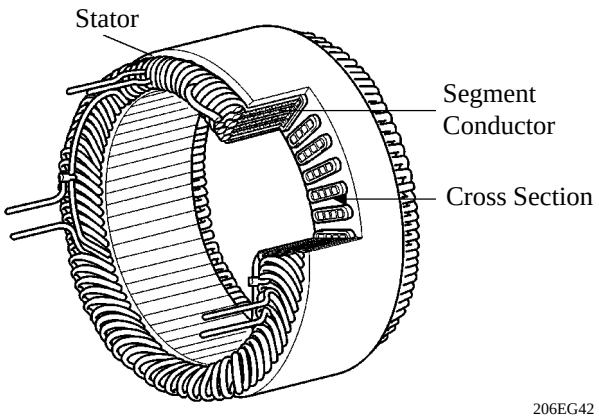
Conventional Type Generator



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Stator of Segment Conductor Type Generator

3. Engine Control System

General

The engine control system of the 2AZ-FE engine on the ’04 Camry has following system.

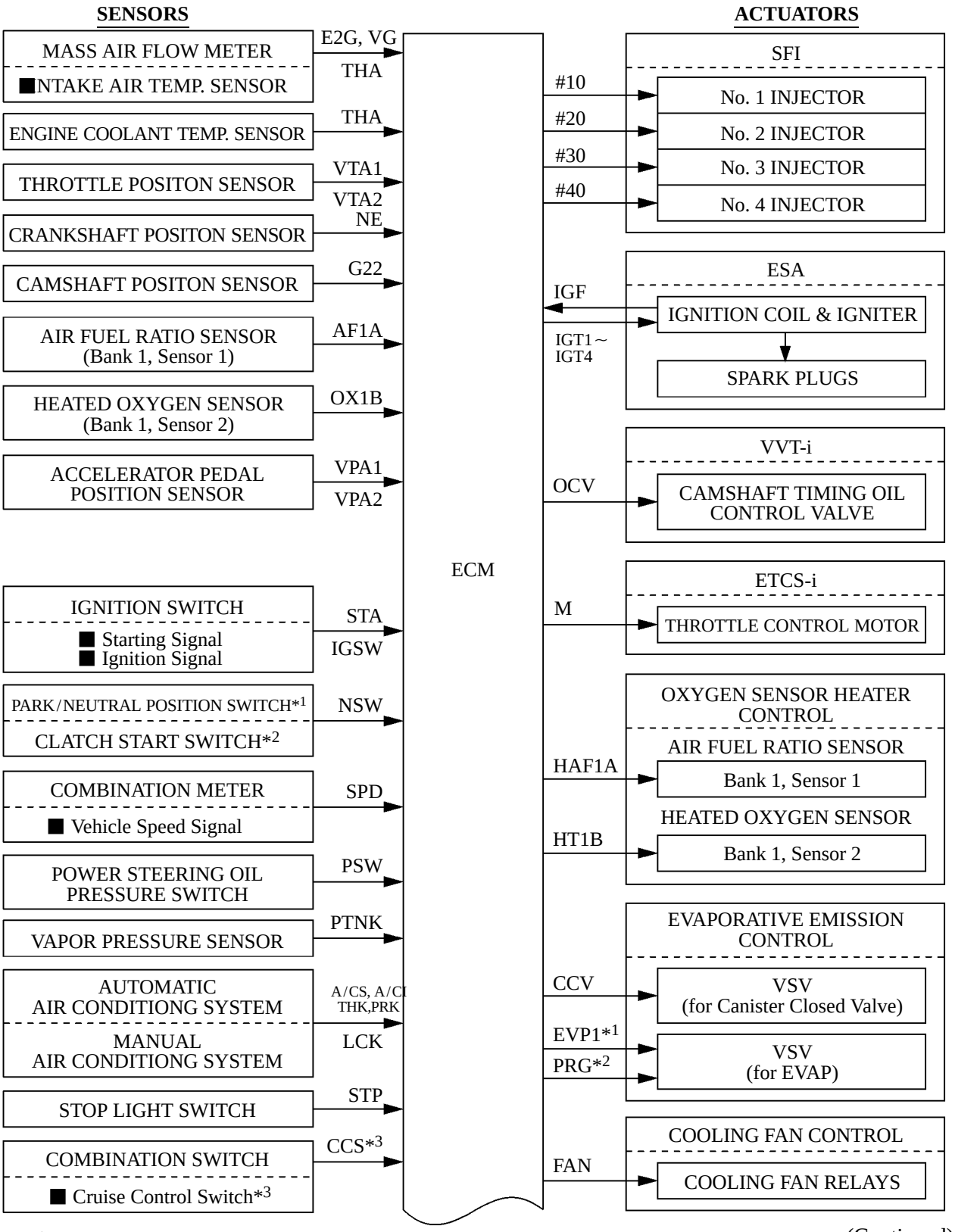
System	Outline	’04 2AZ-FE	’03 2AZ-FE
SFI (Sequential Multiport Fuel Injection)	An L-type EFI system directly detects the intake air mass with a hot wire type mass air flow meter.	○	○
ESA (Electronic Spark Advance)	Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking.	○	○
ETCS-i (Electronic Throttle Control System-intelligent) (See page 23 in 2AZ-FE engine section.)	■ Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle. ■ A link-less type is used, without an accelerator cable. ■ An accelerator pedal position sensor is provided on the accelerator pedal.	○	○
	■ A no-contact type throttle position sensor and accelerator pedal position sensor are used.	○	—
VVT-i (Variable Valve Timing-intelligent)	Controls the intake camshaft to an optimal valve timing in accordance with the engine condition.	○	○
ACIS (Acoustic Control Induction System)	The intake air passages are switched according to the engine speed and throttle valve opening angle to provide high performance in all speed ranges.	○	○
Air Intake Control System	The intake air duct is divided into two areas, and the ECM controls the air intake control valve and the actuator that are provided in one of the areas to reduce the amount of engine noise.	○	○
Cooling Fan Control	Radiator cooling fan operation is controlled by 2 engine coolant temperature switches and the condition of the air conditioning operation.	○	○
Fuel Pump Control (See page 24 in 2AZ-FE engine section)	Fuel pump operation is controlled by signal from the ECM.	○	○
	A fuel cut control is adopted to stop the fuel pump when the airbag is deployed during front or side collision.	○	—
Air Fuel Ratio Sensor, Oxygen Sensor Heater Control	Maintains the temperature of the air fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.	○	○
Air Conditioning Cut-off Control	By turning the air conditioner compressor ON or OFF in accordance with the engine condition, drivability is maintained.	○	○
Evaporative Emission Control (See page 25 in 2AZ-FE engine section.)	The ECM controls the purge flow of evaporative emission (HC) in the charcoal canister in accordance with engine conditions.	○	○
	A pressure gauge is attached to the service port, which is provided between the charcoal canister and the VSV (for purge valve), in order to detect an evaporative emission leakage.	○	○
	System construction and control logic have been made to comply with LEV-II evaporative emission regulation.	○	—

(Continued)

System	Outline	'04 2AZ-FE	'03 2AZ-FE
Engine Immobilizer	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.	○	○
	The ID code stored in the transponder key ECU is compared with that of the transponder tip in the ignition key.	○	—
Diagnosis	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.	○	○
	All the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes.	○	○
Fail-Safe	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.	○	○

Construction

The configuration of the engine control system in the 2AZ-FE engine in the '04 Camry is as shown in the following chart.



(Continued)

*1: With Automatic Transaxle Model
*2: With Manual Transaxle Model
*3: With Cruise Control System Model

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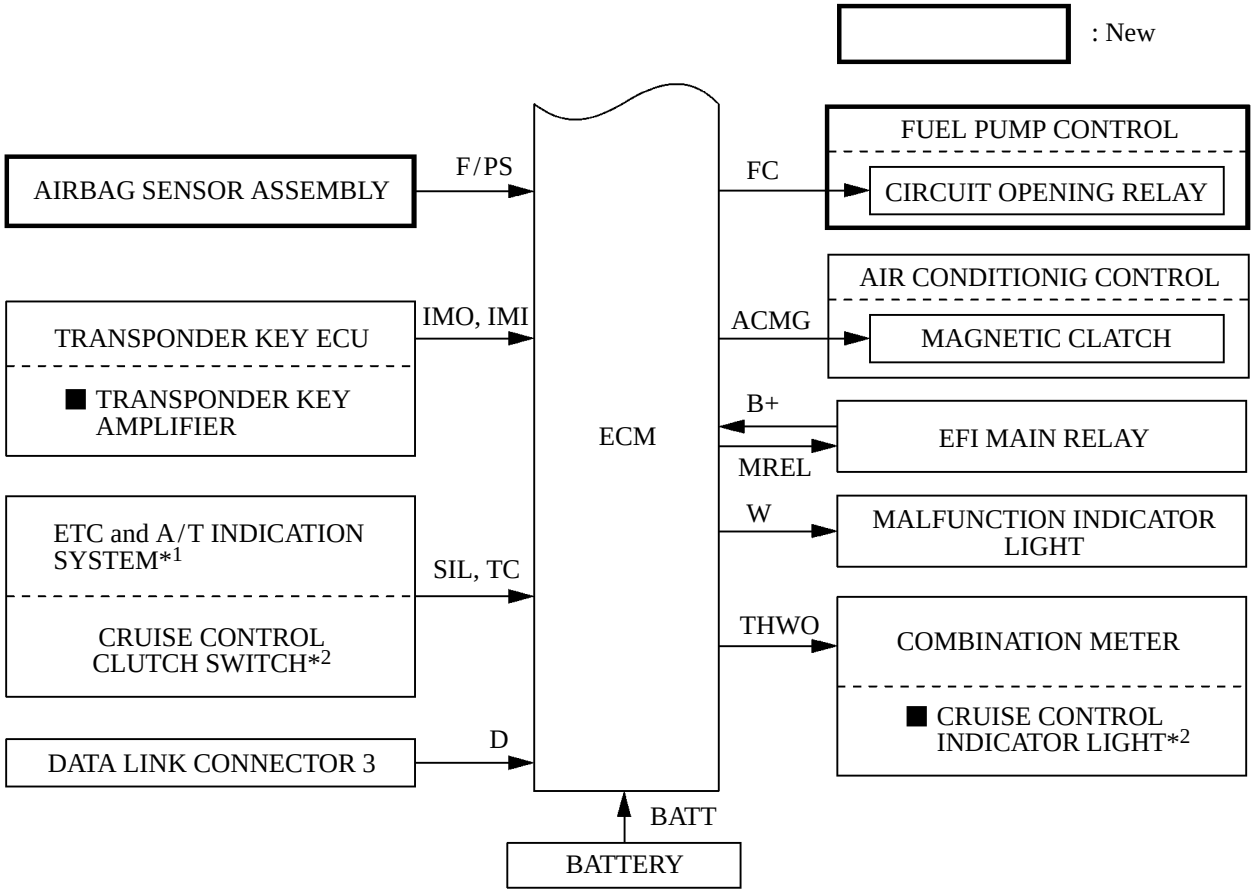

*1: With Engin Immobiliser System Model

*2: With Automatic Transaxle Model

*3: With Cruise Control System Model

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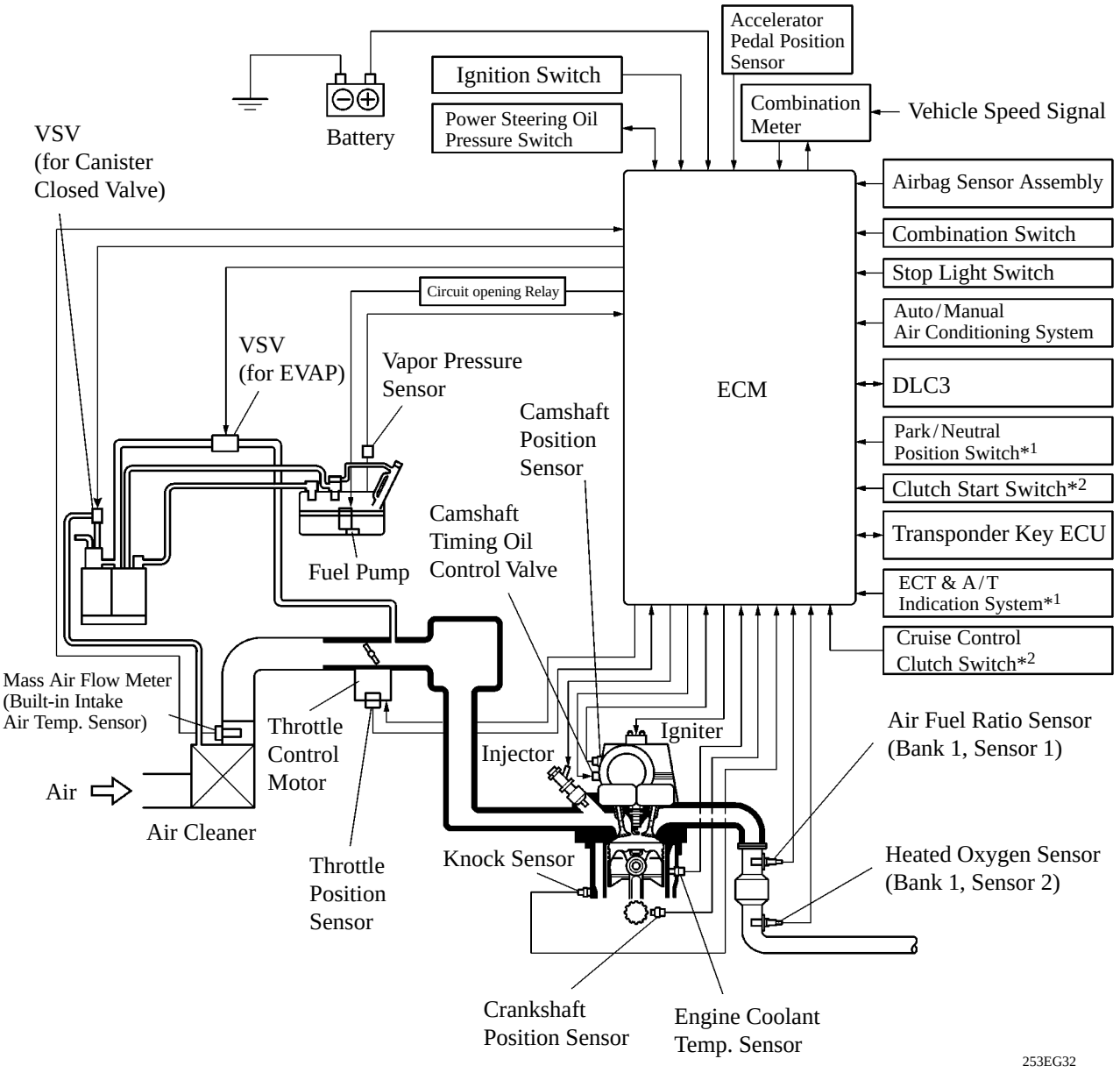
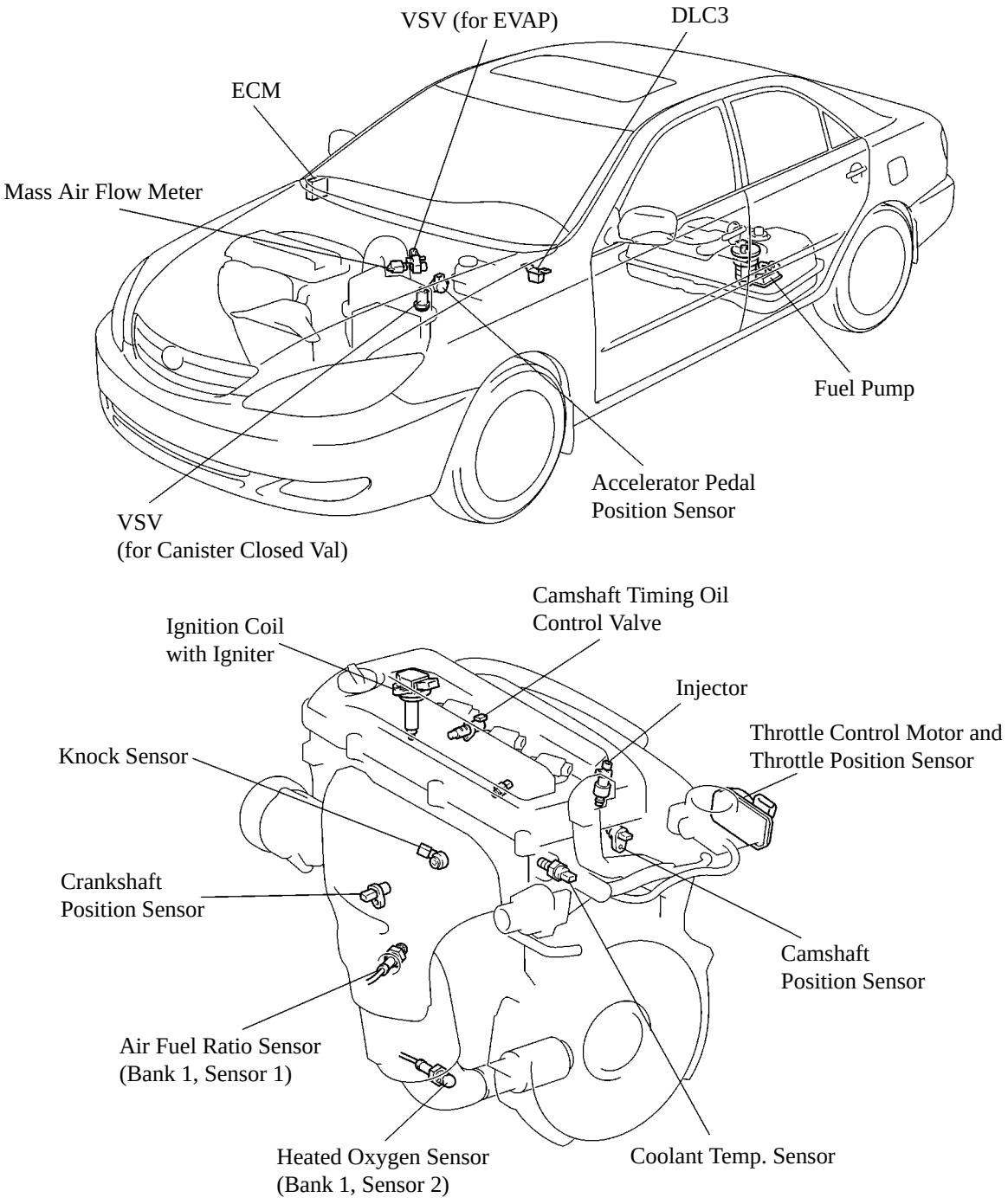
Engine Control System Diagram



*1: With Automatic Transaxle Model
*2: With Manual Transaxle Model

Layout of Main Components



Main Components of Engine Control System

1) General

The following table compares the main components.

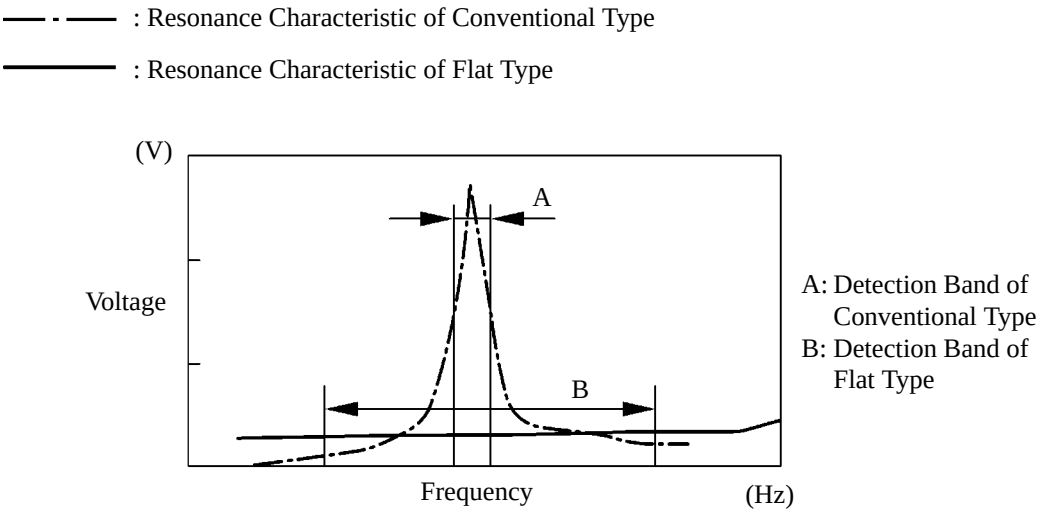
Model / Components	'04 Camry		'03 Camry	
	Outline	Quantity	Outline	Quantity
ECM	32-bit ECU	1	→	1
Mass Air Flow Meter	Hot-wire Type	1	→	1
Crankshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (36-2)	1	→	1
Camshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (3)	1	→	1
Throttle Position Sensor	No-contact Type	1	Linear Type	1
Accelerator Pedal Position Sensor	Linear Type	1	→	1
Knock Sensor	Built-in Piezoelectric Element Type (Flat Type)	1	Built-in Piezoelectric Element Type	1
Air Fuel Ratio Sensor	with Heater Type (Cup Type)	1	→	1
Oxygen Sensor	with Heater Type (Cup Type)	1	→	1
Injector	12-hole Type	4	→	4

2) Knock Sensor (Flat Type)

a. General

In the conventional type knock sensor (resonant type), a vibration plate which has the same resonance point as the knocking frequency of the engine is built in and can detect the vibration in this frequency band.
On the other hand, a flat type knock sensor (non-resonant type) has the ability to detect vibration in a wider frequency band from about 6 kHz to 15 kHz, and has the following features.

■ The engine knocking frequency will change a bit depending on the engine speed. The flat type knock sensor can detect the vibration even when the engine knocking frequency is changed. Thus the vibration detection ability is increased compared to the conventional type knock sensor, and a more precise ignition timing control is possible.



Characteristic of Knock Sensor

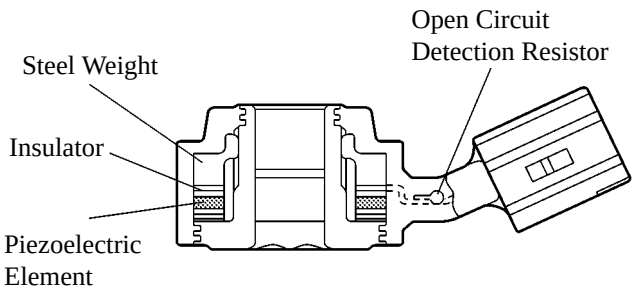
214CE04

b. Construction

■ The flat type knock sensor is installed on the engine through the stud bolt installed on the cylinder block. For this reason, a hole for the stud bolt is running through in the center of the sensor.

■ Inside of the sensor, a steel weight is located on the upper portion and a piezoelectric element is located under the weight through the insulator.

■ The open/short circuit detection resistor is integrated.



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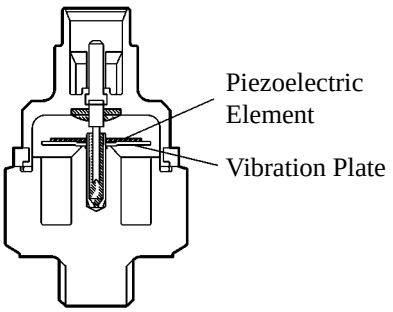
Flat Type Knock Sensor (Non-Resonant Type)



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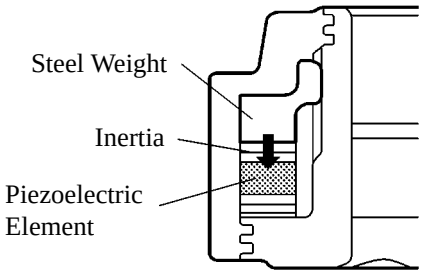
Conventional Type Knock Sensor (Resonant Type)

c. Operation

The knocking vibration is transmitted to the steel weight and its inertia applies pressure to the piezoelectric element. The action generates electromotive force.



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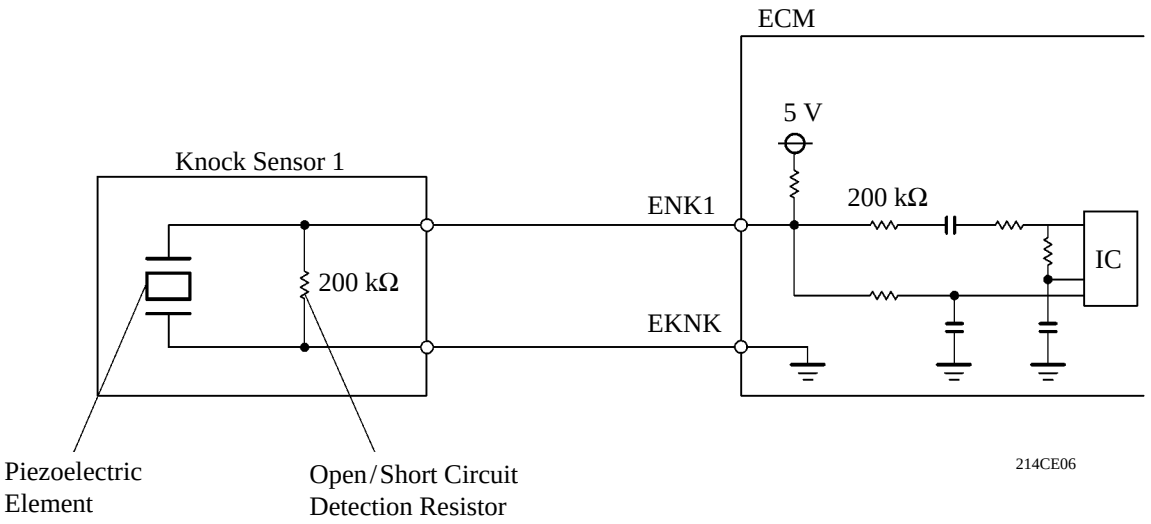
d. Open/Short Circuit Detection Resistor

During the ignition is ON, the open/short circuit detection resistor in the knock sensor and the resistor in the ECM keep the voltage at the terminal KNK1 of engine constant.
An IC (Integrated Circuit) in the ECM is always monitoring the voltage of the terminal KNK1. If the open/short circuit occurs between the knock sensor and the ECM, the voltage of the terminal KNK1 will change and the ECM detects the open/short circuit and stores DTC (Diagnostic Trouble Code).



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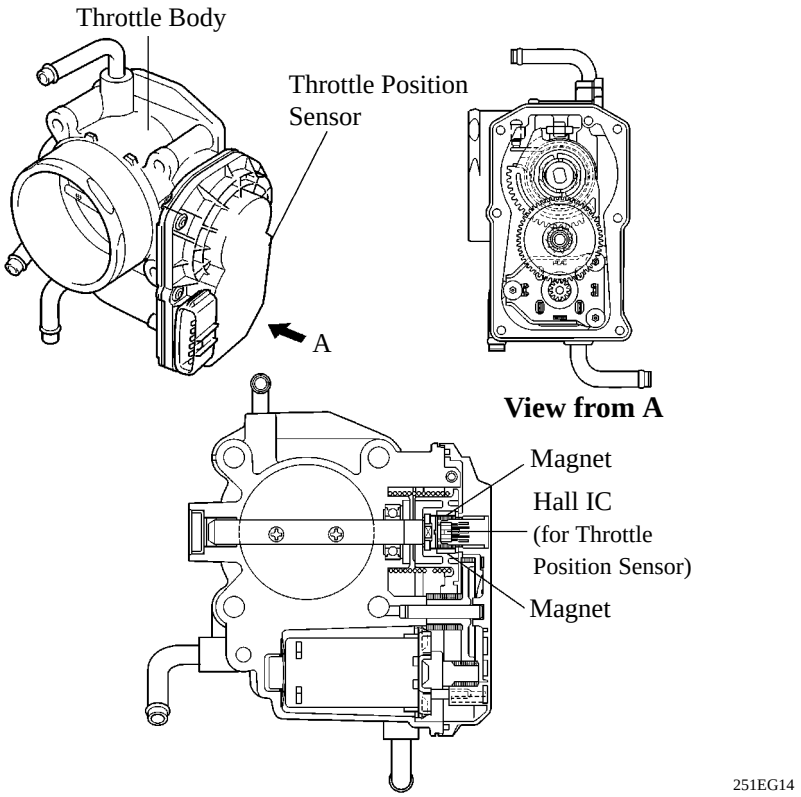
Service Tip

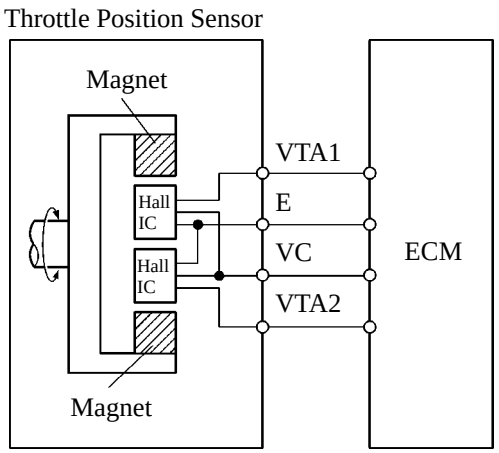
In accordance with the adoption of open/short circuit detection resistor, the inspection method for the sensor has been changed. For details, 2004 Camry Repair Manual (Pub. No. RM1063U).

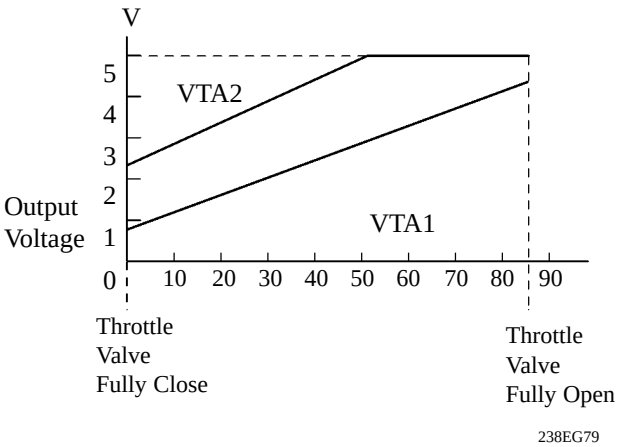
3) Throttle Position Sensor

The throttle position sensor is mounted on the throttle body, to detect the opening angle of the throttle valve, the throttle position sensor converts the magnetic flux density that changes when the magnetic yoke (located on the same axis as the throttle shaft) rotates around the Hall IC into electric signals to operate the throttle control motor.



Cross Section





Throttle Valve Opening Angle

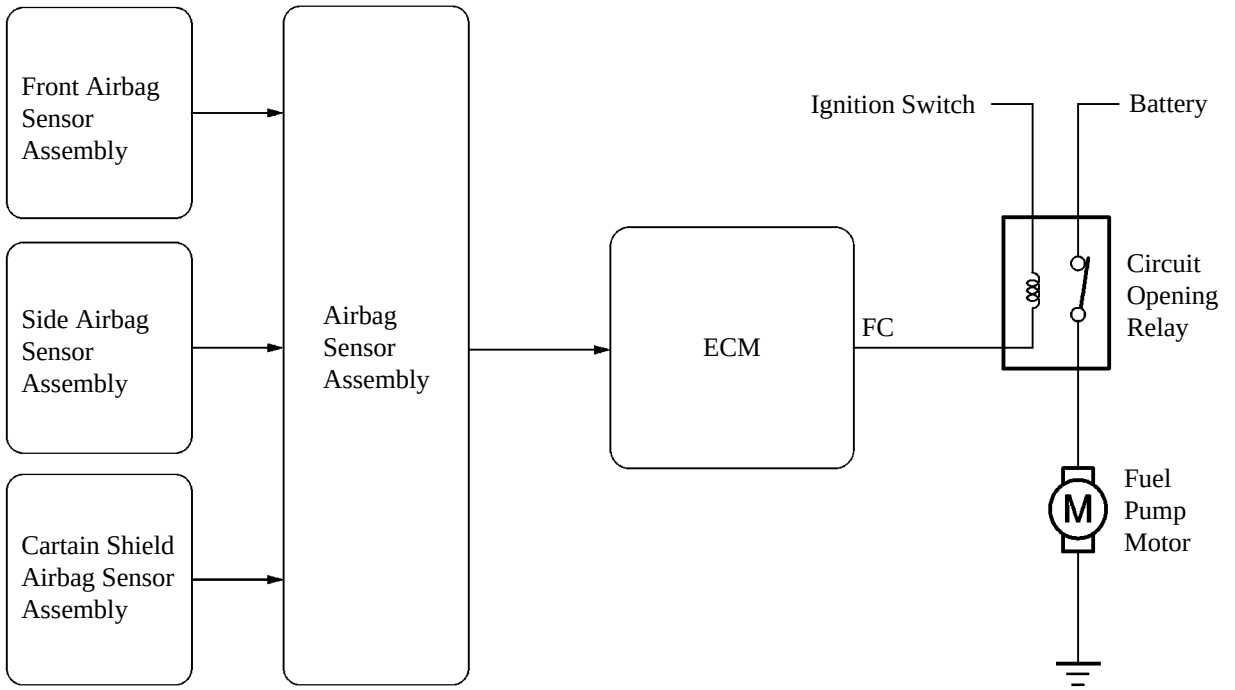
Service Tip

The inspection method differs from the conventional throttle position sensor because this sensor uses a Hall IC. For details, refer to the 2004 Camry Repair Manual (Pub. No. RM1063U).

4) Fuel Pump Control

■ Fuel pump operation is controlled by signal from the ECM.

■ A fuel cut control is adopted to stop the fuel pump when the airbag is deployed at the front or side collision. In this system, the airbag deployment signal from the airbag sensor assembly is detected by the ECM, which turns OFF the circuit opening relay.
After the fuel cut control has been activated, turning the ignition switch from OFF to ON cancels the fuel cut control, and the engine can be restarted.



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Evaporative Emission Control System

1) General

■ The Evaporative Emission Control System for 2AZ-FE engine has been changed from the LEV-I (Low Emission Vehicle-I) evaporative emission regulation to the LEV-II (Low Emission Vehicle-II) evaporative emission regulation. (California specification 2AZ-FE engine has not changed from the '03 Camry.)

■ The construction of the evaporative emission control system has been changed to comply with the LEV-II (Low Emission Vehicle-II) evaporative emission regulation which is belong to CARB (California Air Resources Board). Along with this change, the amount of vapor gas that is discharged outside of the vehicle while the vehicle is parked has been reduced considerably. Because of this construction, which is simpler than the previous, the reliability of the system has been improved.

■ This system consists primarily of a canister closed valve, purge valve, charcoal canister, vapor pressure sensor, refueling valve, and ECM.

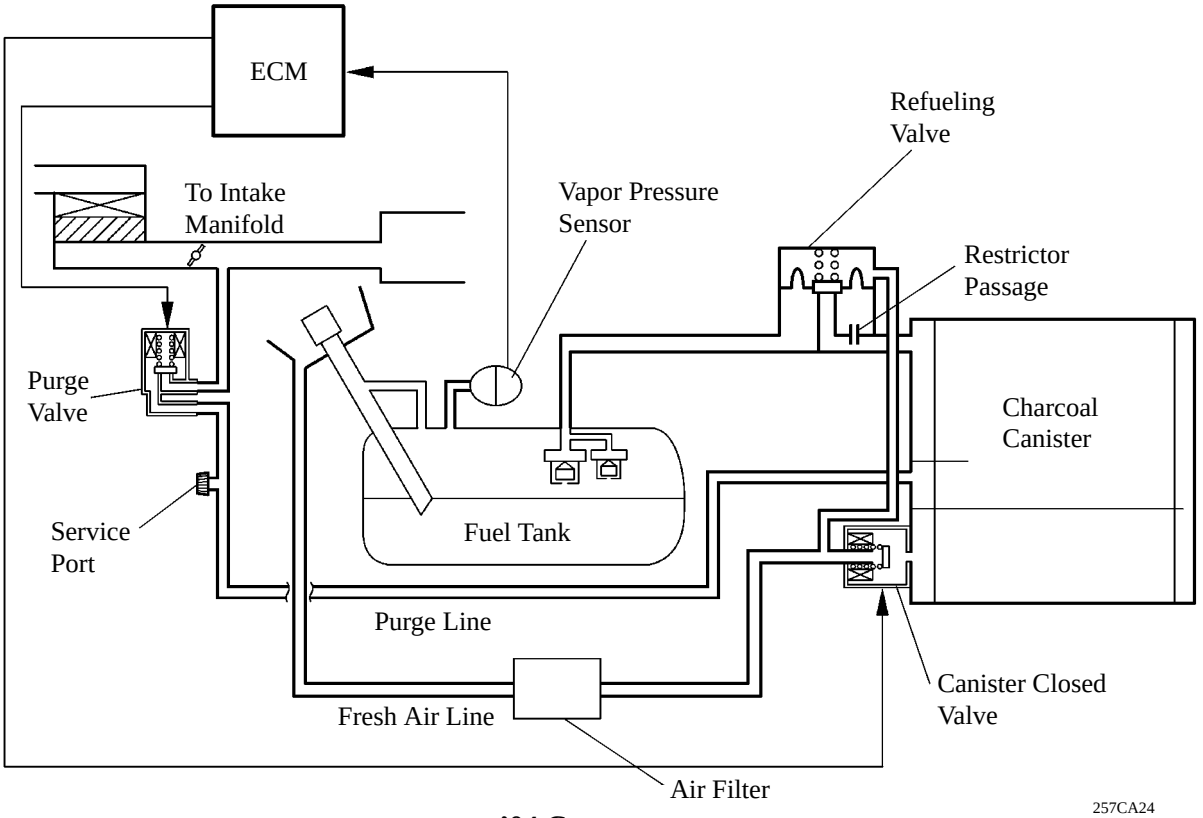
■ In this system, the ECM monitors the system for malfunctions and outputs DTCs (Diagnostic Trouble Codes) in the event of a malfunction. The detection method is basically the same as the conventional vacuum type that is used on other models. A vacuum is introduced into the system, and the amount of increase in the internal pressure of the fuel tank is monitored in order to detect any leakage in the system.

■ Listed below are the construction differences between this system and the conventional vacuum type:

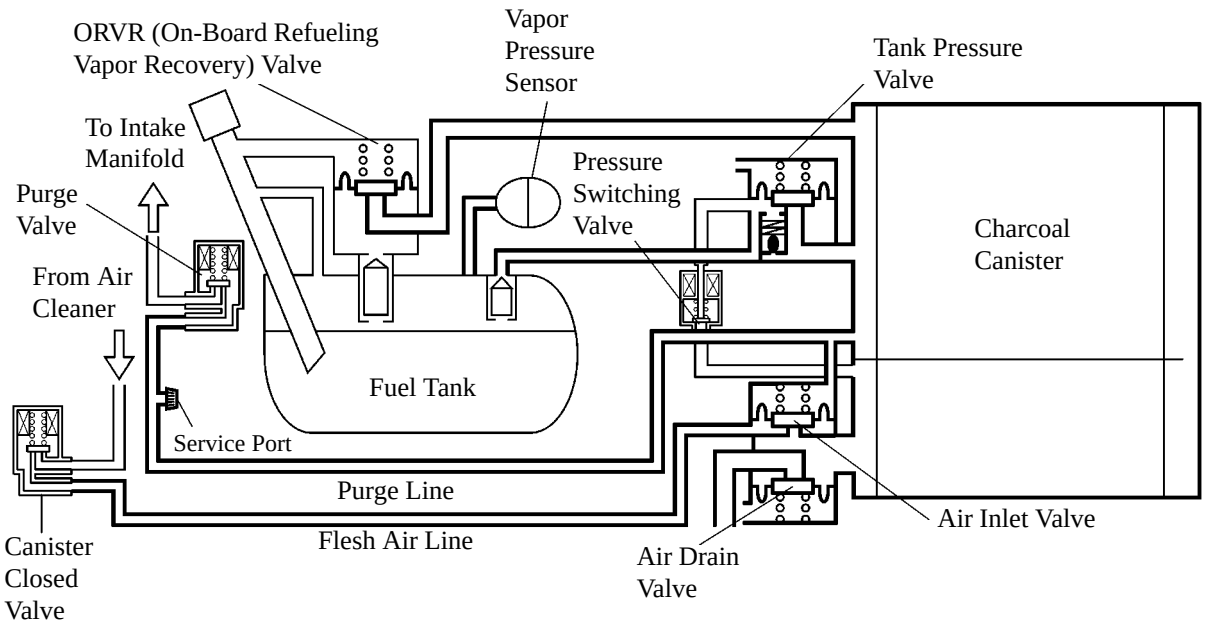
- The air drain valve has been discontinued. The air that has been cleaned through the charcoal canister is discharged through the fresh air line. Accordingly, the fresh air inlet has been moved from the air cleaner to a location near the fuel inlet. Furthermore, the pipe diameter of the fresh air line and the flow rate of the canister closed valve have been increased.
- An ORVR (Onboard Refueling Vapor Recovery) function has been provided in the refueling valve.
- A restrictor passage has been provided in the refueling valve to prevent the large amount of vacuum during purge operation or system monitoring operation from affecting the pressure in the fuel tank. As a result of this construction, the pressure switching valve has been discontinued.
- An air filter has been added to the fresh air line.
- The multiplex layered nyron made fuel main tube has been adopted.
- The capacity of the charcoal canister has been increased.
- The cutoff valve has been integrated in the fuel tank,
- The low emission type has been used for the fuel filler pipe.

*: The air filter is maintenance-free. If the filter becomes clogged, the ECM will illuminate the MIL (Malfunction Indicator Lamp) and record the DTC number P0446 in its memory.

▶ System Diagram ◀

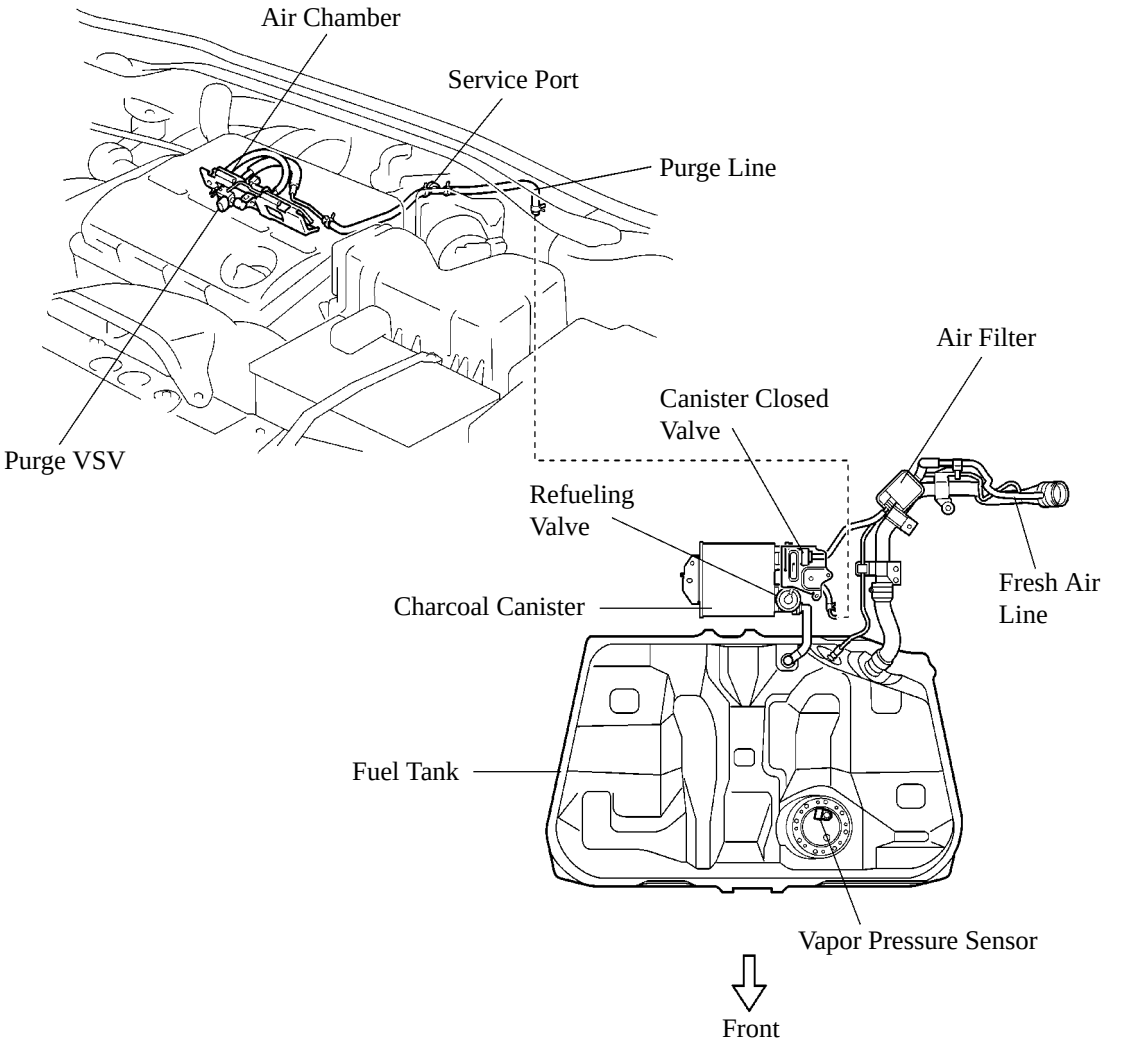


'04 Camry



Conventional Vacuum Type

2) Layout of Main Components



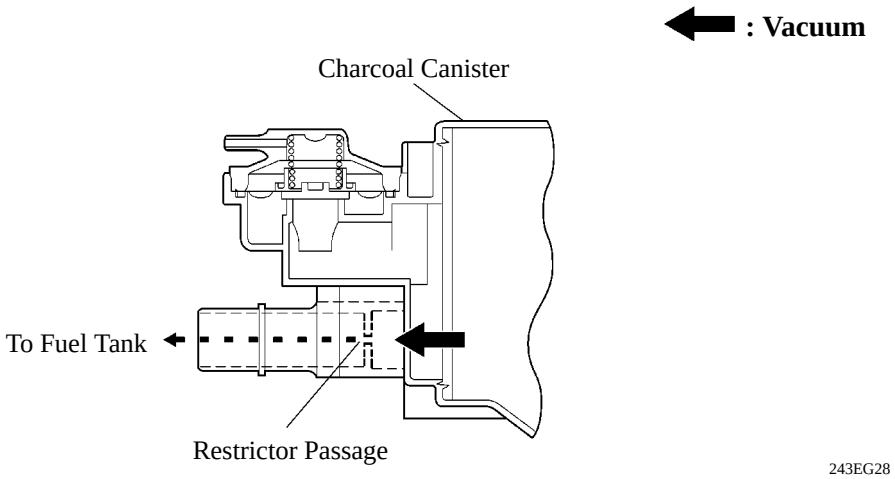
3) Function of Main Components

Components	Function
Canister Closed Valve	Opens and closes the fresh air line in accordance with the signals from the ECM in order to introduce fresh air and control the pressure relief if the internal pressure in the fuel tank increases.
Purge Valve	Opens in accordance with the signals from the ECM when the system is purging, in order to send the vapor gas that was absorbed by the charcoal canister into the intake manifold. During the system monitoring mode, this valve controls the introduction of the vacuum into the fuel tank.
Charcoal Canister	Contains activated charcoal to absorb the vapor gas that is created in the fuel tank.
Vapor Pressure Sensor	Detects the pressure in the fuel tank and sends the signals to the ECM.
Refueling Valve	Controls the flow rate of the vapor gas from the fuel tank to the charcoal canister when the system is purging or during refueling.
Air Filter	Prevents dust and debris in the fresh air from entering the system.
Service Port	This port is used for connecting a vacuum gauge for inspecting the system.
ECM	Controls the canister closed valve and the purge valve in accordance with the signals from various sensors, in order to achieve a purge volume that suits the driving conditions. In addition, the ECM monitors the system for any leakage and outputs a DTC if a malfunction is found.

4) Construction and Operation

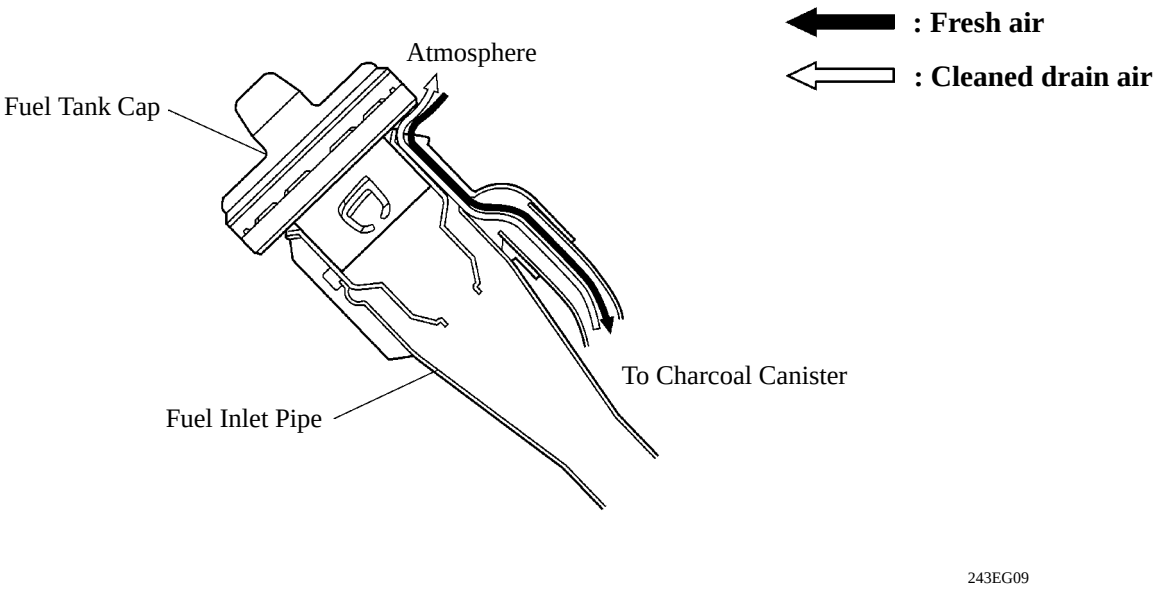
a. Refueling Valve

A restrictor passage has been provided in the tank pressure valve. The restrictor passage prevents the large amount of vacuum that is created during purge operation or system monitoring operation from entering the fuel tank, and limits the flow of the vapor gas from the fuel tank to the charcoal canister. If a large volume of vapor gas recirculates into the intake manifold, it will affect the air-fuel ratio control of the engine. Therefore, the role of the restrictor passage is to prevent this from occurring.



b. Fuel Inlet (Fresh Air Inlet)

In accordance with the change of structure of the evaporative emission control system, the location of a fresh air line inlet has been changed from the air cleaner section to near fuel inlet. The flesh air from the atmosphere and drain air cleaned by the charcoal canister will go in and out to the system through the passage shown below.

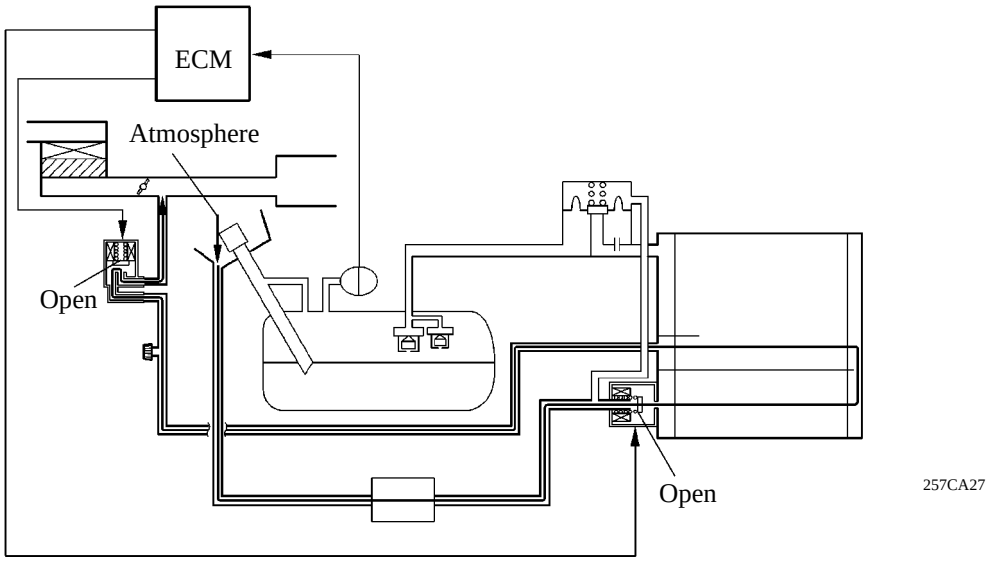


5) System Operation

a. Purge Flow Control

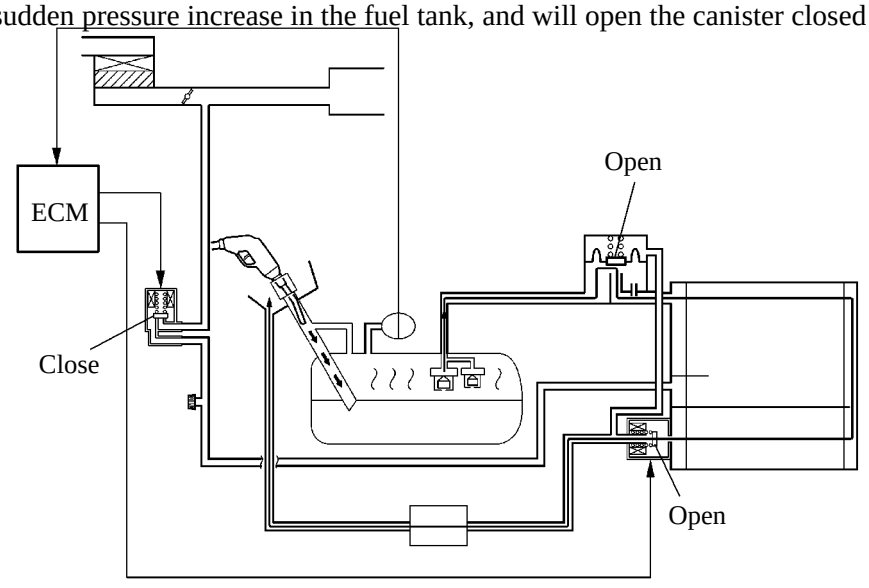
When the engine has reached predetermined parameters (closed loop, engine coolant temp. above 80°C (176°F), etc), stored fuel vapors are purged from the charcoal canister whenever the purge valve is opened by the ECM.

The ECM will change the duty ratio cycle of the purge valve thus controlling purge flow volume. Purge flow volume is determined by intake manifold pressure and the duty ratio cycle of the purge valve. Atmospheric pressure is allowed into the charcoal canister to ensure that purge flow is constantly maintained whenever purge vacuum is applied to the charcoal canister.



b. ORVR (On-board Refueling Vapor Recovery)

When the internal pressure of the fuel tank increases during refueling, this pressure causes the diaphragm in the refueling valve to lift up, allowing the fuel vapors to enter the charcoal canister. Because the canister closed valve is always open (even when the engine is stopped) when the system is in a mode other than the monitoring mode, the air that has been cleaned through the charcoal canister is discharged outside of the vehicle via the fresh air line. If the vehicle is refueled during the system monitoring mode, the ECM will recognize the refueling by way of the vapor pressure sensor, which detects the sudden pressure increase in the fuel tank, and will open the canister closed valve.

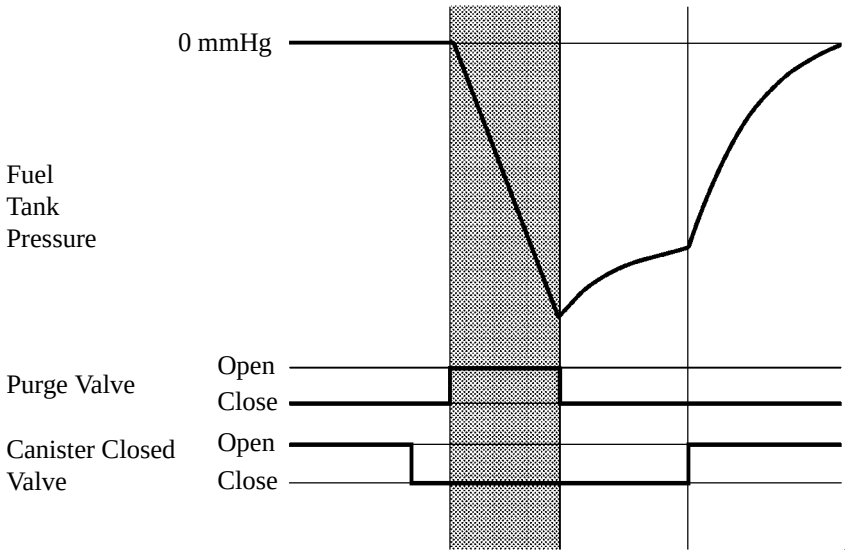


c. System Monitoring

When the initial conditions {low engine temperature (low engine coolant temperature and, engine coolant temperature and intake air temperature being nearly the same) at the engine starting, constant vehicle speed (including idling), and so on.} are met, the ECM introduces a vacuum into the system and monitors the amount of pressure increase in the fuel tank in order to determine if there is any leakage in the system. At the same time, the ECM determines if there is any malfunction in the canister closed valve and the purge valve.

i) Step 1

The ECM opens the purge valve and introduces a vacuum into the fuel tank.



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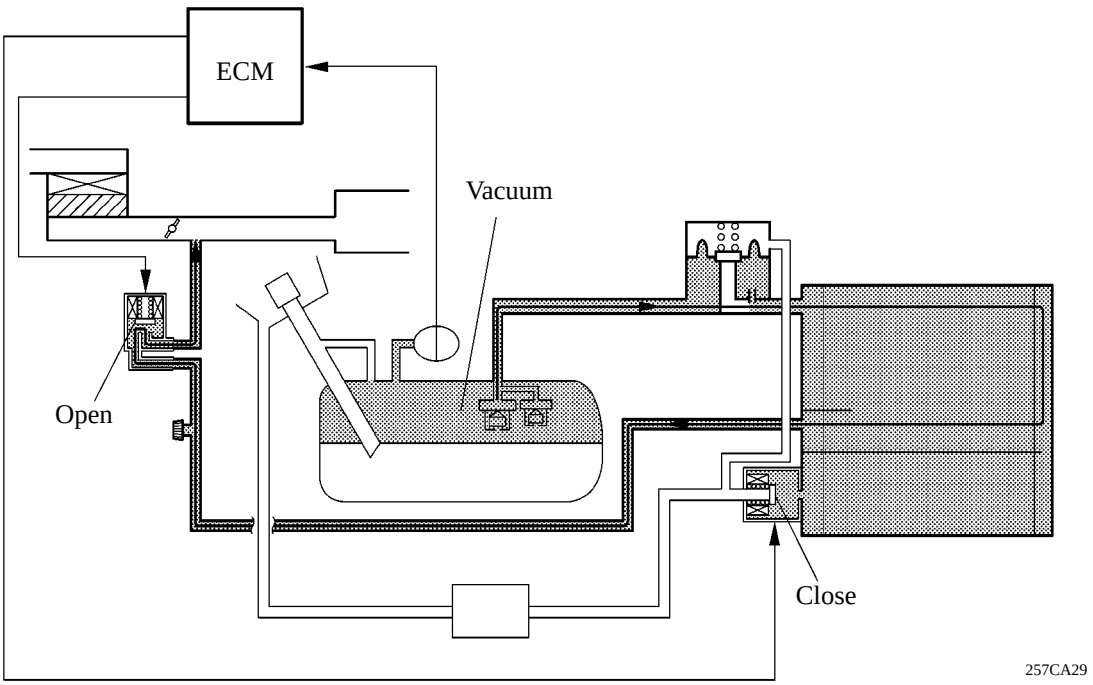

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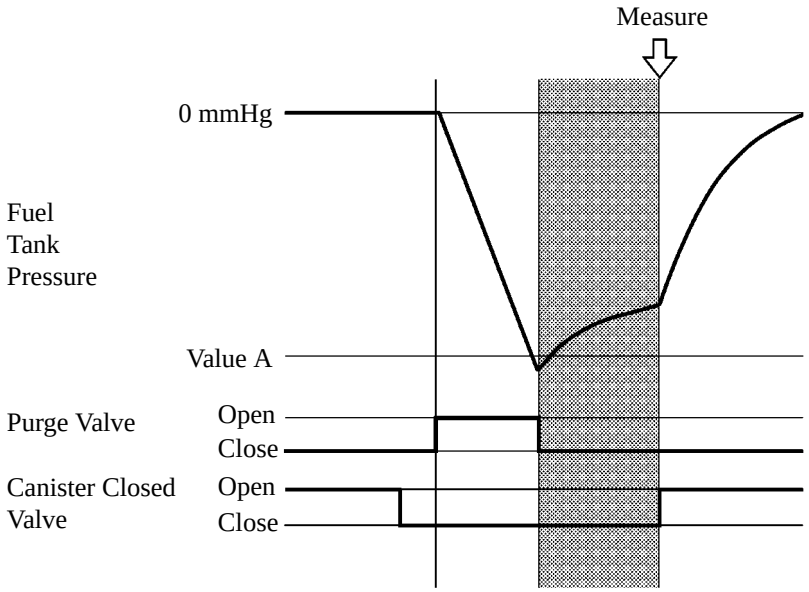
ii) Step 2

When the pressure in the fuel tank decreases below value A, the ECM closes the purge valve again. The ECM measures the amount of pressure increase in the tank.



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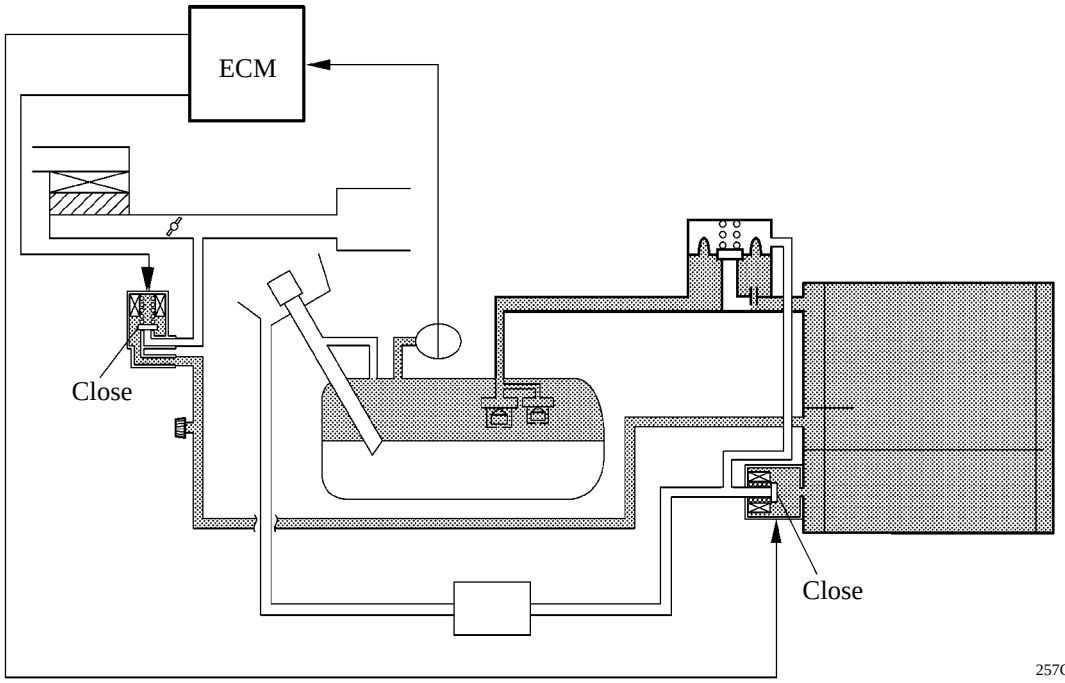

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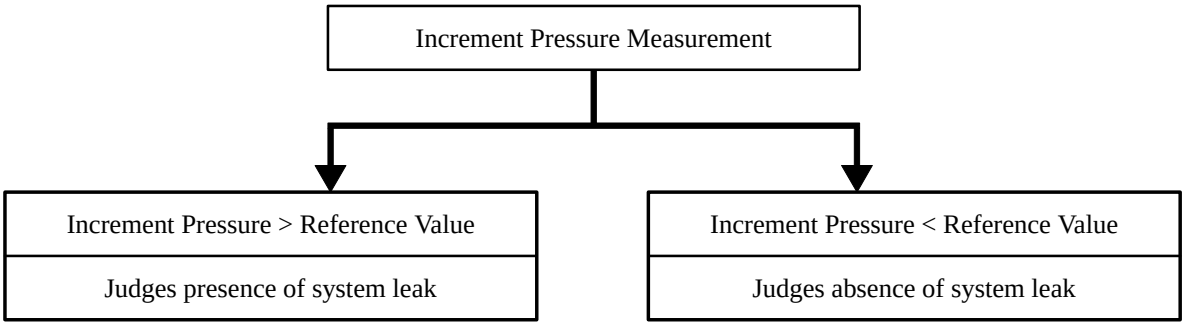
iii) System Leak Judgment

The ECM determines whether there is a leakage in the system by the increment amount of fuel tank pressure at Step2 in the previous page. If the increment amount of the fuel tank pressure is greater than the reference value, the ECM judges that there is a system leak.



■ If the ECM judges that there is no system leak, it ends the system monitoring mode and transfers to the normal system control. (Both the purge valve and canister closed valve are opened.)

■ If the ECM determines that there is a system leak, it illuminates the MIL and stores the following DTCs in its memory:

Level of Leak	DTC
Small or medium leak	P0442
Large leak	P0441, P0442 and P0446

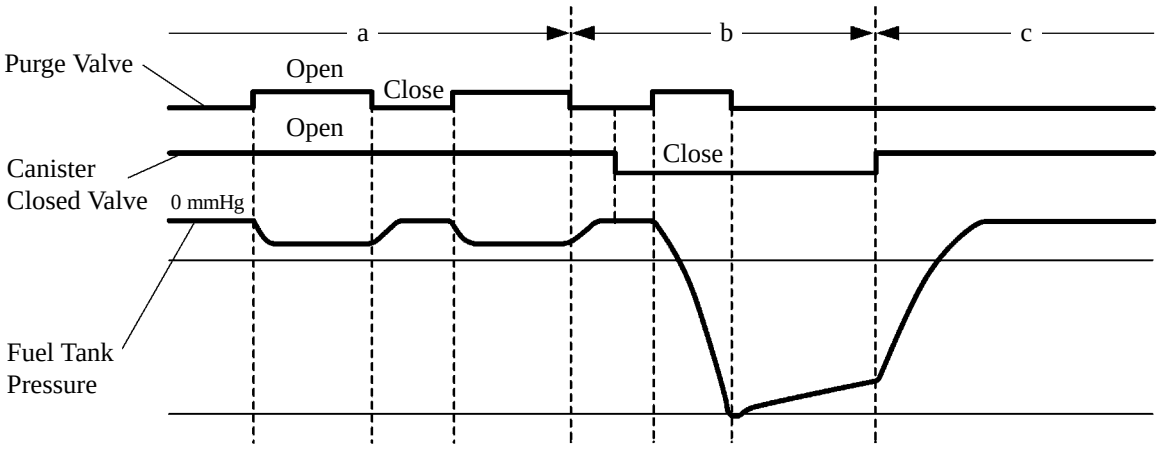
iV) VSV (Vacuum Switching Valve) Monitoring

■ **Normal Condition**

a. During purging, the ECM opens the purge valve, and this creates a slight vacuum in the fuel tank.

b. During the system monitoring mode, the ECM opens the purge valve and closes the canister closed valve to introduce a vacuum into the fuel tank.

c. After the ECM has performed a system leak judgment, it opens the canister closed valve to introduce fresh air into the system. As a result, the atmospheric pressure is reinstated rapidly in the fuel tank.

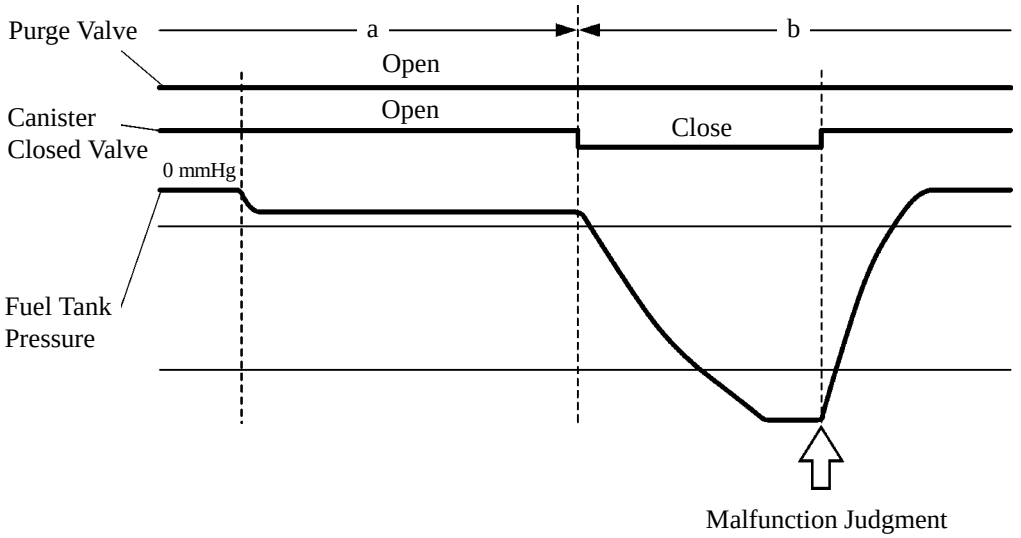


■ Purge Valve Open Malfunction

a. The fuel tank remains in a constant, slight vacuum state regardless of whether the ECM sends an open or close signal to the purge valve.

b. The pressure in the fuel tank drops rapidly regardless of the close signal that the ECM is sending to the purge valve.

When the ECM detects an open malfunction of the purge valve, it illuminates the MIL and stores the DTC number P0441 in its memory.



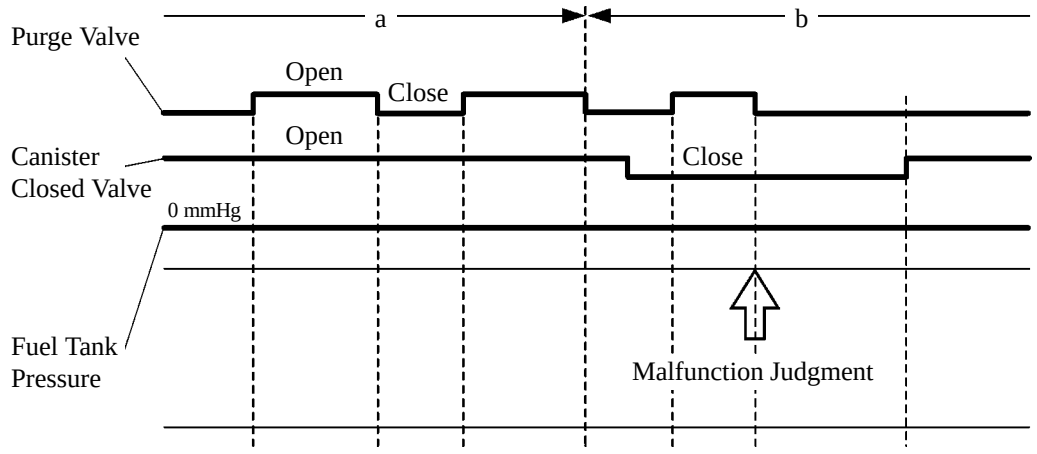
228TU112

■ Purge Valve Close Malfunction

a. The pressure in the fuel tank does not change regardless of whether the ECM sends an open or close signal to the purge valve.

b. Even if the ECM closes the canister closed valve in order to transfer to the system monitoring mode, no vacuum is introduced into the fuel tank.

When the ECM detects a close malfunction of the purge valve, it illuminates the MIL and stores the DTC numbers P0441, P0442, and P0446 in its memory.



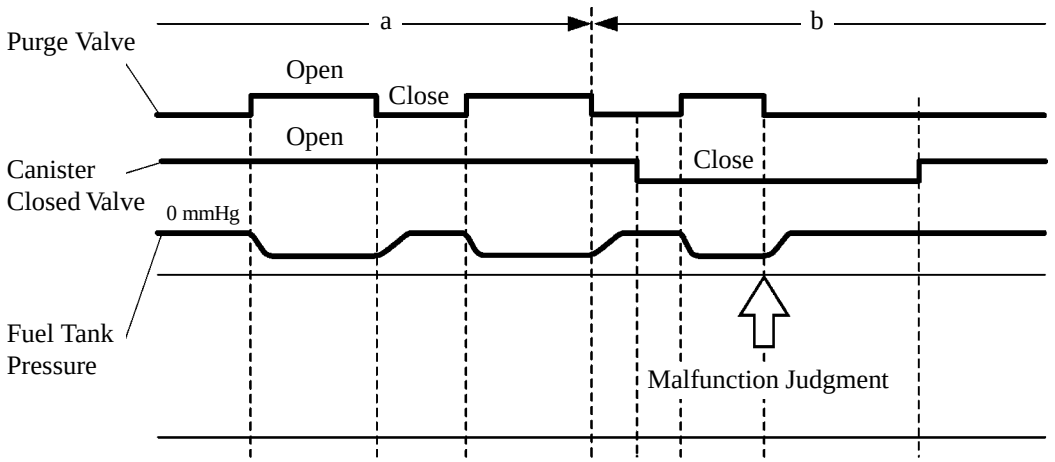
228TU113

■ Canister Closed Valve Open Malfunction

a. As the ECM opens the purge valve, a slight vacuum is created in the fuel tank.

b. Even if the ECM sends a close signal to the canister closed valve in order to transfer to the system monitoring mode, it is not possible to completely introduce a vacuum into the fuel tank.

When the ECM detects an open malfunction of the canister close valve, it illuminates the MIL and stores the DTC numbers P0441, P0442, and P0446 in its memory.

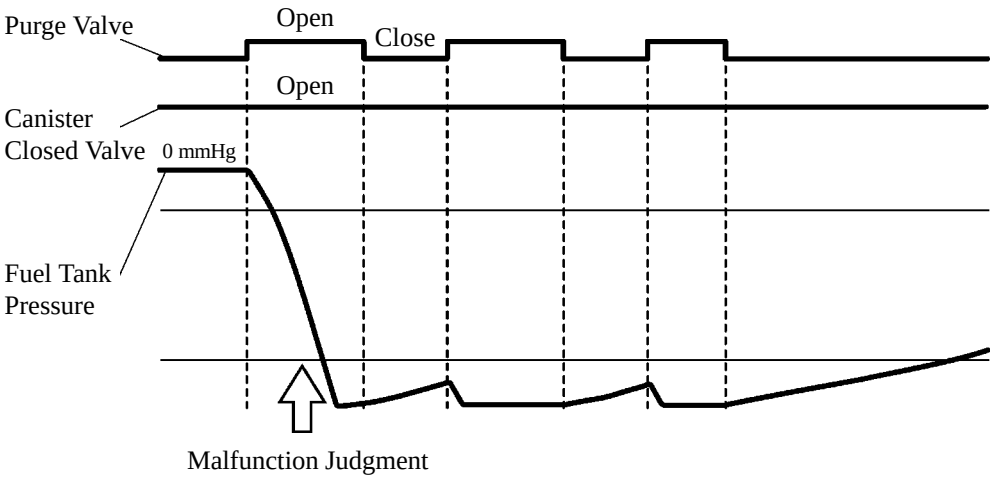


228TU114

■ Canister Closed Valve Close Malfunction

During purging, a large amount of vacuum is introduced into the fuel tank regardless of the open signal that the ECM sends to the canister closed valve. Even if the purge valve closes, the atmospheric pressure is not reinstated in the fuel tank.

When the ECM detects a close malfunction of the canister close valve, it illuminates the MIL and stores the DTC number P0446 in its memory.



228TU115

■1MZ-FE ENGINE

1. Cooling System

The TOYOTA genuine Super Long Life Coolant (SLLC) has been adopted. As result, the maintenance interval has been extended.
Refer to the cooling system on page 12 of the 2AZ-FE engine for the type, color, and the maintenance interval for the coolant.

▶ Specifications ◀

Model		’04 Camry	’03 Camry
Engine Coolant	Capacity litter (US pts, Imp. qts)	9.2 (9.7, 8.1)	→

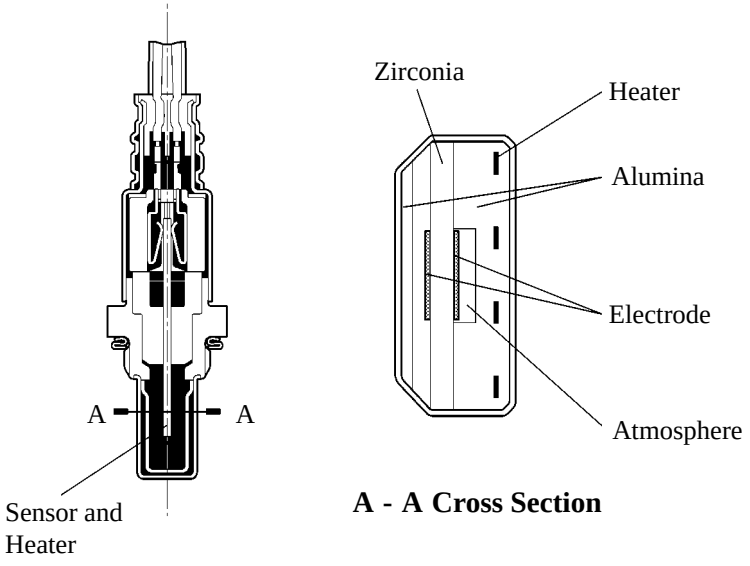
2. Charging System

For details, see page 12 in the 2AZ-FE engine section.

3. Engine Control System

Air Fuel Ratio Sensor

The air-fuel ratio sensor is the planar type. Compared to the conventional type, the sensor and heater portions of the planar type are narrower overall. Because the heat of the heater acts directly on the alumina and zirconia (of the sensor portion) it accelerates the activation of the sensor.



A - A Cross Section

238EG54

Fuel Pump Control System

For details, see page 24 in the 2AZ-FE engine section.

Evaporative Emission Control System

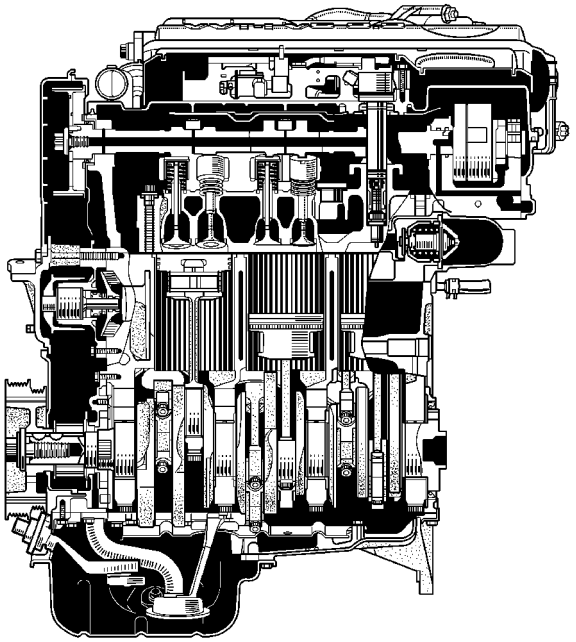
For details, see page 25 in 2AZ-FE engine section.

3MZ-FE ENGINE

1. General

■ The 3MZ-FE engine on the ’04 Camry is a newly developed V6, 3.3-liter, 24-valve DOHC engine. It is based on the 1MZ-FE engine of the ’03 Camry, in which the cylinder bore has been increased. Furthermore, the VVT-i (Variable Valve Timing-intelligent) system, ACIS (Acoustic Control Induction System), and the ETCS-i (Electronic Throttle Control System-intelligent) have been adopted.

■ This engine complies with the LEVII-ULEV (Ultra Low Emission Vehicle) (California) and Tier2-Bin 5 (except California) regulations as a result of the changes made to its intake, exhaust, and fuel systems, as well as the optimal control of these systems.



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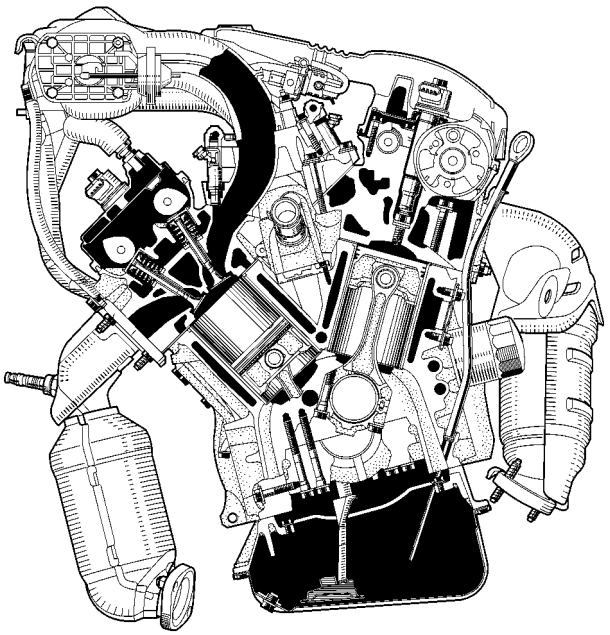


253EG02

▶ Engine Specifications ◀

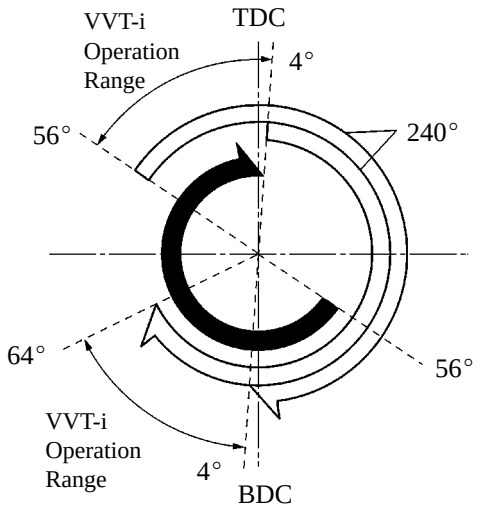
Model			’04 Camry	’03 Camry
Engine Type			3MZ-FE	1MZ-FE
No. of Cyls. & Arrangement			6-Cylinder, V Type	
Valve Mechanism			24-Valve DOHC, Belt & Gear Drive (with VVT-i)	24-Valve DOHC, Belt & Gear Drive (less VVT-i)
Combustion Chamber			Pentroof Type	
Manifolds			Cross-Flow	
Fuel System			SFI	
Displacement cm^3 (cu. in.)			3311 (202.1)	2995 (182.8)
Bore x Stroke mm (in.)			92.0 x 83.0 (3.62 x 3.27)	87.5 x 83.0 (3.44 x 3.27)
Compression Ratio			10.8 : 1	10.5 : 1
Max. (SAE-NET) Output			168 kW @ 5600 rpm (225 HP @ 5600 rpm)	156 kW @ 5800 rpm (210 HP @ 5800 rpm)
Max. (SAE-NET) Torque			325 N·m @ 3600 rpm (240 ft lbf @ 3600 rpm)	298 N·m @ 4400 rpm (220 ft lbf @ 4400 rpm)
Valve Timing	Intake	Open	- 4° - 56° BTDC	
		Close	64° - 4° ABDC	60° - 0° ABDC
	Exhaust	Open	56° BBDC	54° BBDC
		Close	4° ATDC	2° ATDC
Firing Order			1-2-3-4-5-6	
Research Octane Number			91 or higher	
Octane Rating			87 or higher	
Engine Service Mass* (Reference) kg (lb)			159 (351)	157 (346)
Oil Grade			API SL, EC or ILSAC	API SH, SJ, EC or ILSAC
Tailpipe Emission Regulation			LEVII-ULEV (California) Tier2-Bin 5 (except California), SFTP	ULEV, SFTP
Evaporative Emission Regulation			LEV-II, ORVR	LEV-I, ORVR

*: Weight shows the figure with the oil and engine coolant fully filled.

▶ Valve Timing ◀

: Intake Valve Opening Angle

: Exhaust Valve Opening Angle



241EG03

2. Major Difference

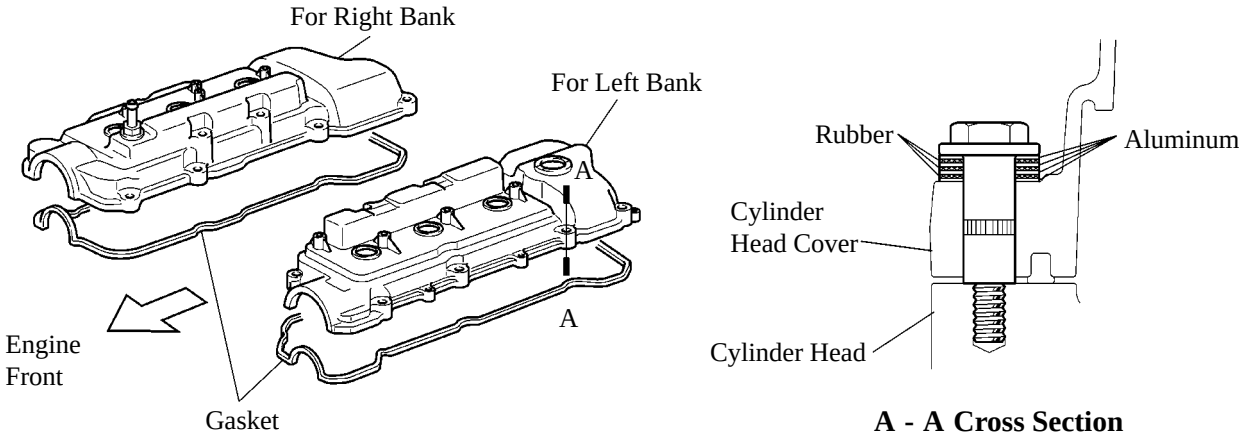
The major difference between the new 3MZ-FE engine on the ’04 Camry and the 1MZ-FE engine on the ’03 Camry are the following:

System		Features
Engine Proper	Cylinder Head	■ The shape of the areas surrounding the intake and exhaust valves has been changed. ■ The water passage shape has been changed.
	Cylinder Block	■ The cylinder bore has been increased.
	Piston	■ The piston diameter has been increased. ■ The placement position of the piston rings has been slightly raised.
Valve Mechanism		■ In contrast to the lead-free valve seats that are used only for the exhaust on the 1MZ-FE engine, the 3MZ-FE uses the lead-free valve seats for both the intake and exhaust. ■ Due to the changed piston shape, the valves may come in contact with the pistons during the installation of the timing belt, depending on the position of the pistons. To prevent this contact, the installation procedure has been changed.
Cooling System		■ The TOYOTA genuine super long life coolant has been adopted. ■ The fin pitch of the radiator has been changed rom 2.25 mm (0.09 in.) to 2.5 mm (0.10 in.).
Intake and Exhaust System		A carbon filter, which absorbs the HC that accumulates in the intake system when the engine is stopped, has been adopted in the air cleaner cap.
Charging System		The segment conductor type generator has been adopted. (For details, see page 12 in 2AZ-FE engine section.)
Starting System		The PS (Planetary reduction-Segment conductor motor) type starter has been adopted.
Engine Control System		■ The planar type air fuel ratio sensor has been adopted. ■ The flat type knock sensor has been adopted. ■ The fuel pump is stopped, when the SRS airbag is deployed in a front or side collision.
Evaporative Emission System		System construction and control logic have been made to comply with LEV-II evaporative emission regulation.
Diagnosis		All the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes.

3. Engine Proper

Cylinder Head Cover

- Lightweight yet high-strength aluminum diecast cylinder head covers are used.
- An aluminum washer made of vibration-damping laminated aluminum sheet is used on the evenly spaced shoulder bolts which fasten the cylinder head covers.



A - A Cross Section

243EG30

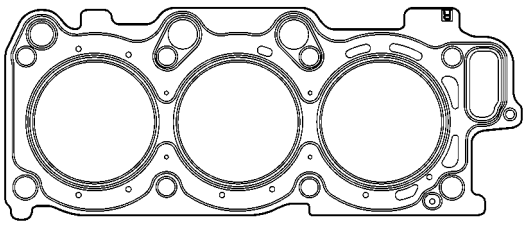
Cylinder Head Gasket

- A metal type cylinder head gasket which offers superior pressure resistance and sealing performance has been adopted.

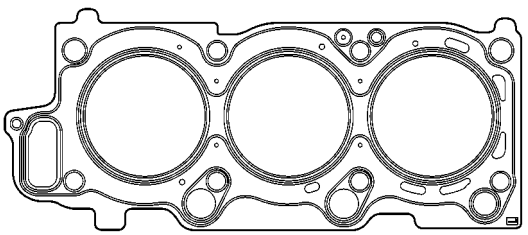
— Main Changes from '03 1MZ-FE engine —

Along with the increased diameter of the cylinder bore and the change in the shape of the water passage of the 3MZ-FE engine on the '04 model, the shape of the cylinder head gasket has been changed.

for Right Bank



for Left Bank



Engine Front ⇦

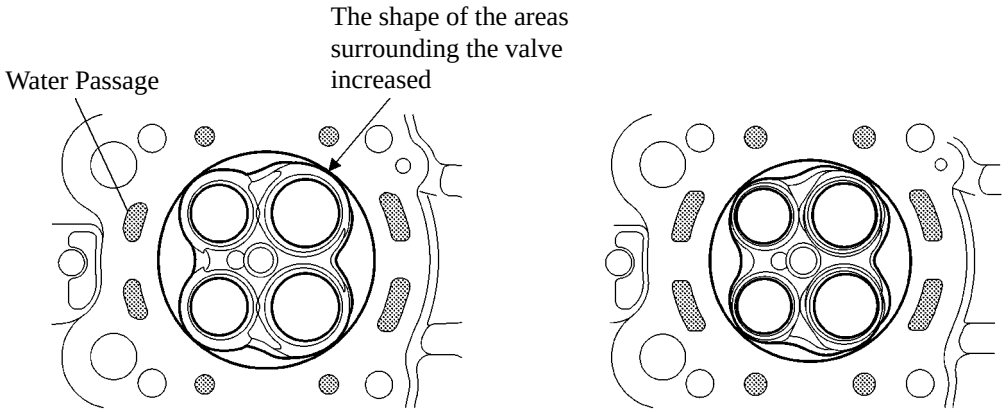
243EG22

Cylinder Head

- The cylinder head, which is made of aluminum, has adopted a pentroof-type combustion chamber. The spark plug is located in the center of the combustion chamber.
- Upright, small-diameter intake ports are adopted.
- Plastic region tightening bolts are used for the cylinder head bolts for good axial tension.

— Main Changes from '03 1MZ-FE engine —

Along with the increased diameter of the cylinder bore of the 3MZ-FE engine on the '04 model, the area of the combustion chamber that surrounds the valves in the cylinder head has been extended all the way to the edge of the cylinder bore.
As a result, the intake and exhaust efficiency of the engine has been improved. Also, by optimizing the shape of the water passage, the cooling efficiency has been improved in order to accommodate the high compression ratio of this engine.



3MZ-FE Engine **1MZ-FE Engine**

View of Back Side

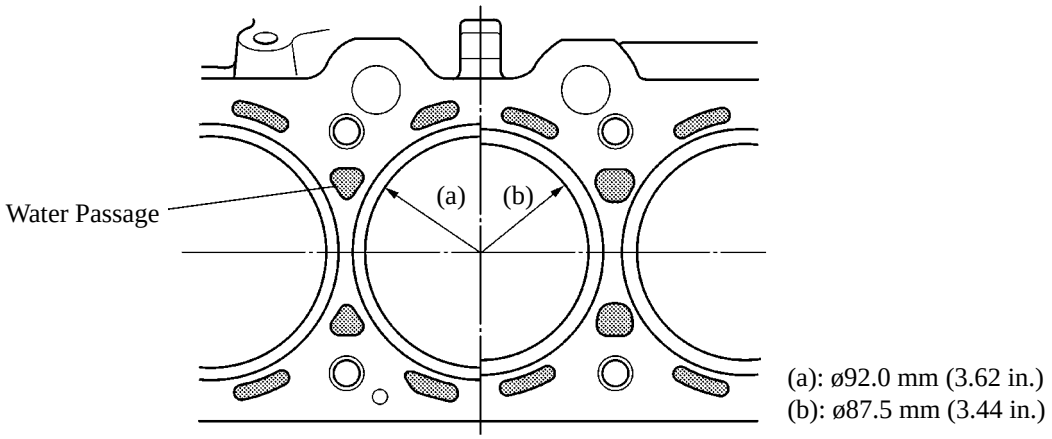
241EG06

Cylinder Block

- The cylinder block has a bank angle of 60°, a bank offset of 36.6 mm (1.44 in.) and a bore pitch of 105.5 mm (4.15 in.), resulting in a compact block.
- Lightweight aluminum alloy is used for the cylinder block.
- A thin cast-iron liner is press-fit inside the cylinder to ensure an added reliability. This liner is thin, so boring is not possible.
- A water pump swirl chamber and an inlet passage to the pump are provided in the V-bank to help make the engine compact.
- Knock sensor bosses are provided at 2 locations in V-bank.

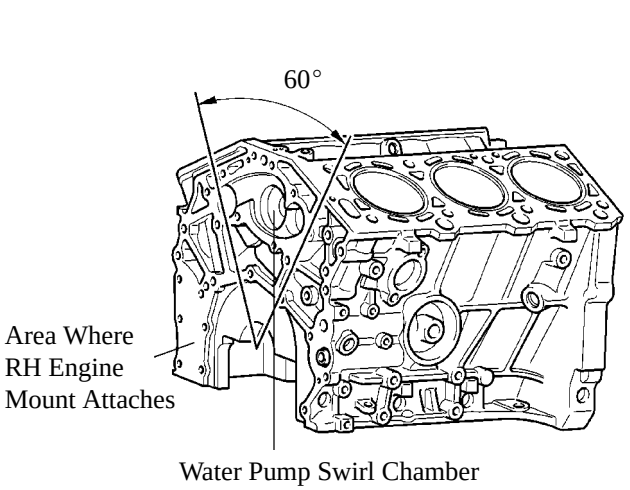
— Main Changes from '03 1MZ-FE engine —

The diameter of the cylinder bore has been increased in the 3MZ-FE engine on the '04 model. Along with this increase, the thickness of the cylinder wall and the shape of the water passage have been optimized. In addition, the shape of the area where the RH engine mount attaches has been changed.



3MZ-FE Engine **1MZ-FE Engine**

241EG07



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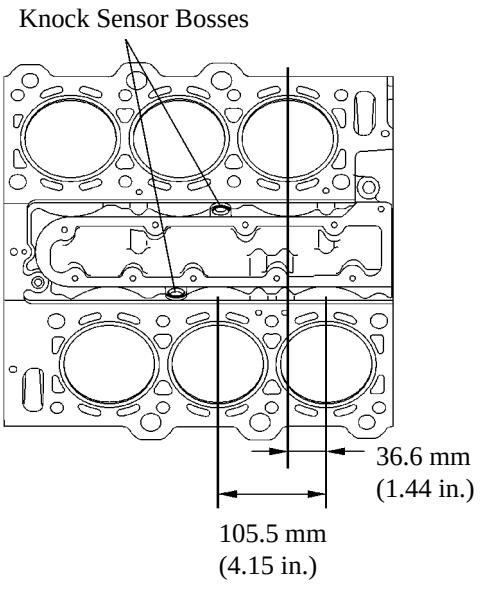


208EG63

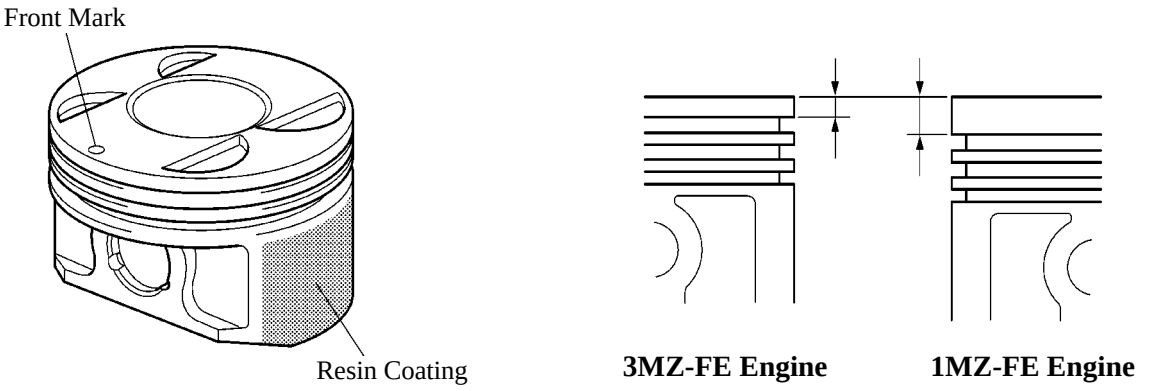
View of Top Side

Piston

- The piston is made of aluminum alloy and skirt area is made compact and lightweight.
- The piston skirt has been coated with resin to reduce the friction loss.
- Full floating type piston pins are used.

— Main Changes from '03 1MZ-FE engine —

- Along with the increased diameter of the cylinder bore of the 3MZ-FE engine on the '04 model, the diameter of the piston has been also increased. Furthermore, the piston rings have been positioned slightly higher in order to reduce the area in which unburned fuel is likely to accumulate during combustion.
- This piston is common to all cylinders. Therefore, the pistons are not shaped especially for the right or the left bank. As a result, serviceability has been improved.

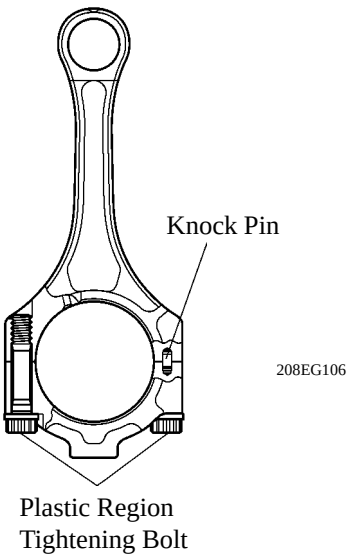


▶ Specifications ◀

Engine Type		3MZ-FE	1MZ-FE
Basic Diameter	mm (in.)	92.0 (3.62)	87.5 (3.44)
Piston Pin Offset	mm (in.)	1.0 (0.04)	
Height	mm (in.)	55.2 (2.17)	51.2 (2.02)
Compression Height	mm (in.)	31.2 (1.23)	
Material		Aluminum Alloy	

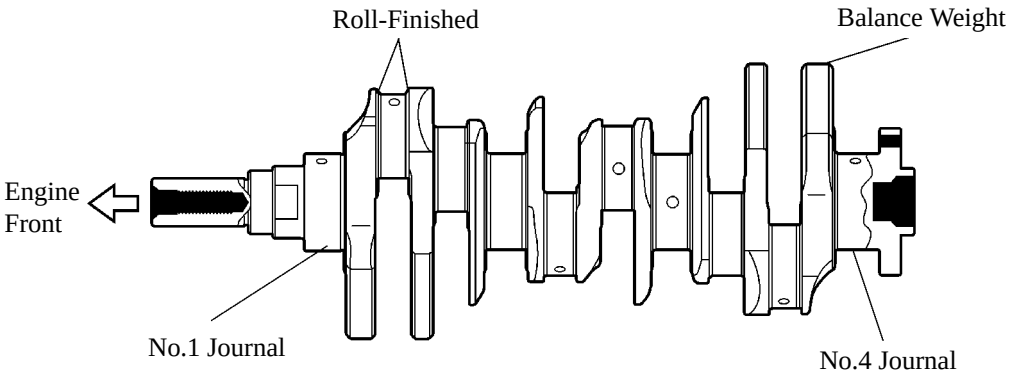
Connecting Rod

- Connecting rods that have been forged for high strength are used for weight reduction.
- An aluminum bearing with overlay is used for the connecting rod bearings.
- Plastic region tightening bolts are used.
- Knock pins are used at the mating surfaces of the bearing caps of the connecting rod to minimize the shifting of the bearing caps during assembly.



Crankshaft

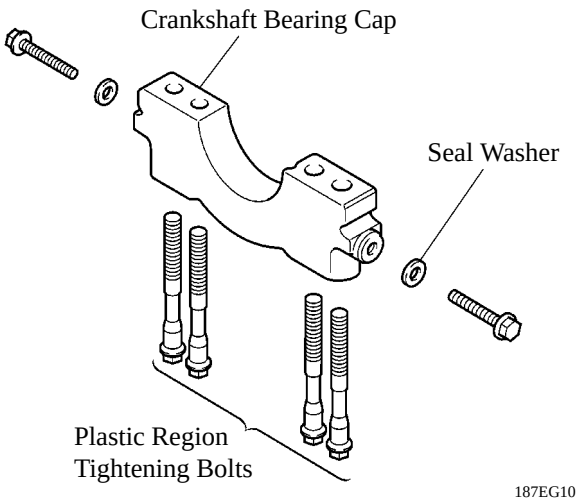
- The crankshaft is made of forged steel and has 4 journals and 9 balance weights.
- All pin and journal fillets are roll-finished to maintain adequate strength.
- The crankshaft bearings for the No.1 and No.4 journals are made wider to decrease noise and vibration, and those for the No.2 and No.3 journals are made narrower to reduce friction.



243EG23

Crankshaft Bearing Cap

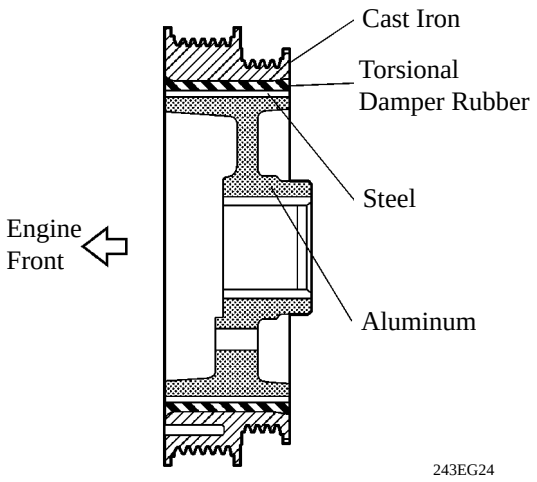
The crankshaft bearing caps are tightened using 4 plastic-region bolts for each journal. In addition, each cap is tightened laterally to improve its reliability.



187EG10

Crankshaft Pulley

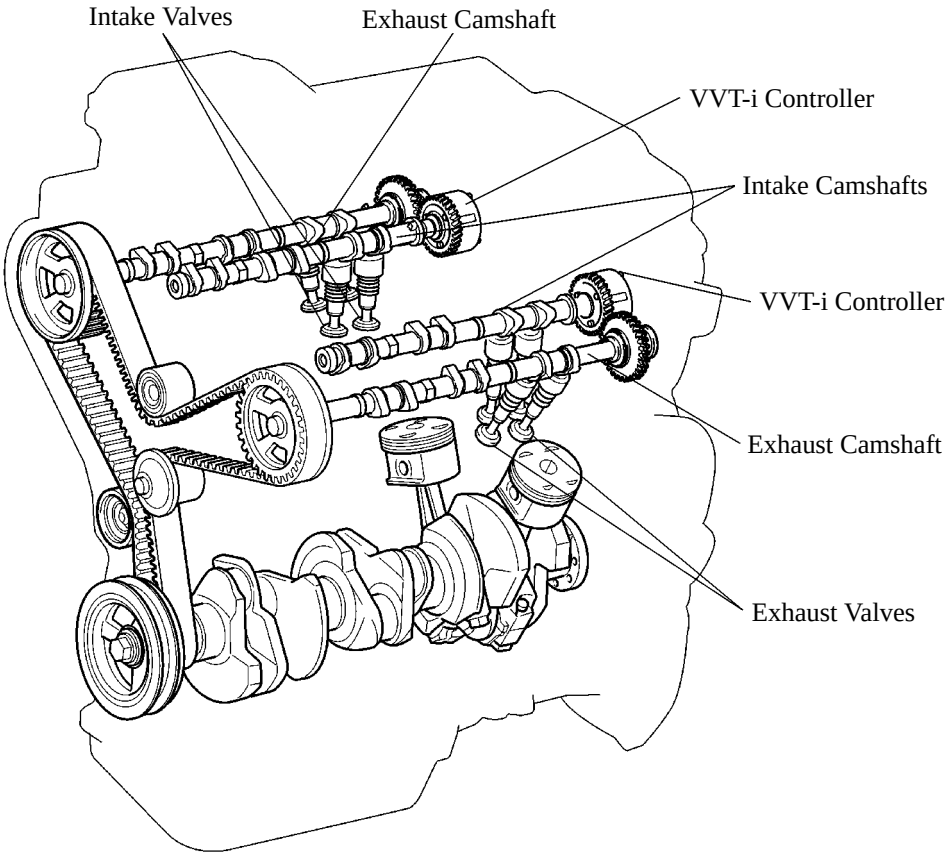
- The crankshaft pulley hub is made of aluminum to reduce weight and vibration.
- The rigidity of the torsional damper rubber has been optimized to reduce noise.



4. Valve Mechanism

General

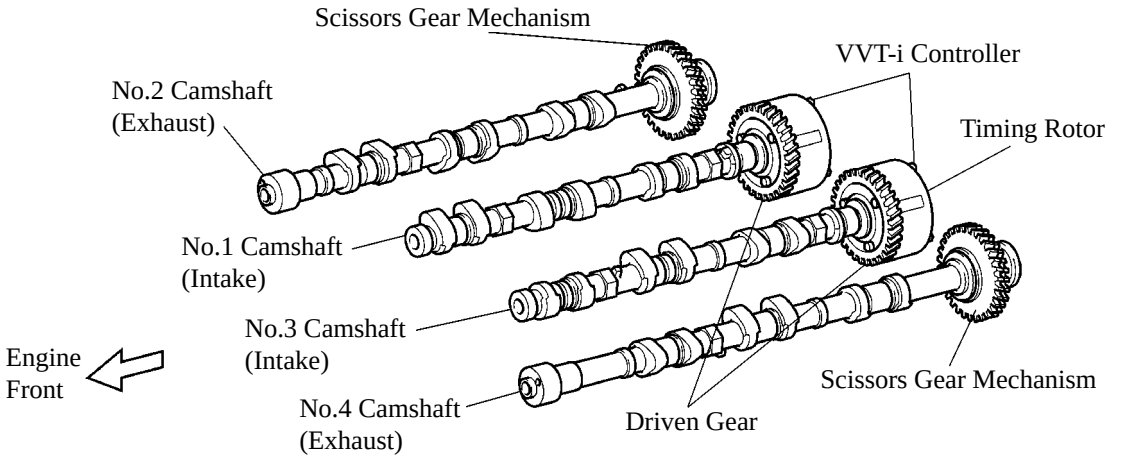
- The valves are directly opened and closed by 4 camshafts.
- The exhaust camshafts are driven by a timing belt, while the intake camshafts are driven through gears on the exhaust camshafts.
- The VVT-i system, used for the intake camshaft, is adopted to realize excellent fuel economy, engine performance and reduce exhaust emissions.
  For details, see page 78 in the VVT-i system section.



211EG06

Camshafts

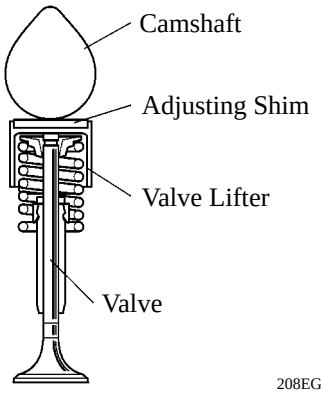
- The camshafts are made of cast iron alloy.
- In conjunction with the adoption of the VVT-i system, an oil passage is provided in the intake camshaft in order to supply engine oil to the VVT-i system.
- A VVT-i controller has been installed on the rear of the intake camshaft to vary the timing of the intake valves.
- The intake camshafts are driven by gears on the exhaust camshafts. The scissors gear mechanism is used on drive gear of the exhaust camshaft to control backlash and suppress gear noise.
- To detect the intake camshaft position, a timing rotor is provided in the VVT-i controller. This timing rotor, which is secured to the intake camshaft, is used by the VVT sensor to detect the actual position of the intake camshaft.



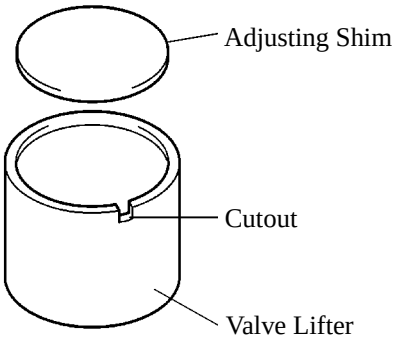
243EG25

Intake and Exhaust Valve and Valve Lifter

- Narrower valve stems have been adopted to reduce the intake and exhaust resistance and for weight reduction.
- The adjusting shim has been located directly above the valve lifter. This construction allows the adjusting shim to be replaced without removing the camshaft, which improves the serviceability during valve clearance adjustment.
- A cutout is provided in the valve lifter to improve the serviceability of removing the adjusting shims.



208EG64



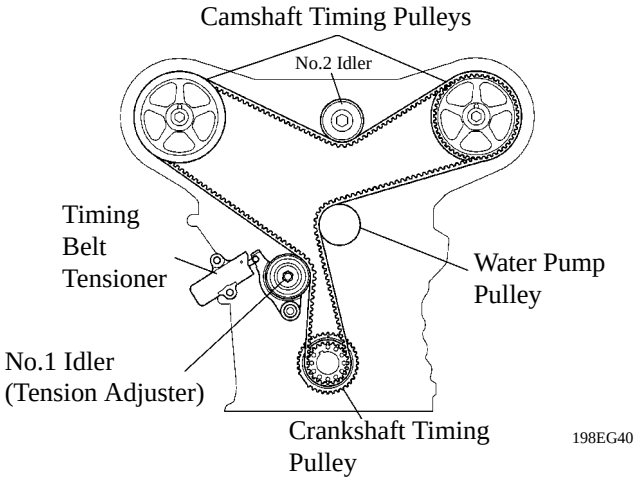
187EG17

Service Tip

The adjusting shims are available in 17 sizes in increments of 0.05 mm (0.002 in.), from 2.50 (0.098 in.) to 3.30 (0.130 in.).
For details, refer to the 2004 Camry Repair Manual (Pub. No. RM1063U).

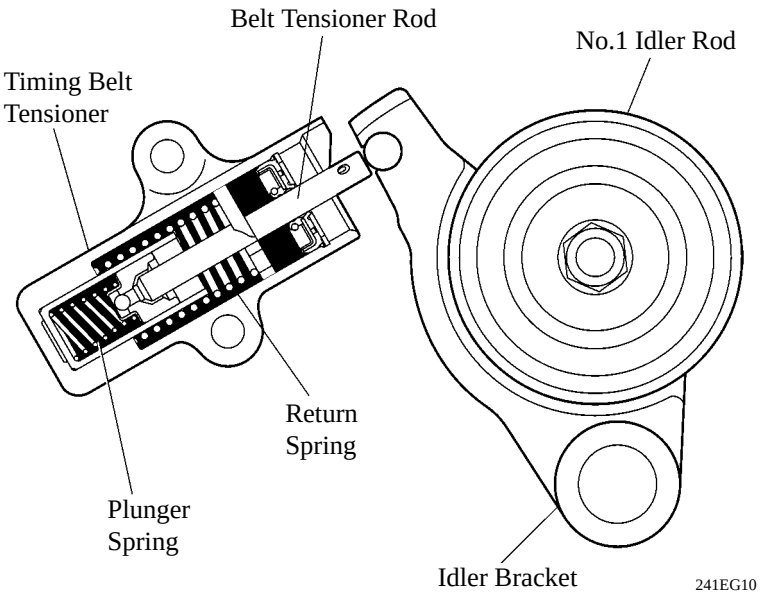
Timing Belt

The timing belt tooth configuration has been designed to help to reduce noise and enable the belt to transmit power under high load factors.



Timing Belt Tensioner

The timing belt tensioner uses a spring and silicon oil damper, and maintains proper timing belt tension at all times. The timing belt tensioner suppresses noise generated by the timing belt.

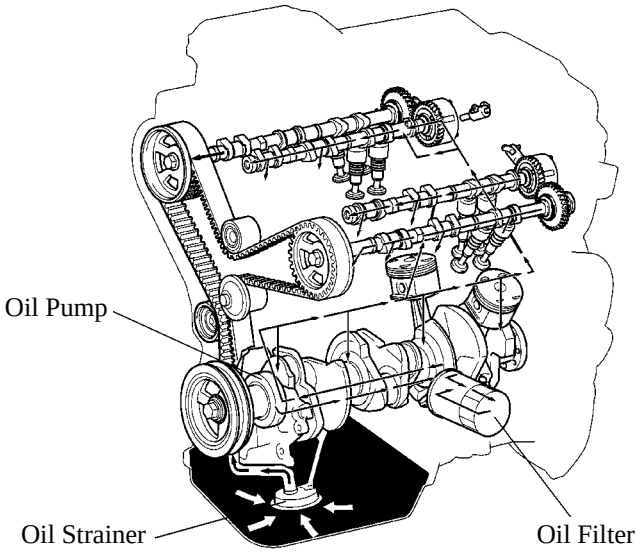


5. Lubrication System

General

■ The lubrication is fully pressurized and all oil passes through an oil filter.

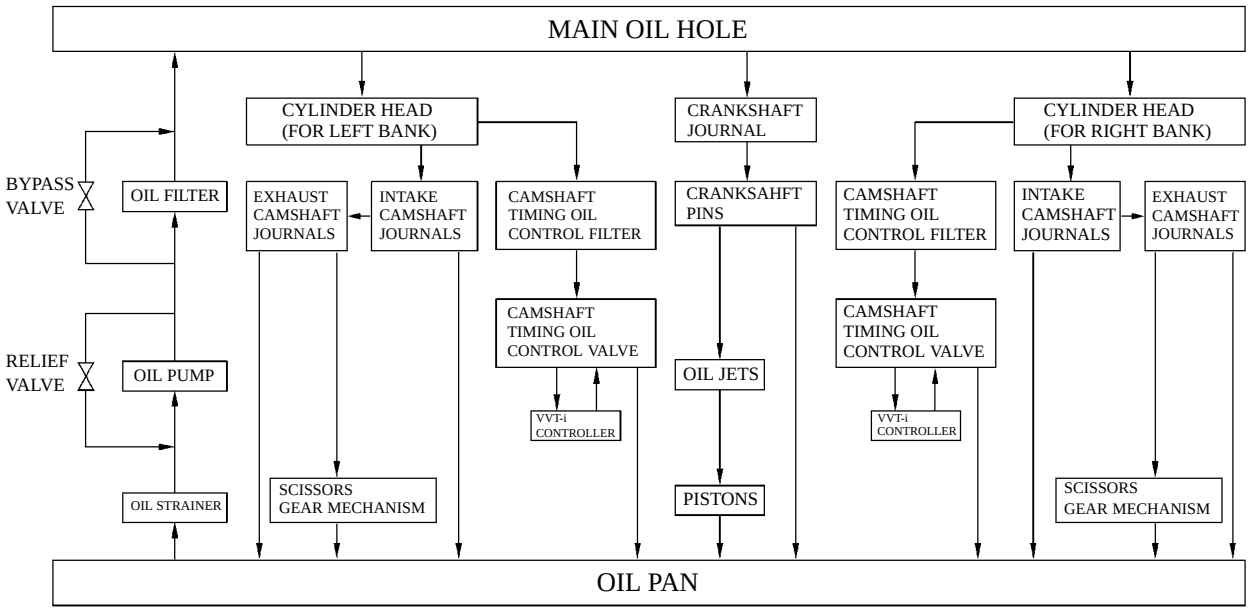
■ A trochoid gear type oil pump is directly driven by the crankshaft.



211EG07

▶ Oil Capacity ◀

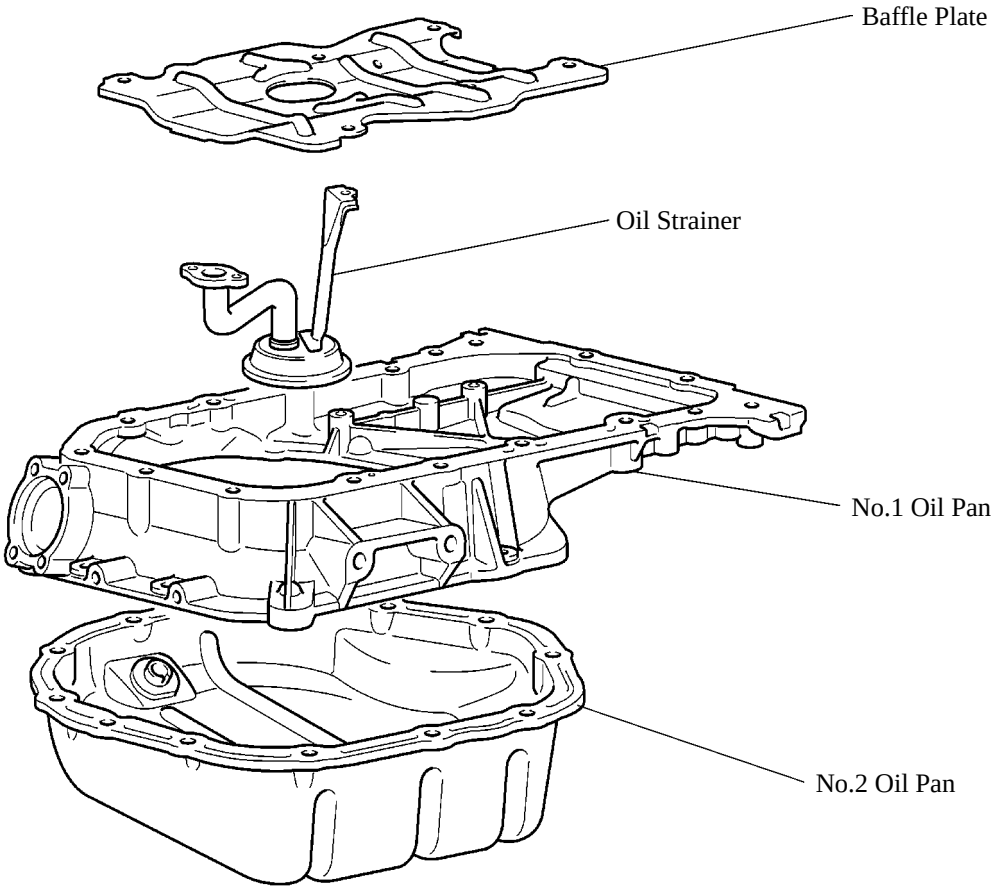
	liter (US qts, Imp. qts)
Dry	5.5 (5.8, 4.8)
with Oil Filter	4.7 (5.0, 4.1)
without Oil Filter	4.5 (4.8, 4.0)



187EG22

Oil Pan

- The oil pan is made up of 2 pieces. No.1 oil pan is made of aluminum alloy and No.2 oil pan is made of steel sheet.
- No.1 oil pan is secured to the cylinder block and the transaxle housing to increase rigidity.



187EG23

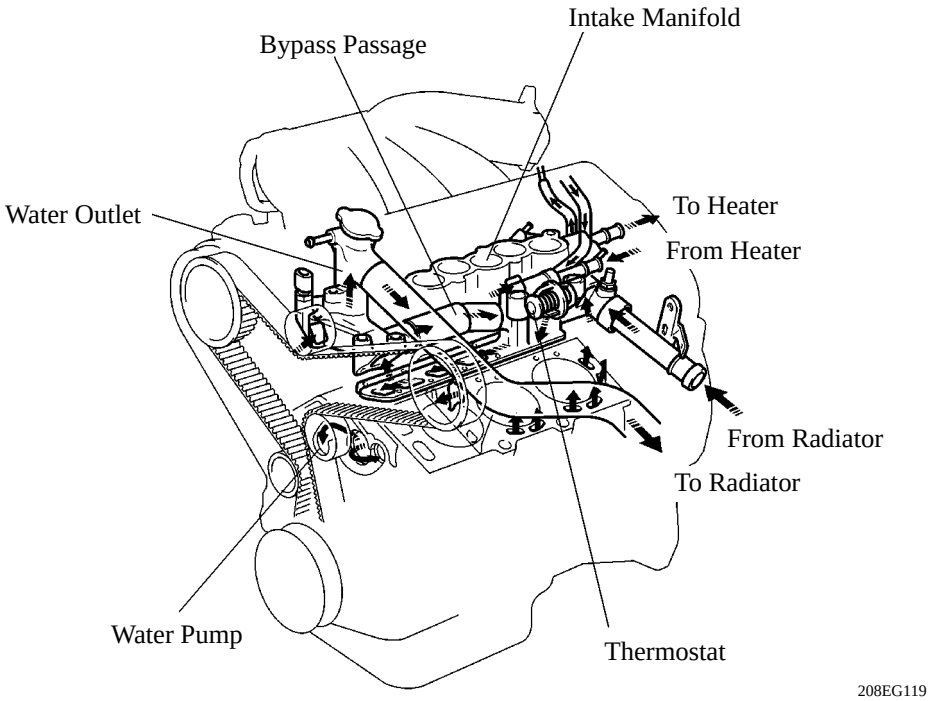
6. Cooling System

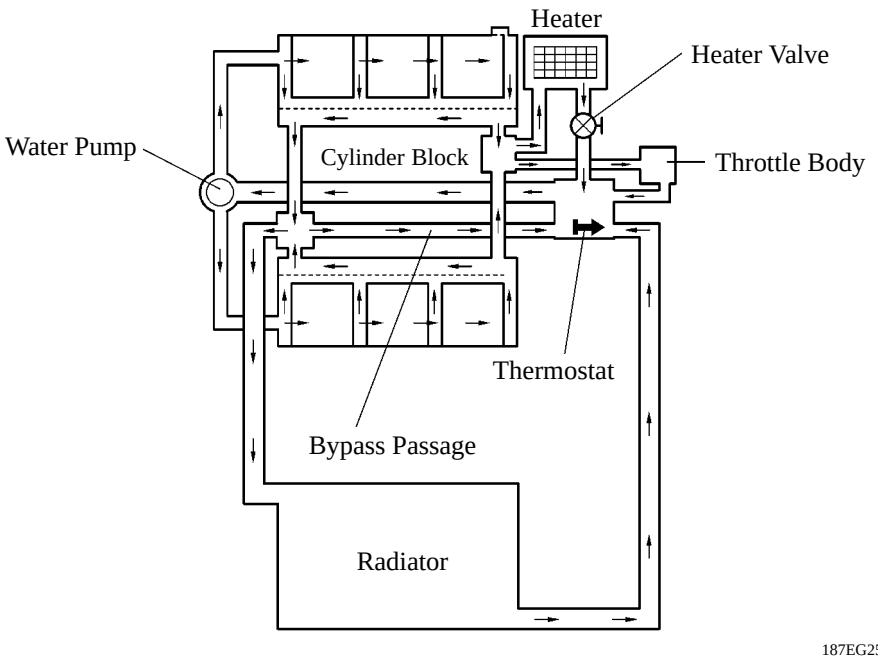
General

- The cooling system is a pressurized, forced-circulation type.
- A thermostat which has a bypass valve is located on the water pump inlet side of the cooling circuit.
- An electric cooling fan has been adopted.

— Change from '03 1MZ-FE engine —

- The TOYOTA genuine Super Long Life Coolant (SLLC) has been adapted. As a result, the maintenance interval has been extended. (See page-34 1MZ-FE engine section.)
- The fin pitch of the radiator has been changed from 2.25 mm (0.09 in.) to 2.5 mm (0.10 in.).

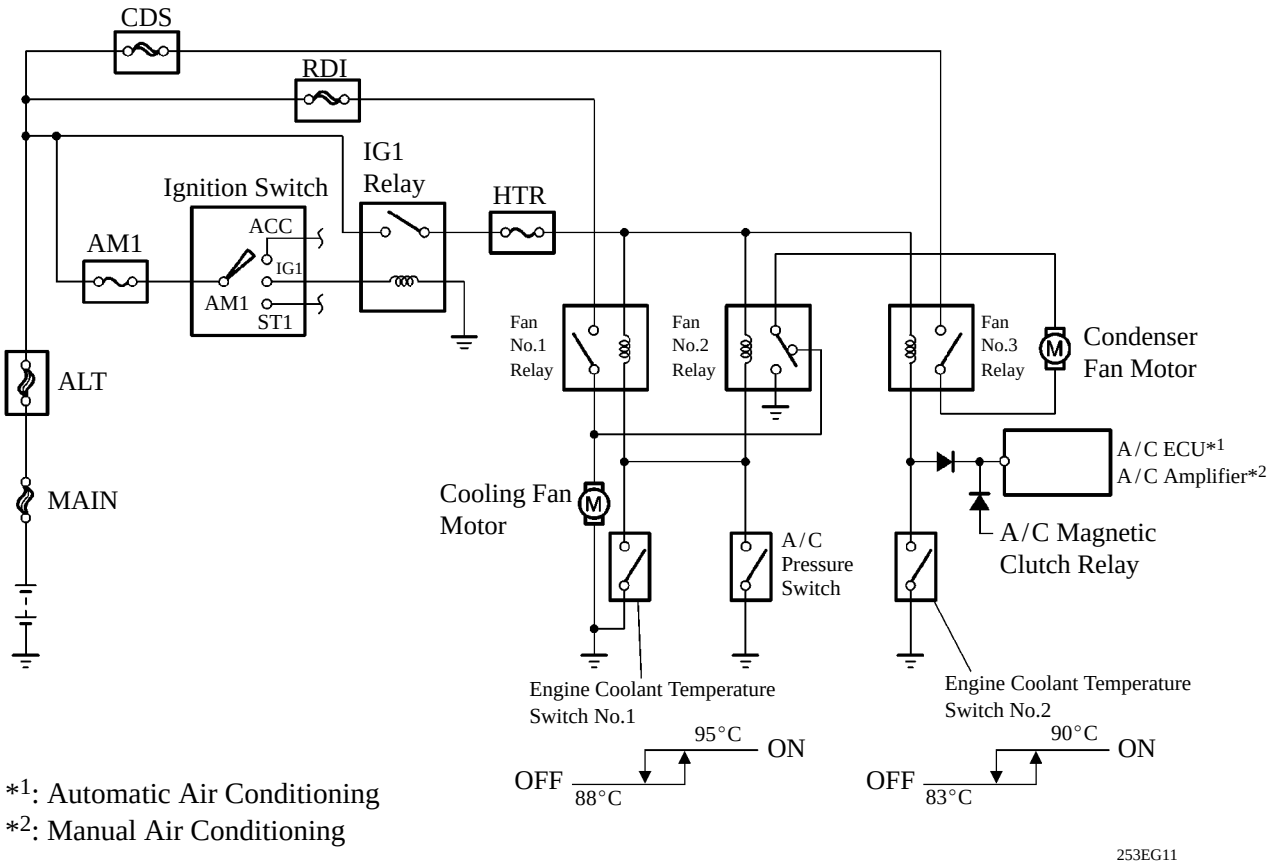




Cooling Fan System

The electric cooling fan is adopted. The cooling fan controls the fan speed in 3 steps (OFF, Low, High) by using the 2 water temperature switches in accordance with the engine coolant temperature and the operating condition of the air conditioner and by turning the 3 fan relays ON and OFF and connecting 2 fan mortors in a series or parallel circuit.

▶ Wiring Diagram ◀



*1: Automatic Air Conditioning
*2: Manual Air Conditioning

253EG11

▶ Cooling Fan Operation ◀

Engine Coolant Temperature Switch	No.1		OFF	OFF	ON
	No.2		OFF	ON	ON
A/C Condition	A/C OFF		OFF	Low	High
	A/C ON	A/C Pressure Switch OFF	Low	Low	High
		A/C Pressure Switch ON	High	High	High

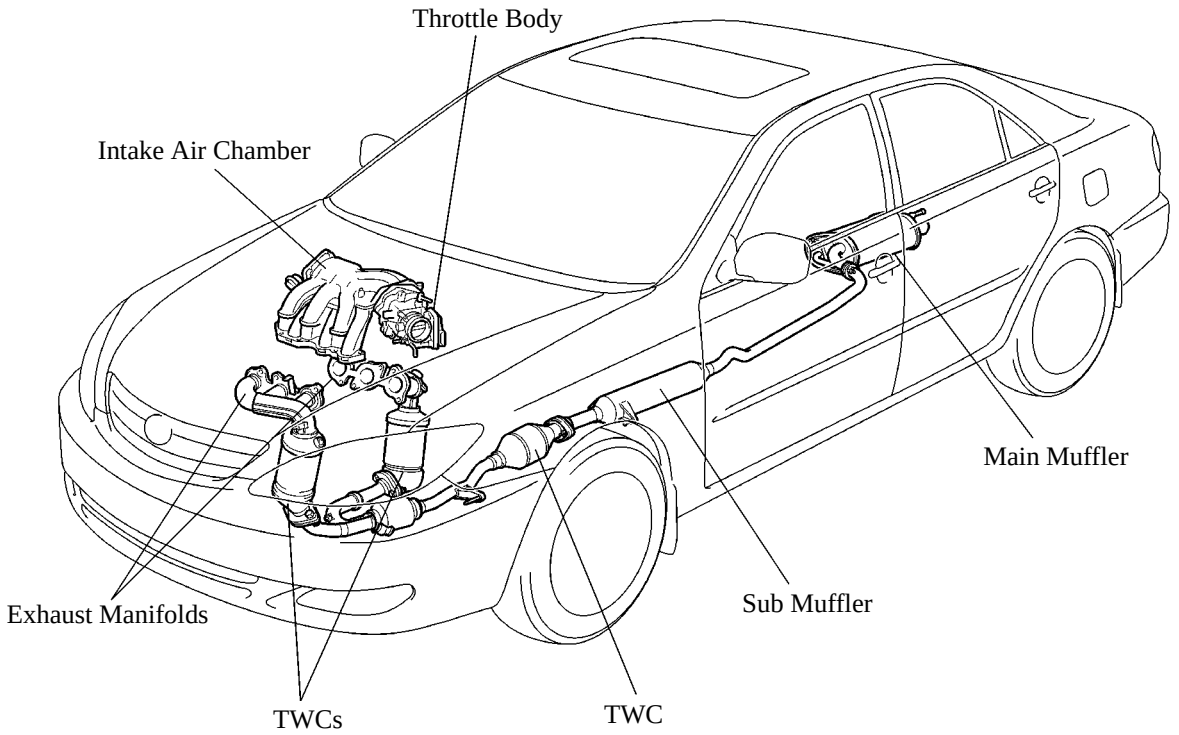
7. Intake And Exhaust System

General

- The ACIS (Acoustic Control Induction System) is used to improve the engine performance.
- The adoption of the ETCS-i (Electronic Throttle Control System-intelligent) has achieved excellent throttle control.
- The link-less type throttle body has been adopted.
- The adoption of the air intake control system has improved engine noise reduction and performance.
- The intake air chamber is made of plastics to achieve lightweight.
- A high temperature resistant exhaust manifold with an integrated TWC (Three-Way Catalytic converter) has been adopted.
- The ceramic type TWC has been adopted.
- 2-way exhaust control system is provided to reduce noise and back pressure in the main muffler.

— Change from '03 1MZ-FE engine —

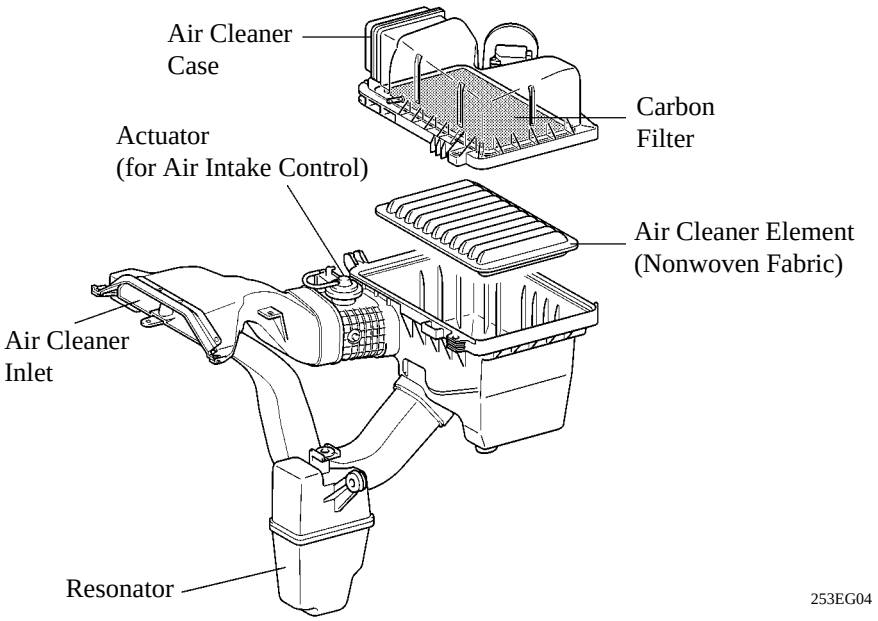
- A carbon filter, which absorbs the HC that accumulates in the intake system when the engine is stopped, has been adopted in the air cleaner cap.



257CA03

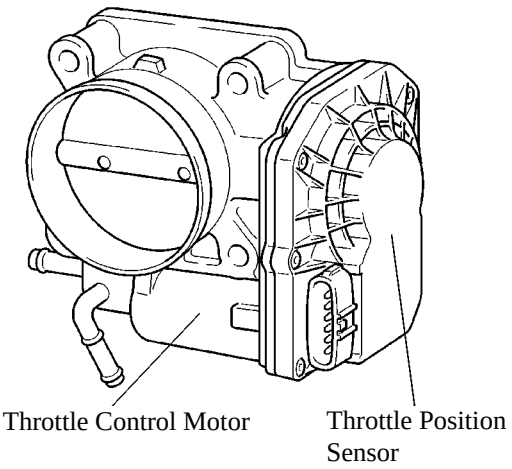
Air Cleaner

- Along with the adoption of the air intake control system, the air cleaner inlet has been divided into two areas, and an air intake control valve and an actuator have been provided in one of the areas. For details, see page-84 3MZ-FE engine section.
- A frameless, nonwoven, full-fabric type air cleaner element has been adopted to reduce weight and to simplify its disposal.
- A carbon filter, which adsorbs the HC that accumulates in the intake system when the engine is stopped, has been adopted in the air cleaner case in order to reduce evaporative emissions.
  This filter is maintenance-free.



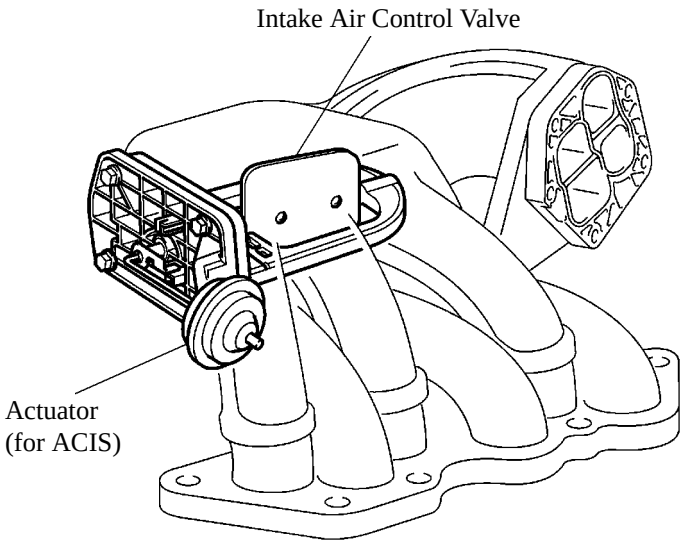
Throttle Body

- A DC motor with excellent response and minimal power consumption is used for the throttle control motor. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the opening angle of the throttle valve.
- The link-less type throttle body has adopted and it realizes excellent throttle control.
  For details of ETCS-i control, refer to see page-22 2AZ-FE engine section.



Intake Air Chamber

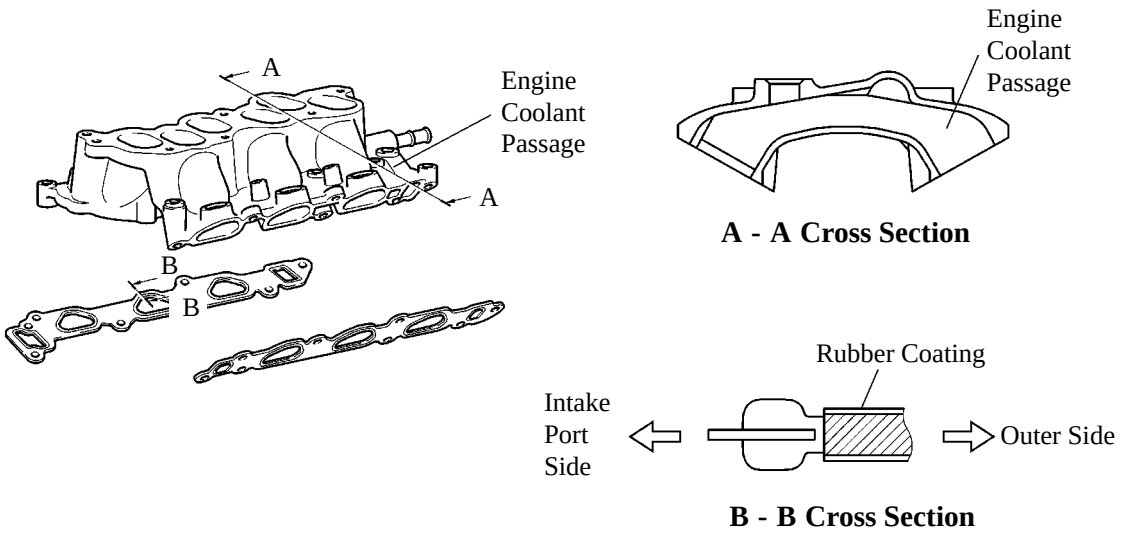
The intake air chamber is made of plastic to reduce weight.
The intake air chamber consists of upper and lower sections and contains an intake air control valve. This valve is activated by ACIS (Acoustic Control Induction System) actuator and is used to alter the intake pipe length to improve the engine performance in all speed ranges. For details of ACIS control, refer to see page 82 3MZ-FE engine section.



241EG16

Intake Manifold

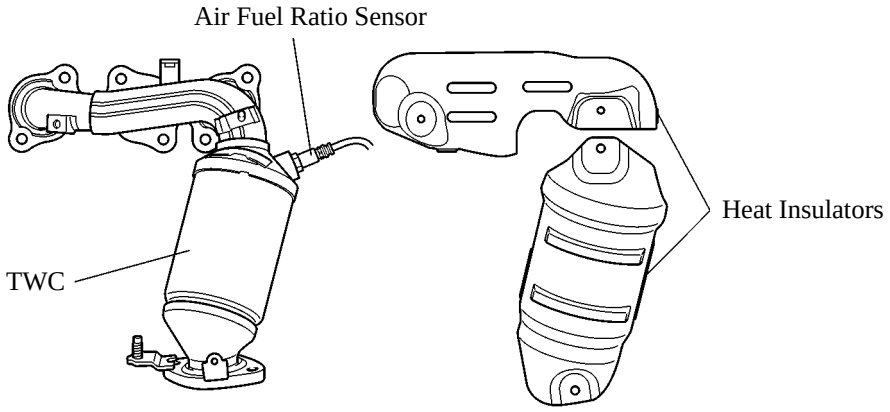
- The port diameter of the intake manifold and the port length have been optimized.
- An engine coolant passage connects the left and right banks at the rear end of the intake manifold.
- The intake manifold gaskets have a rubber coating applied to the surface, and provide superior durability.



243EG26

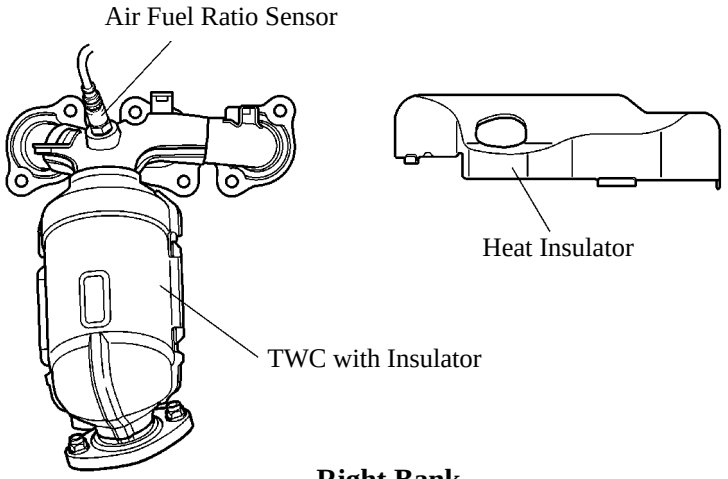
Exhaust Manifold

- A stainless steel exhaust manifold is used for improving the warm-up of TWC (Three-Way Catalytic Converter) and for weight reduction.
- The air fuel ratio sensor has been adopted on the exhaust manifold.
- A high temperature resistant exhaust manifold with an integrated TWC (Three-Way Catalytic converter) has been adopted.
- The ceramic type TWC (Three-Way Catalytic Converter) has been adopted. This TWC enables to improve exhaust emissions by optimizing the cells density.



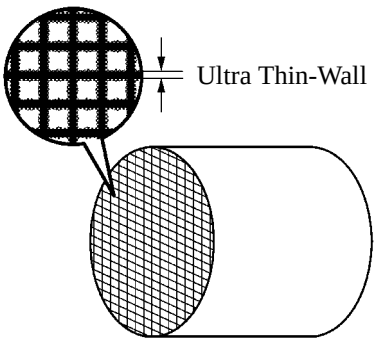
253EG05

Left Bank



Right Bank

253EG06



TWC (Sketchy figure)

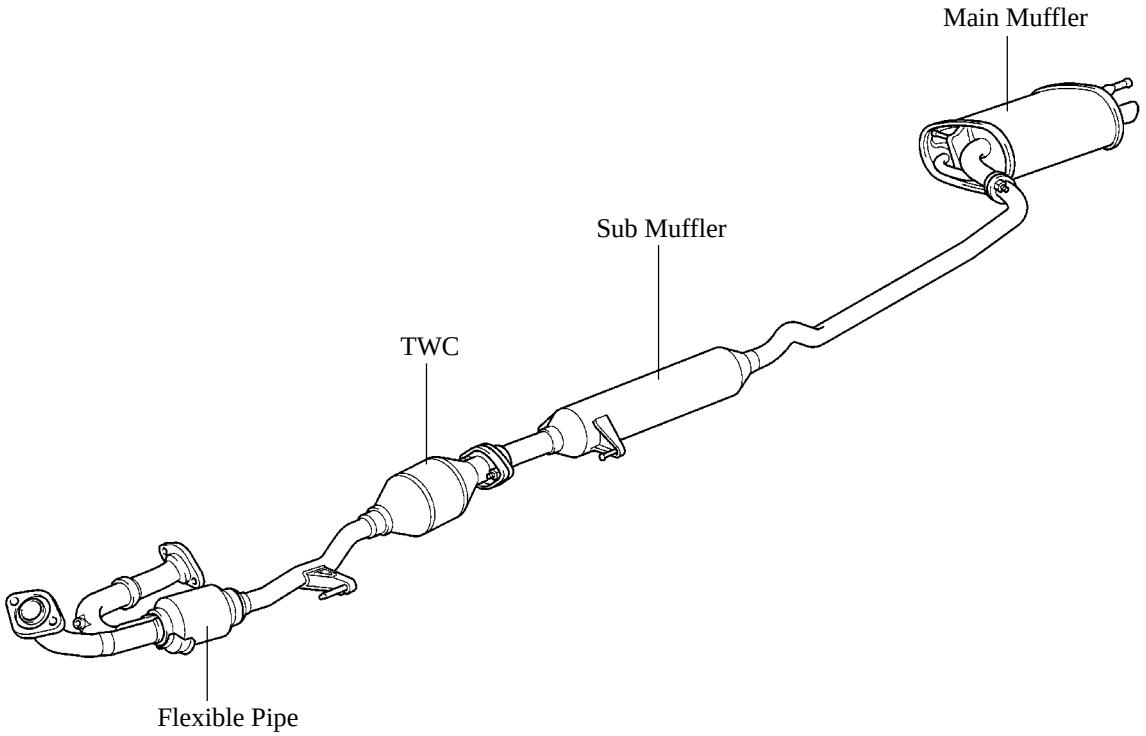
198EG06

Exhaust Pipe

1) General

■ The ceramic type TWC has been adopted. This TWC improves exhaust emissions.

■ A 2-way exhaust control system is provided to reduce noise and back pressure in the main muffler.



253EG07

2) 2-Way Exhaust Control System

- A 2-way exhaust control system is used.
- At lower engine speeds, this system enable a quieter operation with control valve close in main muffler.
- The valve opens steplessly in accordance with engine condition and this system reduce the back pressure at higher engine speeds.

a. Construction

The control valve is enclosed in the main-muffler. When the exhaust gas pressure overcomes the spring pressure, the control valve opens steplessly in accordance with the exhaust gas pressure.

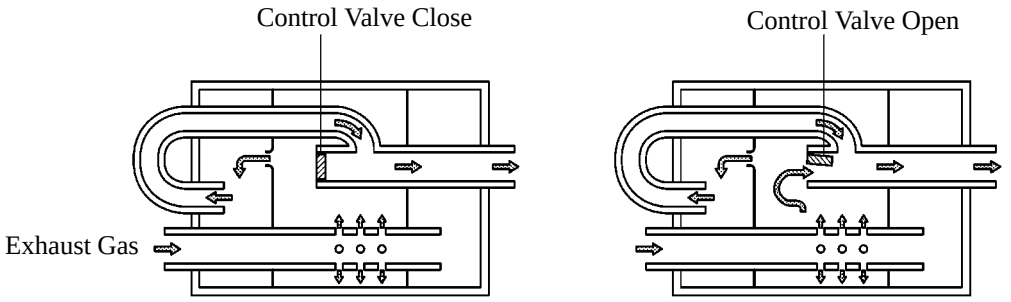
b. Operation

i) When Control Valve is Closed (low engine speed)

Since the pressure in the main muffler is low, the control valve is closed. Hence exhaust gas does not pass the bypass passage, and exhaust noise decreased by the main muffler.

ii) When Control Valve is Open (middle to high engine speed)

The valve opens more as the engine speed and the back pressure in the muffler increase. This allows a large volume of exhaust gas to pass the bypass passage, thereby substantially decreasing the back pressure.



Low Engine Speed **Middle to High Engine Speed**

208EG16

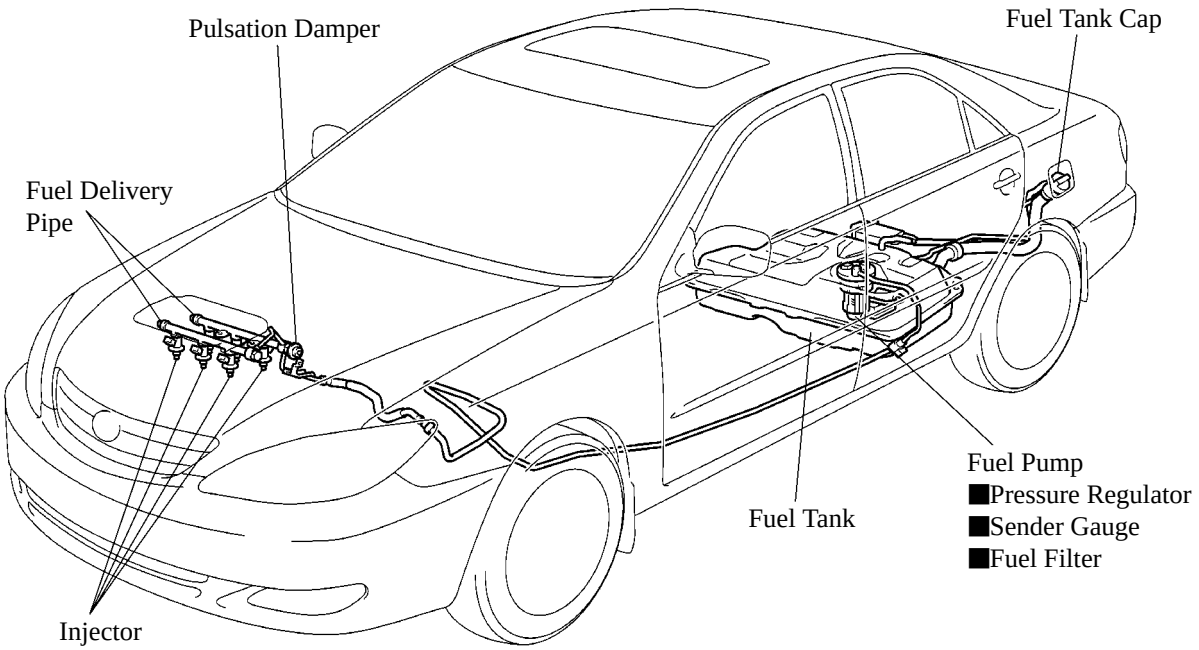
8. Fuel System

General

- A fuel returnless system is used to reduce evaporative emissions.
- A compact fuel pump in which a fuel filter and pressure regulator are integrated in the module fuel pump assembly has been adopted.
- A quick connector has been adopted to connect the fuel pipe with the fuel hose to improve serviceability.
- A tether has been provided on the fuel tank cap to prevent the cap from being lost, which results in preventing the leakage of fuel or the evaporative gas.
- A compact 12-hole type injector with high atomizing performance has been adopted to improve the atomization of fuel.

— Change from 1MZ-FE engine —

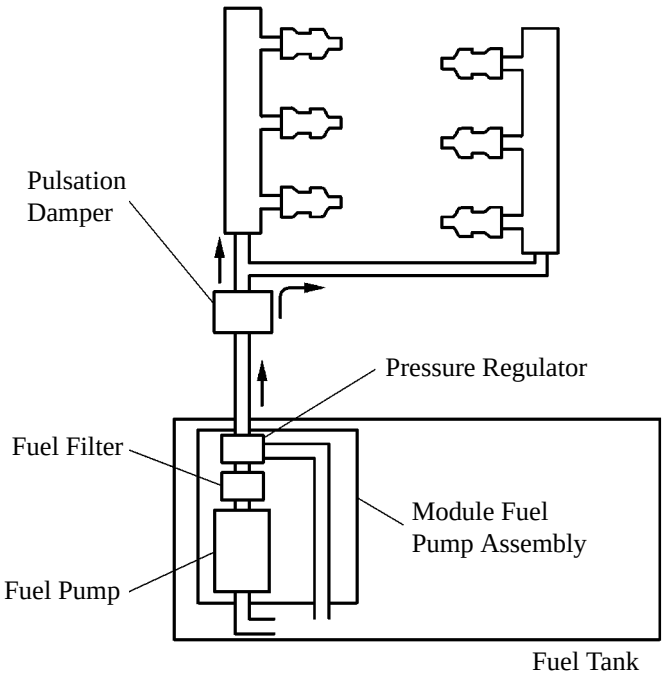
- On the ’04 Camry the construction of the evaporative emission control system has been changed in order to comply with the LEV-II (Low Emission Vehicle-II) evaporative emission regulations.
  For details, see page 25 in the 2AZ-FE engine section.



257CA04

Fuel Returnless System

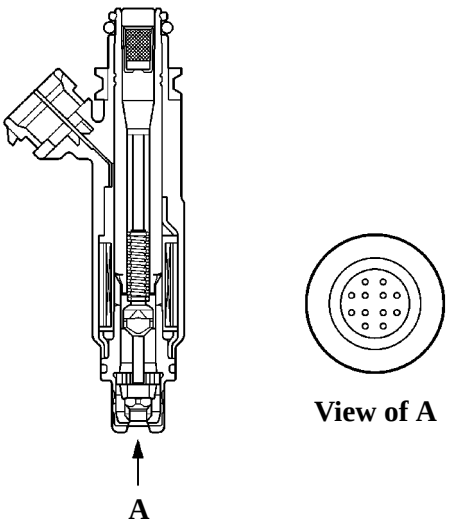
This system has been adopted to reduce the evaporative emission. As shown below, integrating the fuel filter, pressure regulator, and fuel sender gauge with fuel pump assembly, it is possible to discontinue the return of fuel from the engine area and prevent temperature rise inside the fuel tank.



208EG117

Fuel Injector

The 12-hole type injector has been adopted to improve the atomization of fuel.



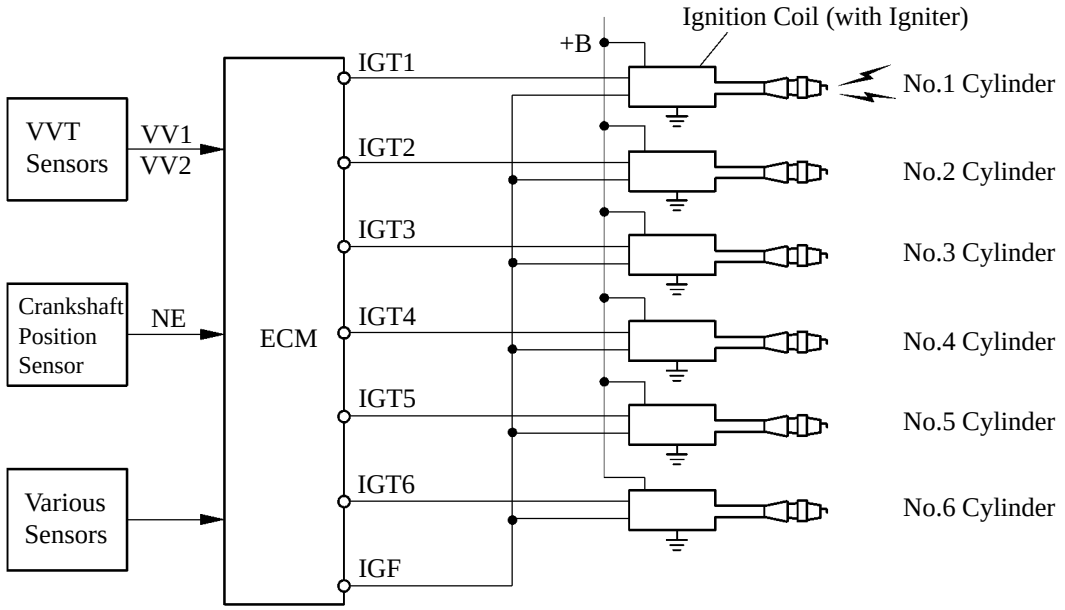
208EG118

9. Ignition System

General

■ A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS in this engine is an independent ignition system which has one ignition coil (with igniter) for each cylinder.

■ Iridium-tipped spark plugs have been adopted.



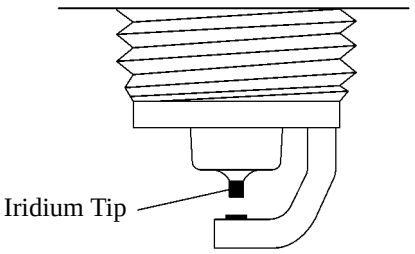
243EG17

Ignition Coil

The DIS provides 6 ignition coils, one for each cylinder. The spark plug caps, which provide contact to the spark plugs, are integrated with an ignition coil. Also, an igniter is enclosed to simplify the system.

Spark Plug

Iridium-tipped spark plugs have been adopted to realize a 120,000 mile (192,000 km) maintenance-free operation. By making the center electrode of iridium, the same ignition performance as the platinum-tipped spark plug have been achieved and further improvement of durability has been realized.



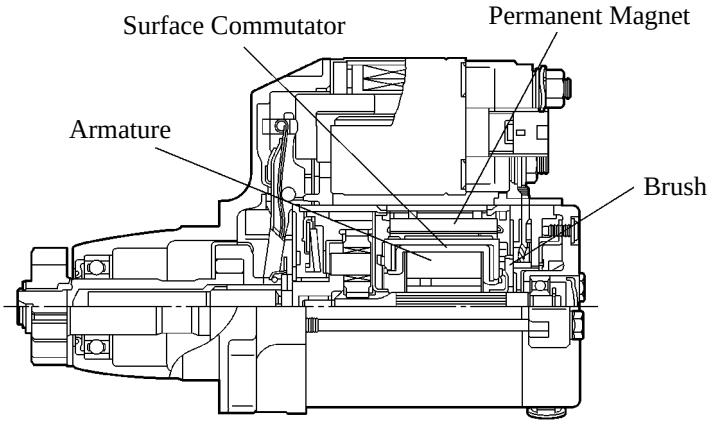
208EG70

▶ Specifications ◀

DENSO	SK20R11
NGK	IFR6A11
Plug Gap	1.0 - 1.1 mm (0.039 - 0.043 in.)

10. Starting System

- A compact and lightweight PS (Planetary reduction-Segment conductor motor) type starter has been adopted on all models.
- Because the PS type starter contains an armature that uses square-shaped conductors, and its surface functions as a commutator, it has resulted in both improving its output torque and reducing its overall length.
- In place of the field coil used in the conventional type starter, the PS type starter uses two types of permanent magnets: main magnets and interpolar magnets. The main magnets and interpolar magnets have been efficiently arranged to increase the magnetic flux and to shorten the length of the yoke.



257CA26

▶ Specifications ◀

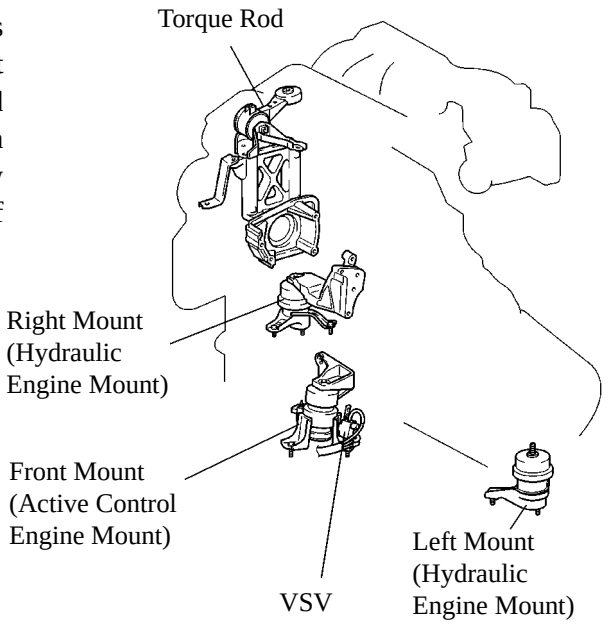
Starter Type	'04 Camry	'03 Camry
Rating Output	1.7 kW	1.6 kW
Rating Voltage	12 V	
Length	128 mm (5.04 in.)	
Weight	2950 g (6.50 lb)	
Rotating of Direction*	Counterclockwise*	

*: Viewed from Pinion Side

11. Engine Mount

General

A 3-point support on the front sub-frame has been adopted. An active control engine mount has been adopted on the front engine mount and a hydraulic engine mount has been adopted on the right and left engine mounts to realize low noise and vibration and to achieve high levels of both riding comfort and drivability.



257CA23

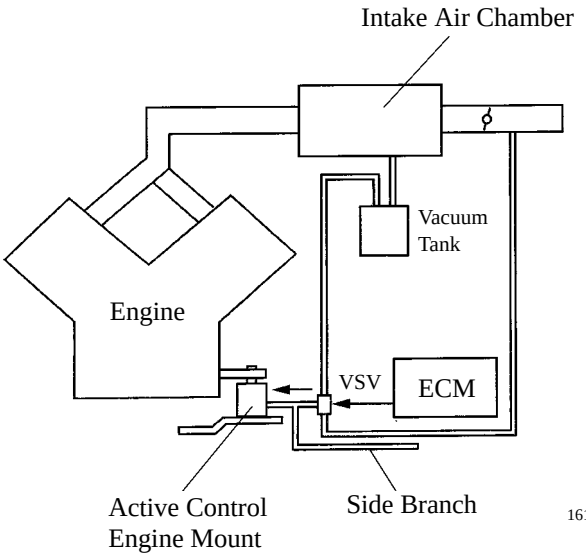
Active Control Engine Mount

The operating range of the active control engine mount is during idling under the engine speeds of 900 rpm ~ 950 rpm.

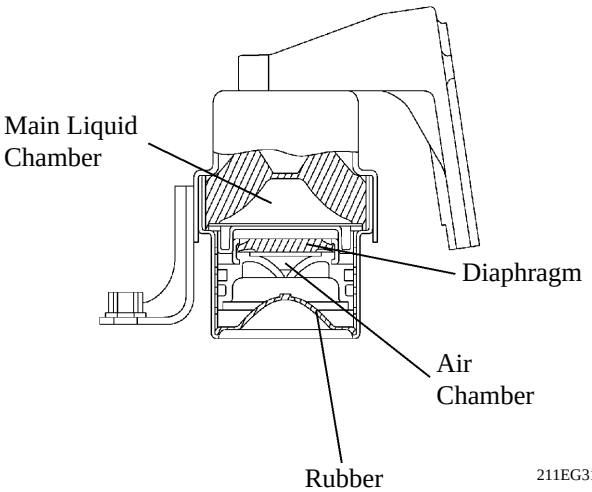
Signals that are synchronized to the engine speed are sent by the ECM to the VSV and the engine vacuum is utilized to vary the pressure of the intake air chamber in the active control engine mount. As a result, the diaphragm vibrates, and using the liquid as a medium, the rubber mount vibrates.

This vibration of the engine mount acts to cancel out the engine vibration during idle, thus reducing the vibration and noise at idle.

The engine mount's damping force to generate vibrations is adjusted through the effects of the orifice and the side branch.



161ES46



211EG31

12. Engine Control System

General

The engine control system of the 3MZ-FE engine on the '04 Camry has following system.

System	Outline	'04 3MZ-FE	'03 1MZ-FE
SFI (Sequential Multiport Fuel Injection) (See page 72 in 3MZ-FE engine section.)	An L-type EFI system directly detects the intake air mass with a hot wire type mass air flow meter.	○	○
ESA (Electronic Spark Advance)	Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking.	○	○
ETCS-i (Electronic Throttle Control System-intelligent) (See page 73 in 3MZ-FE engine section.)	■ Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle. ■ A link-less type is used, without an accelerator cable. ■ An accelerator pedal position sensor is provided on the accelerator pedal. ■ A no-contact type throttle position sensor and accelerator pedal position sensor are used.	○	○
VVT-i (Variable Valve Timing-intelligent) (See page 78 in 3MZ-FE engine section.)	Controls the intake camshaft to an optimal valve timing in accordance with the engine condition.	○	○
ACIS (Acoustic Control Induction System) (See page 82 in 3MZ-FE engine section.)	The intake air passages are switched according to the engine speed and throttle valve opening angle to provide high performance in all speed ranges.	○ (2-Stage)	○ (3-Stage)
Air Intake Control System (See page 85 in 3MZ-FE engine section.)	The intake air duct is divided into two areas, and the ECM controls the air intake control valve and the actuator that are provided in one of the areas to reduce the amount of engine noise.	○	○
Fuel Pump Control (See page 24 in 2AZ-FE engine section.)	Fuel pump operation is controlled by signal from the ECM.	○	○
	A fuel cut control is adopted to stop the fuel pump when the airbag is deployed during front or side collision.	○	—
Active Control Engine Mount (See page 62 in 3MZ-FE engine section.)	The damping characteristic of the front engine mount is controlled variably to reduce idling vibration.	○	○
Air Fuel Ratio Sensor, Oxygen Sensor Heater Control (See page 35 in 1MZ-FE engine section.)	Maintains the temperature of the air fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.	○	○
Air Conditioning Cut-off Control	By turning the air conditioner compressor ON or OFF in accordance with the engine condition, drivability is maintained.	○	○

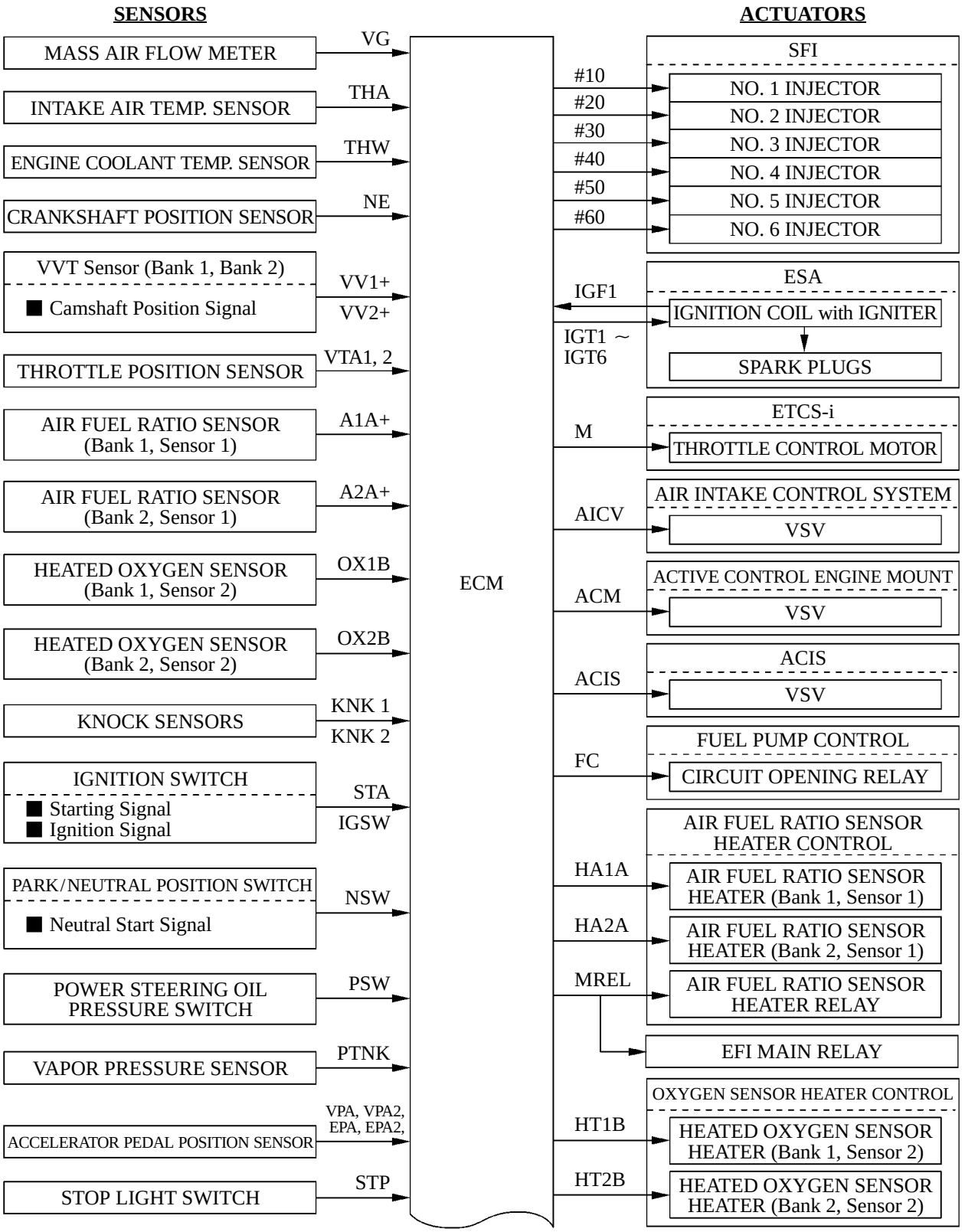
(Continued)

System	Outline	’04 3MZ-FE	’03 1MZ-FE
Evaporative Emission Control* (See page 25 in 2AZ-FE engine section.)	The ECM controls the purge flow of evaporative emission (HC) in the charcoal canister in accordance with engine conditions.	○	○
	A pressure gauge is attached to the service port, which is provided between the charcoal canister and the VSV (for purge valve), in order to detect an evaporative emission leakage.	○	○
	System construction and control logic have been made to comply with LEV-II evaporative emission regulation.	○	—
Engine Immobilizer	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.	○	○
	The ID code stored in the transponder key ECU is compared with that of the transponder tip in the ignition key.	○	—
Diagnosis (See page 86 in 3MZ-FE engine section.)	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.	○	○
	All the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes.	○	○
Fail-Safe (See page 86 in 3MZ-FE engine section)	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.	○	○

*: The Evaporative Emission Control system for 2AZ-FE engine has been chenged from the LEV-I (Low Emission Vehicle-I) evaporative emission regulation to the LEV-II (Low Emission Vehicle-II) evaporative emission regulation. (California specification 2AZ-FE engine has not changed from the ’03 Camry.)

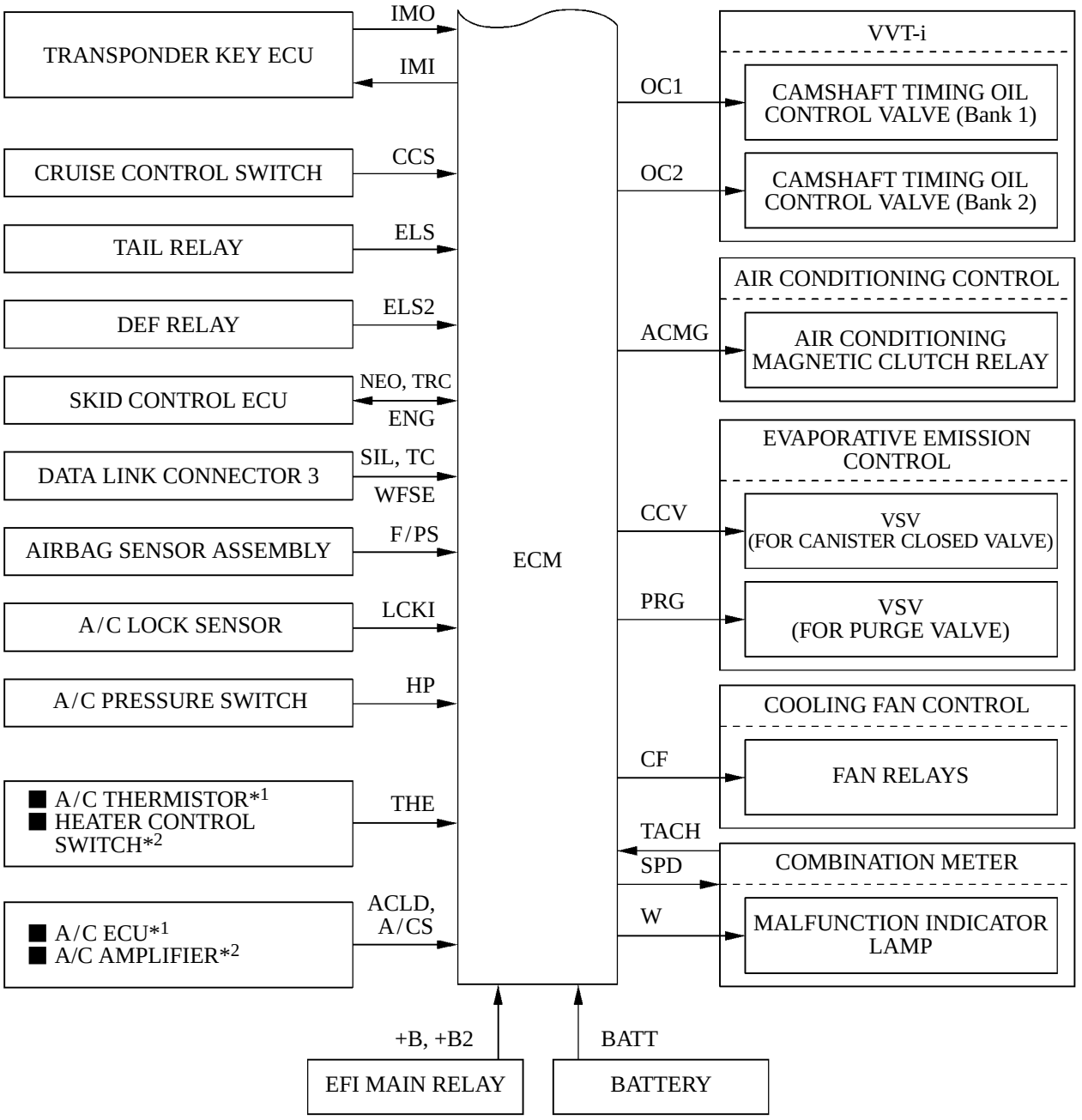
Construction

The configuration of the engine control system in the 3MZ-FE engine on the '04 Camry is as shown in the following chart.



(Continued)

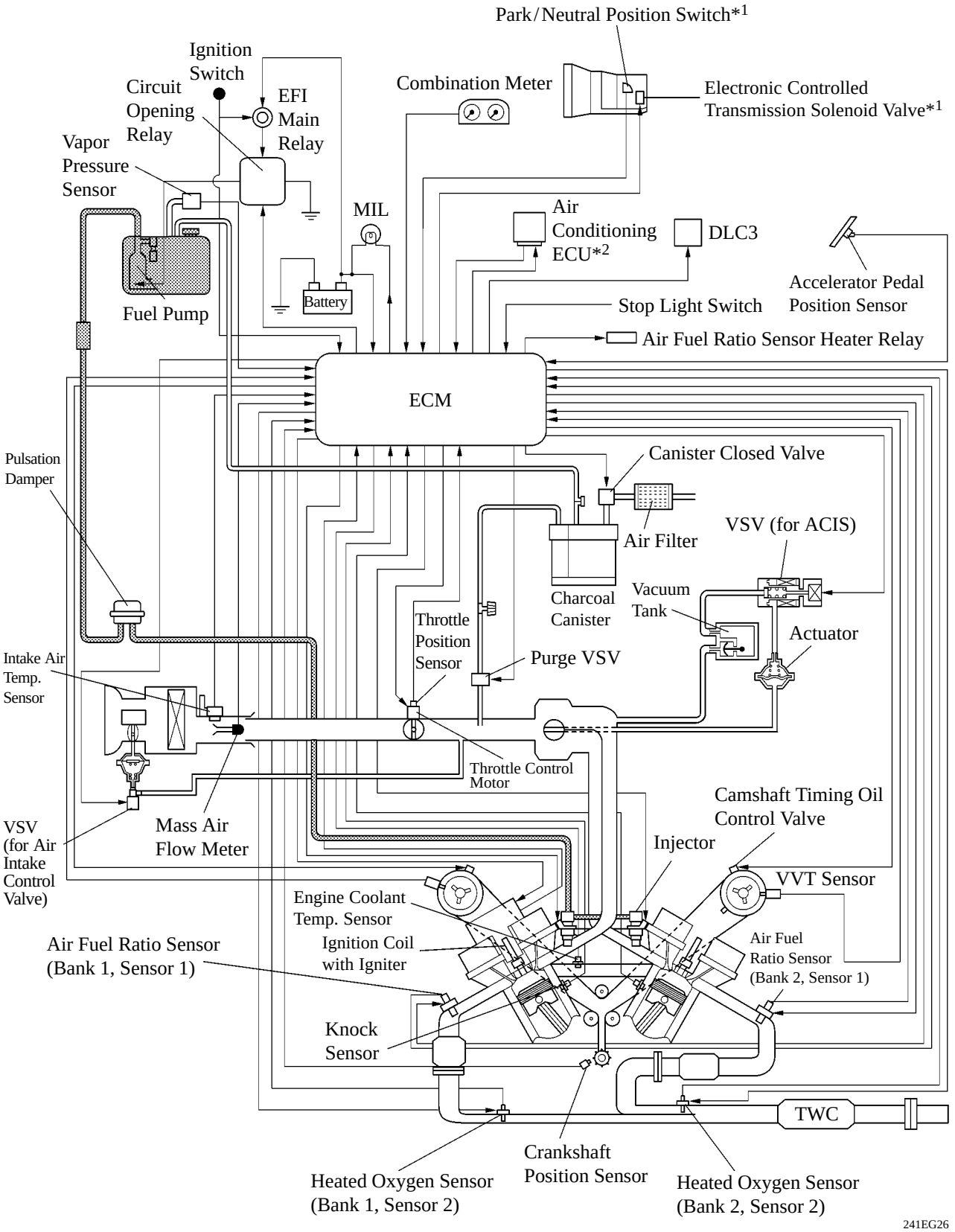
253EG14



*1: with Automatic Air Conditioning
*2: with Manual Air Conditioning

253EG15

Engine Control System Diagram

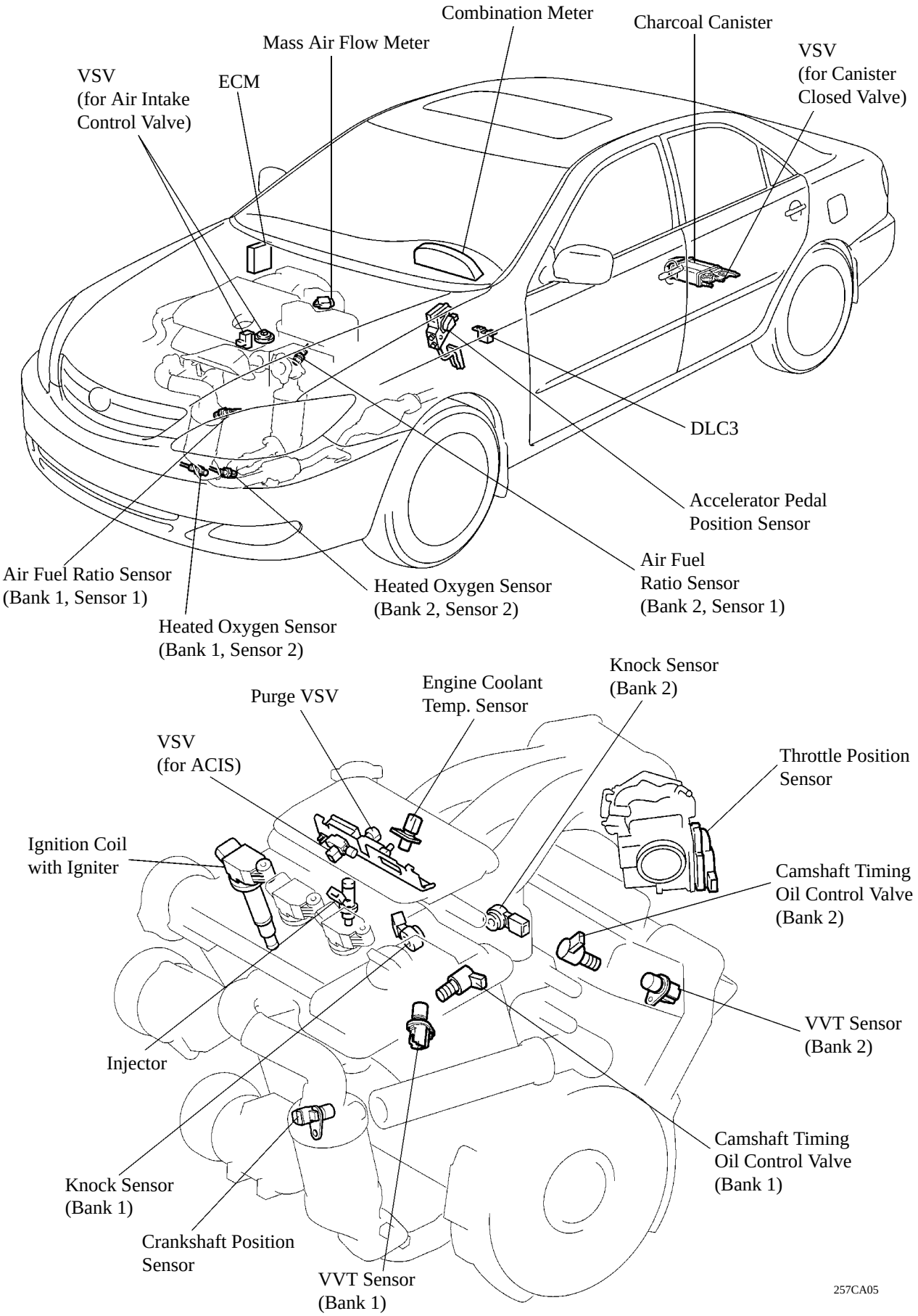


241EG26

*1: with Automatic Transaxle

*2: with Automatic Air Conditioning

Layout of Main Components



Main Components of Engine Control System

1) General

The following table compares the main components.

Components	'04 3MZ-FE		'03 1MZ-FE	
	Outline	Quantity	Outline	Quantity
ECM	32-bit CPU	1		
Air Fuel Ratio Sensor (Bank 1, Sensor 1) (Bank 2, Sensor 1)	with Heater Type (Planar Type)	2	with Heater Type (Conventional Type)	2
Oxygen Sensor (Bank 1, Sensor 2) (Bank 2, Sensor 2)	with Heater Type (Conventional Type)	2		
Mass Air Flow Meter	Hot-wire Type	1		
Crankshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (36-2)	1		
VVT Sensor LH, RH (Rotor Teeth)	Pick-up Coil Type (3)	2		
Knock Sensor 1, 2	Built-in Piezoelectric Type (Flat Type)	2	Built-in Piezoelectric Type	
Accelerator Pedal Position Sensor	Linear Type (Mounted on Accelerator Pedal)	1	—	
Throttle Position Sensor	No-contact Type	1		
Injector	12-Hole Type	6		

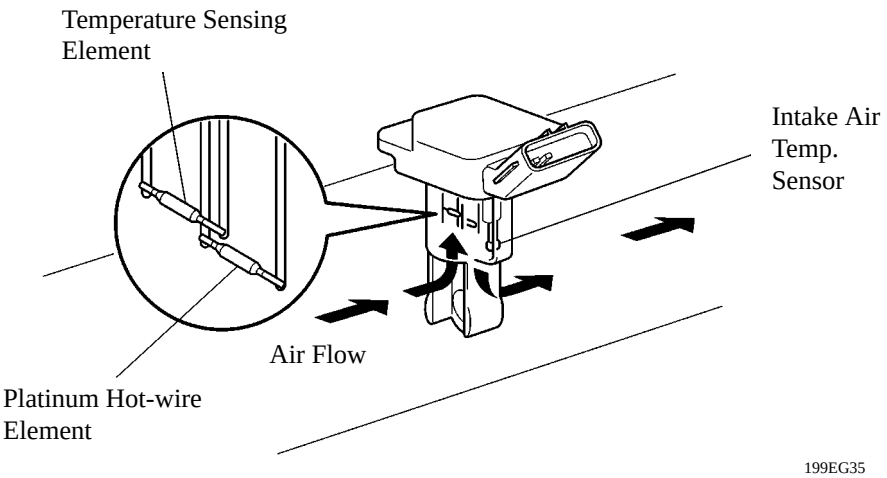
2) Air Fuel Ratio Sensor

For details, see page 35 in the 2AZ-FE engine section.

3) Mass Air Flow Meter

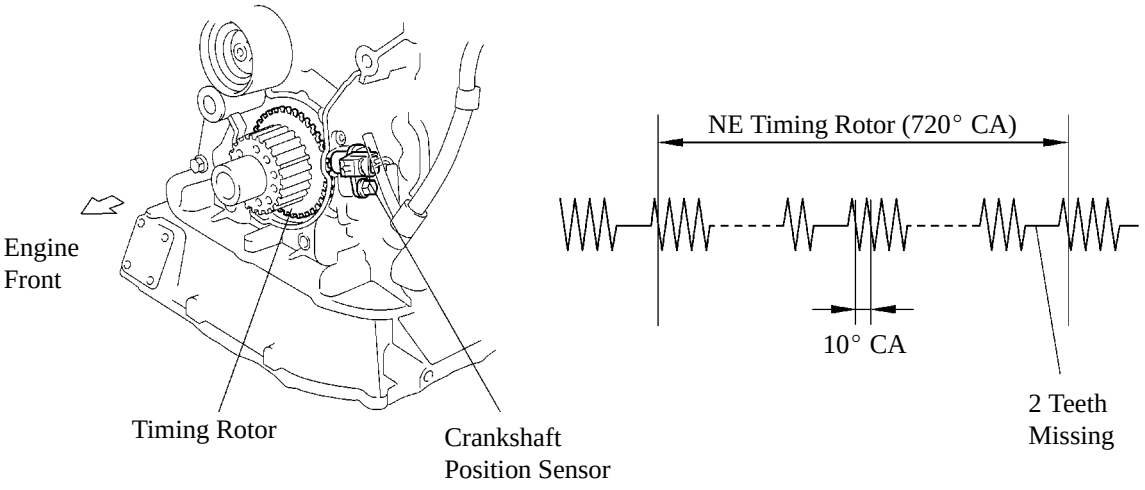
■ This mass air flow meter, which is a plug-in type, allows a portion of the intake air to flow through the detection area. By directly measuring the mass and the flow rate of the intake air, the detection precision has been improved and the intake air resistance has been reduced.

■ This mass air flow meter has a built-in intake air temperature sensor.



4) Crankshaft Position Sensor

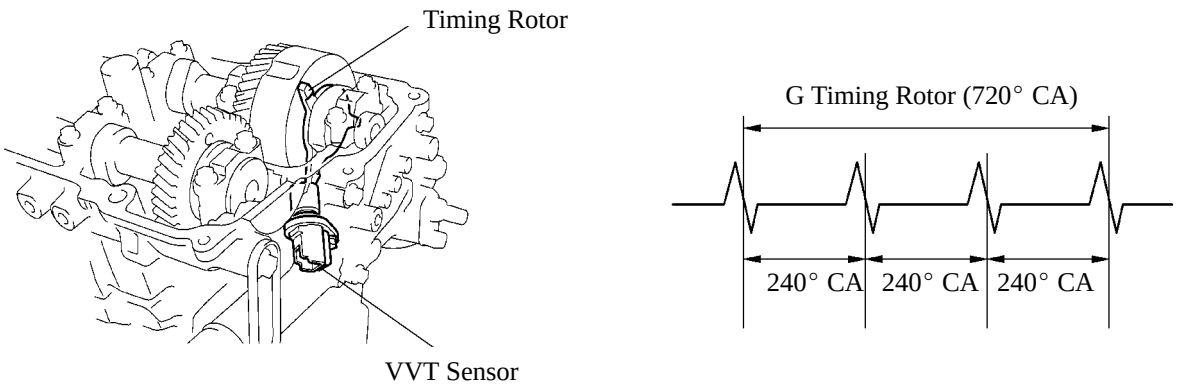
The timing rotor of the crankshaft consists of 34 teeth, with 2 teeth missing. The crankshaft position sensor outputs the crankshaft rotation signals every 10°, and the missing teeth are used to determine the top-dead-center.



208EG40

5) VVT Sensor

The VVT sensors are mounted on the right and left banks of the cylinder heads. To detect the camshaft position, these sensors pick up the protrusion of the timing rotor that is secured to the camshaft in front of the VVT controller. In addition, each sensor generates 3 pulses for every 2 revolutions of the crankshaft.



Left Bank

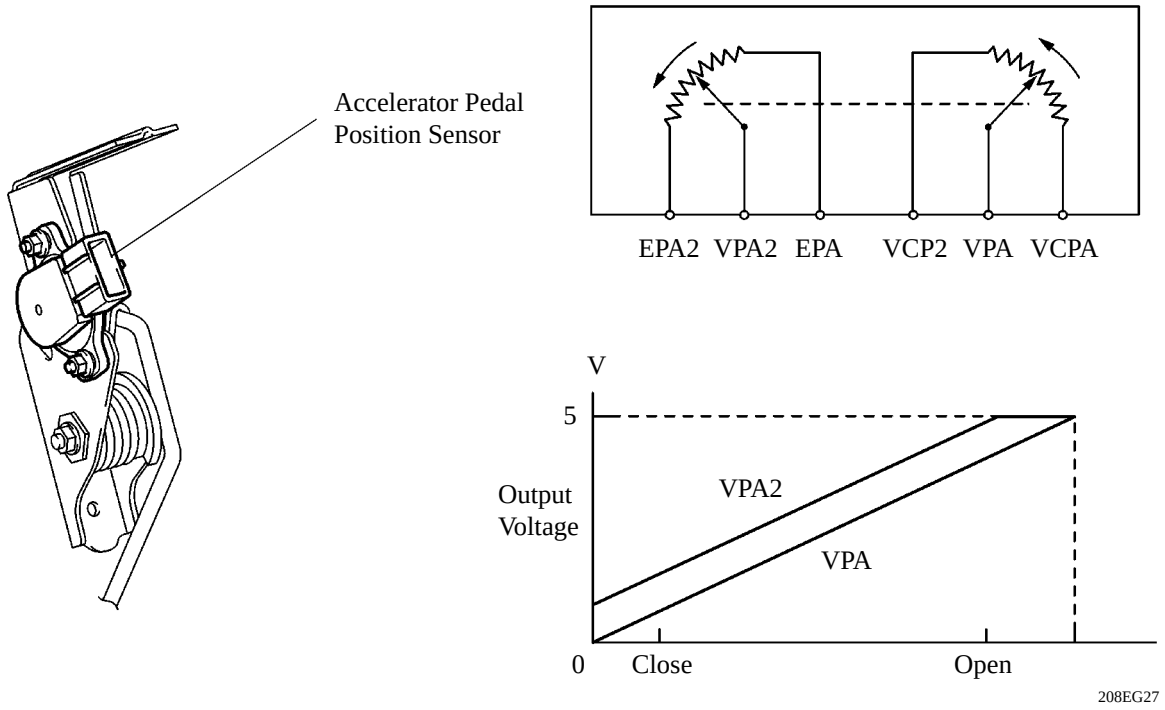
257CA20

6) Knock Sensor (Flat Type)

For details, see page 21 in the 2AZ-FE engine section.

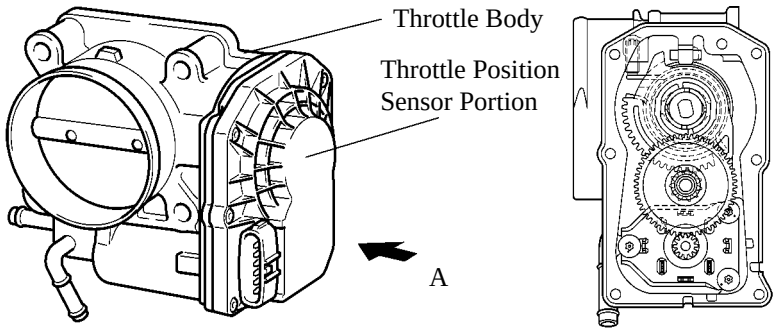
7) Accelerator Pedal Position Sensor

This sensor converts the accelerator pedal depressed angles into electric signals with two differing characteristics and outputs them to the ECM. One is the VPA signal that linearly outputs the voltage along the entire range of the accelerator pedal depressed angle. The other is the VPA2 signal that outputs on offset voltage.

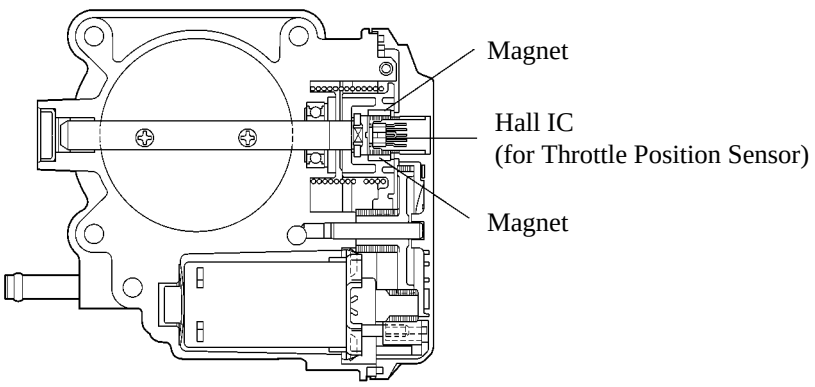


8) Throttle Position Sensor

For details, see page-22 in 2AZ-FE engine section.



View from A

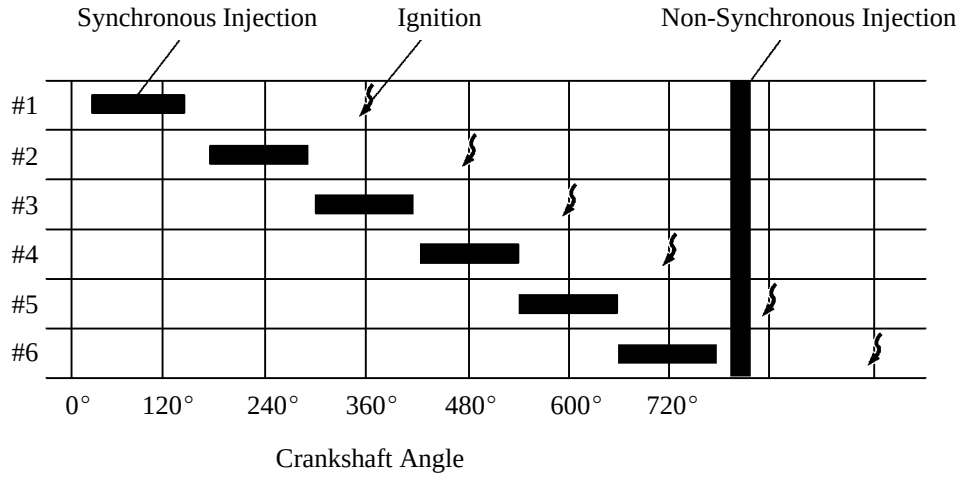


Cross Section

241EG28

SFI (Sequential Multiport Fuel Injection) System

- An L-type SFI system directly detects the intake air mass with a hot wire type mass air flow meter.
- An independent injection system (in which fuel is injected once into each cylinder for each two revolution of the crankshaft) has been adopted.
- There are two types of fuel injection:
  - One is synchronous injection in which corrections based on the signals from the sensors are added to the basic injection duration so that injection occurs always at the same timing.
  - The other is non-synchronous injection in which injection is effected by detecting the requests from the signals of the sensors regardless of the crankshaft angle.
    Furthermore, to protect the engine and improve fuel economy, the system effects fuel cutoff in which the injection of fuel is stopped temporarily in accordance with the driving conditions.
- This system performs group injection when the engine coolant temperature is extremely low and the engine is operating at a low speed.



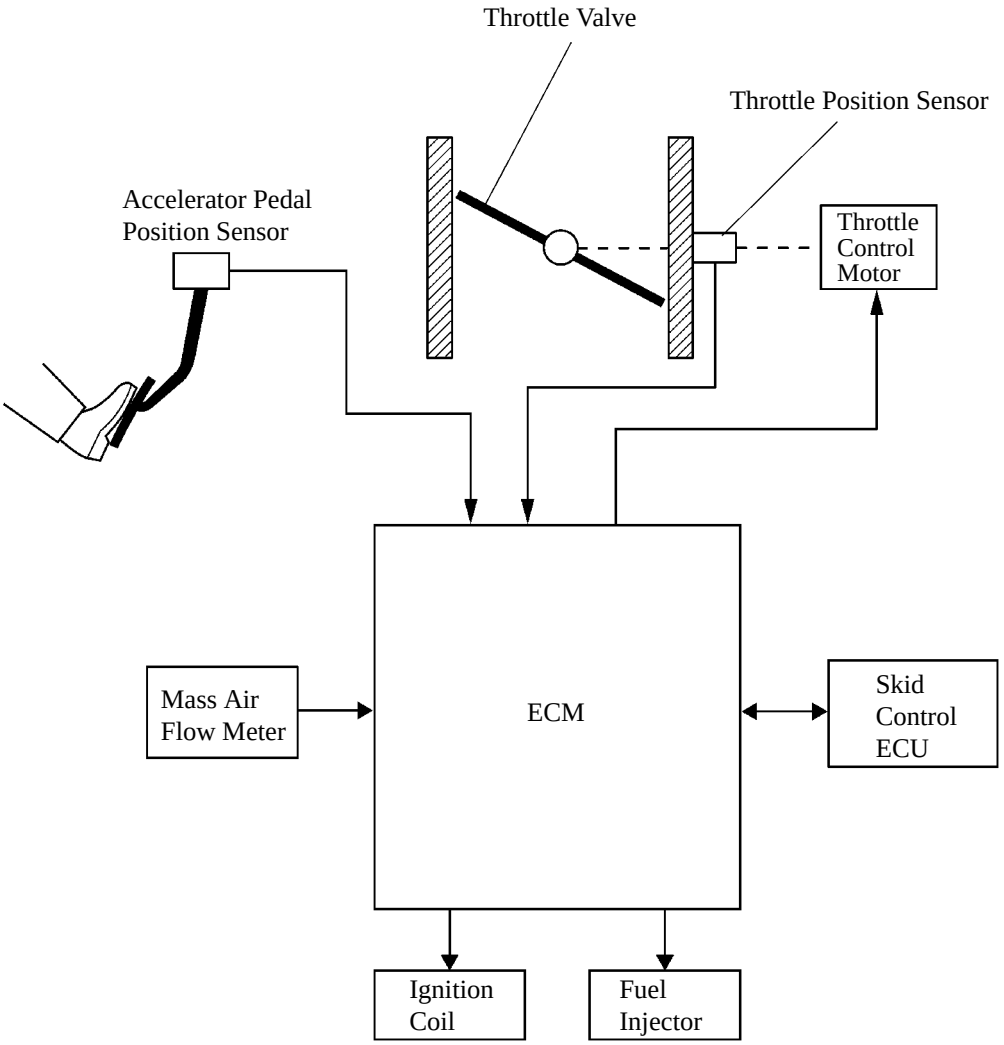
Independent Injection

ETCS-i (Electronic Throttle Control System-intelligent)

1) General

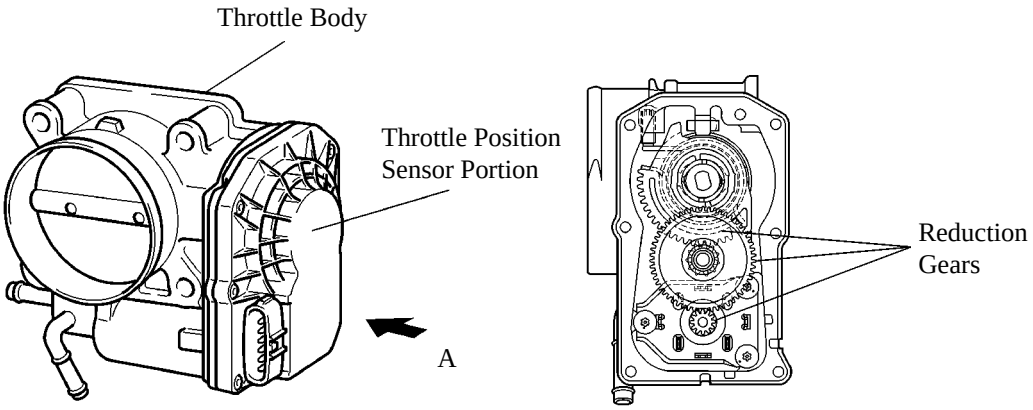
- The ETCS-i is used, providing excellent throttle control in all the operating ranges.
  In the new 3MZ-FE engine, the accelerator cable has been discontinued, and an accelerator position sensor has been provided on the accelerator pedal.
- In the conventional throttle body, the throttle valve opening is determined by the amount of the accelerator pedal effort. In contrast, the ETCS-i uses the ECM to calculate the optimal throttle valve opening that is appropriate for the respective driving condition and uses a throttle control motor to control the opening.
- The ETCS-i controls the IAC (Idle Air Control) system, the cruise control system, the TRAC (Traction Control), and the VSC (Vehicle Stability Control) system.
- In case of an abnormal condition, this system transfers to the limp mode.

▶ System Diagram ◀

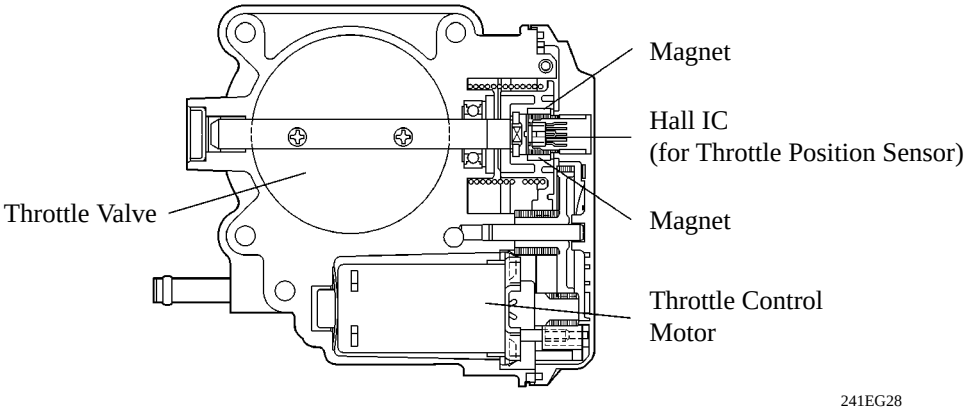


208EG44

2) Construction



View from A



Cross Section

a. Throttle Position Sensor

The throttle position sensor is mounted on the throttle body, to detect the opening angle of the throttle valve. For details, refer to Main Components of Engine Control System section on page 23.

b. Throttle Control Motor

A DC motor with excellent response and minimal power consumption is used for the throttle control motor. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the opening of the throttle valve.

3) Operation

a. General

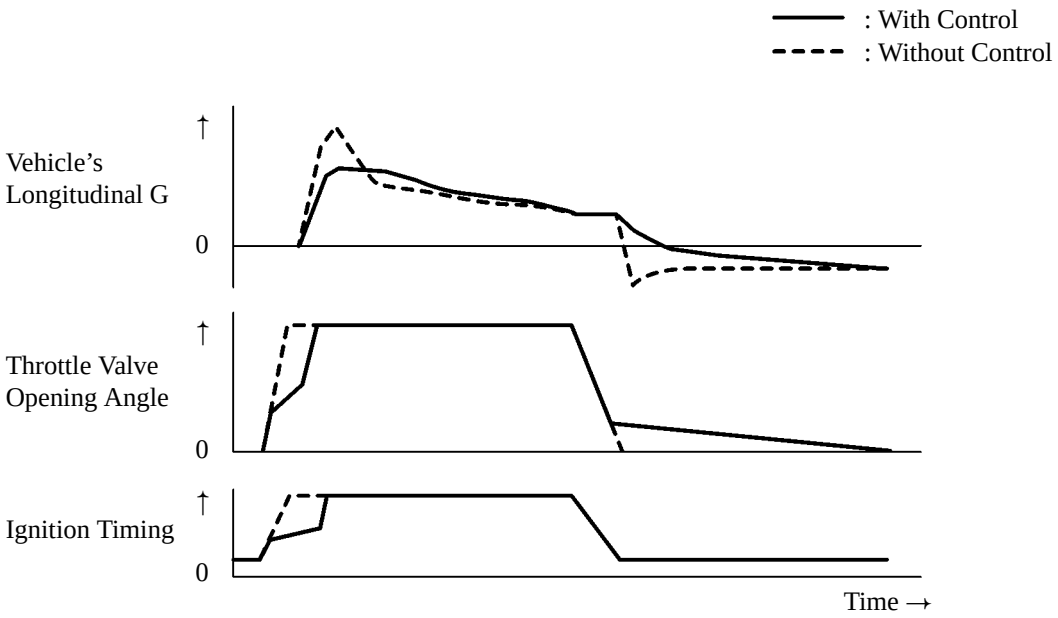
The ECM drives the throttle control motor by determining the target throttle valve opening in accordance with the respective operating condition.

- Non-Linear Control
- Idle Speed Control
- TRAC Throttle Control
- VSC Coordination Control
- Cruise Control

b. Non-Linear Control

Controls the throttle to an optimal throttle valve opening that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed in order to realize excellent throttle control and comfort in all operating ranges.

▶ Control Examples During Acceleration and Deceleration ◀



150EG37

c. Idle Speed Control

The ECM controls the throttle valve in order to constantly maintain an ideal idle speed.

d. TRAC Throttle Control

As part of the TRAC system, the throttle valve is closed by a demand signal from the skid control ECU if an excessive amount of slippage is created at a driving wheel, thus facilitating the vehicle in ensuring stability and driving force.

e. VSC Coordination Control

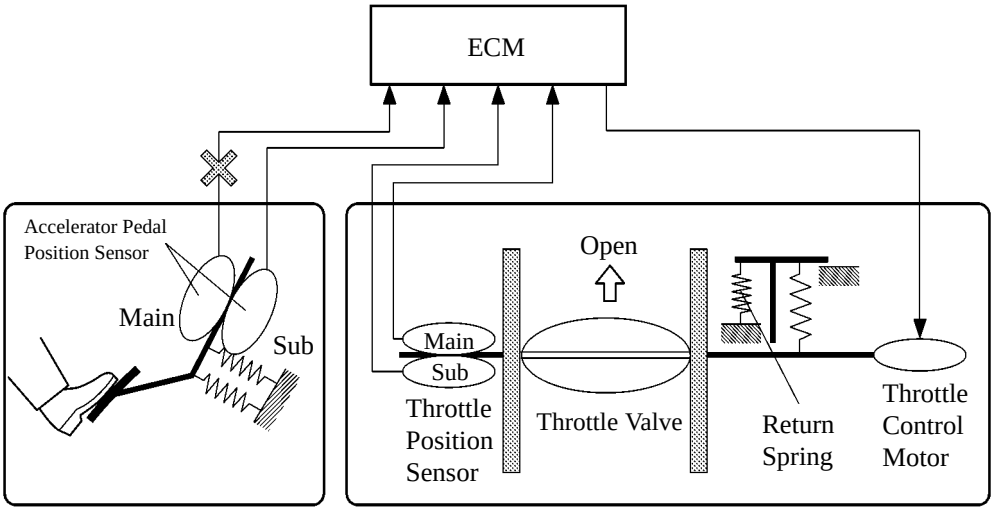
In order to bring the effectiveness of the VSC system control into full play, the throttle valve opening angle is controlled by effecting a coordination control with the skid control ECU.

f. Cruise Control

An ECM with an integrated cruise control ECU directly actuates the throttle valve for operation of the cruise control.

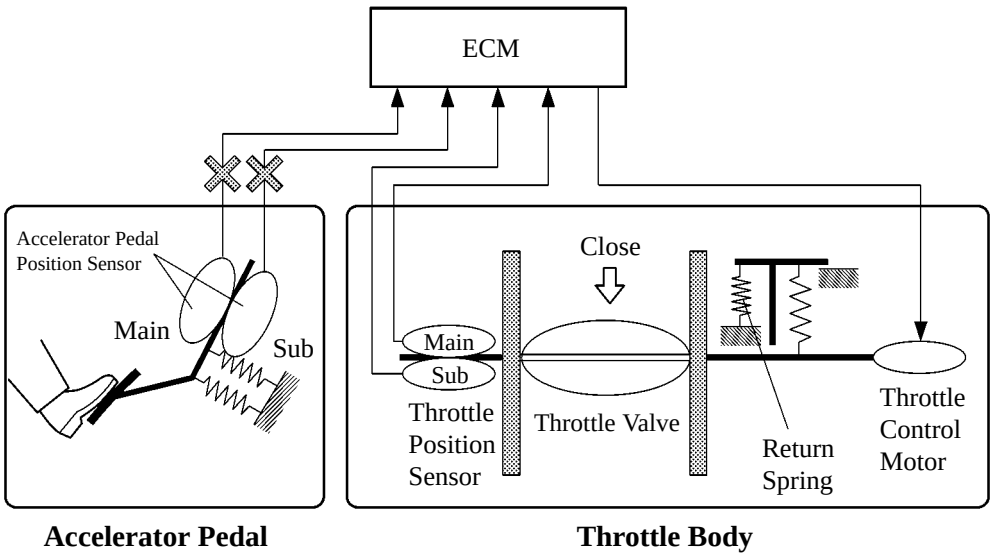
4) Fail-Safe of Accelerator Pedal Position Sensor

■ The accelerator pedal position sensor comprises two (main, sub) sensor circuits. If a malfunction occurs in either one of the sensor circuits, the ECM detects the abnormal signal voltage difference between these two sensor circuit and switches to the limp mode. In the limp mode, the remaining circuit is used to calculate the accelerator pedal opening, in order to operate the vehicle under limp mode control.



199EG45

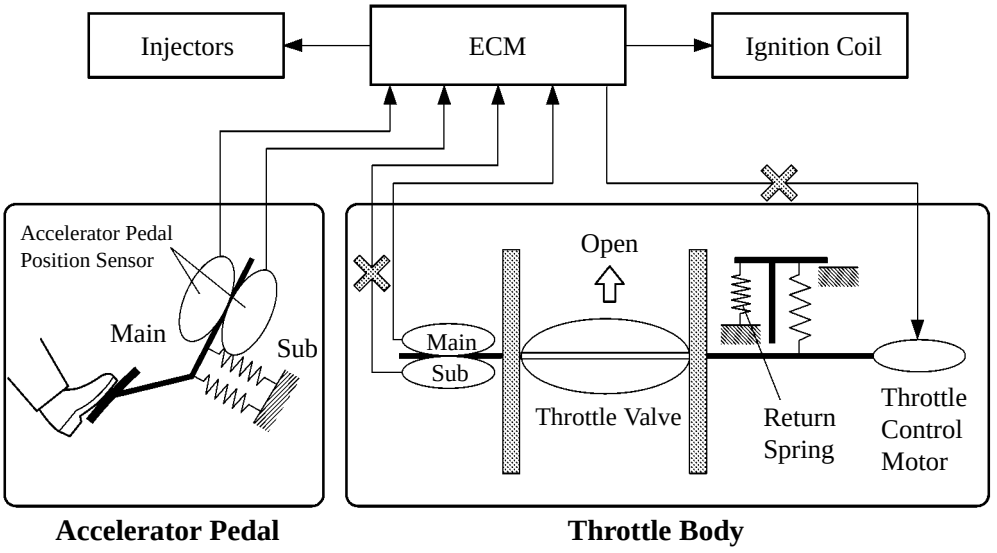
■ If both circuits malfunction, the ECM detects the abnormal signal voltage from these two sensor circuits and discontinues the throttle control. At this time, the vehicle can be driven within its idling range.



199EG46

5) Fail-Safe of Throttle Position Sensor

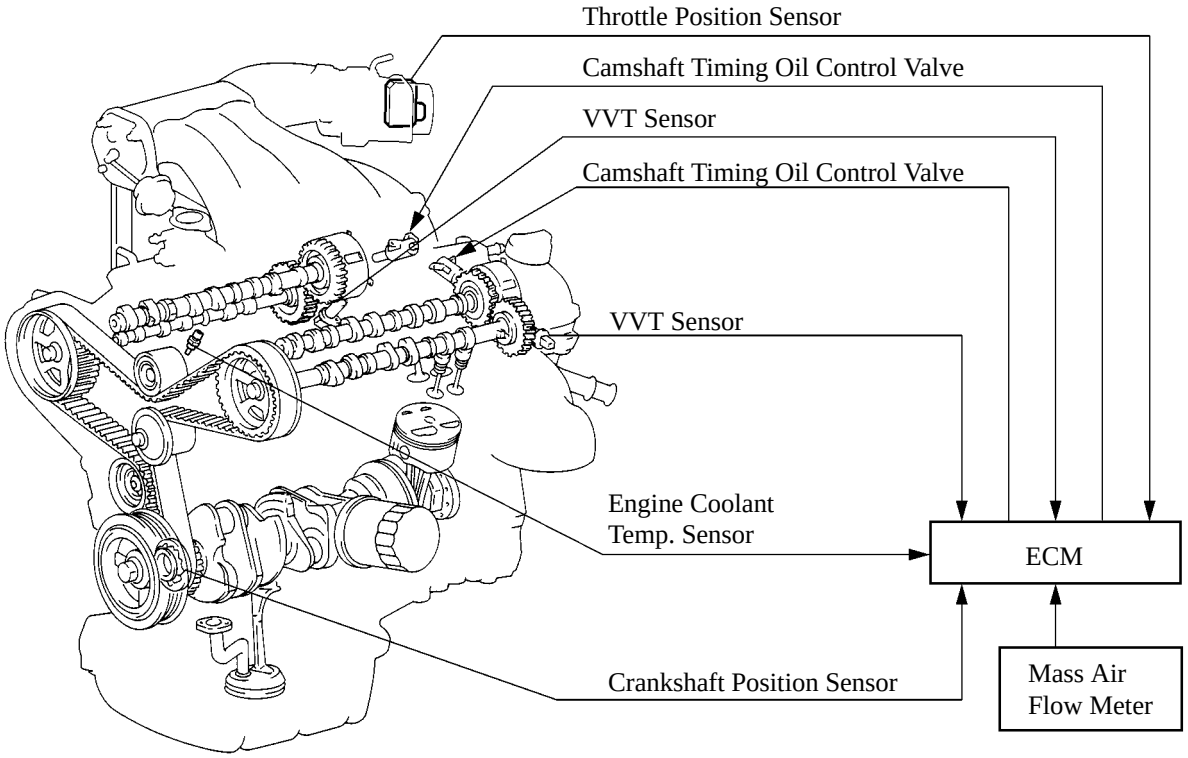
- The throttle position sensor comprises two (main, sub) sensor circuits. If a malfunction occurs in either one of the sensor circuits, the ECM detects the abnormal signal voltage difference between these two sensor circuits, cuts off the current to the throttle control motor, and switches to the limp mode. Then, the force of the return spring causes the throttle valve to return and stay at the prescribed opening. At this time, the vehicle can be driven in the limp mode while the engine output is regulated through the control of the fuel injection and ignition timing in accordance with the accelerator opening.
- The same control as above is effected if the ECM detects a malfunction in the throttle control motor system.



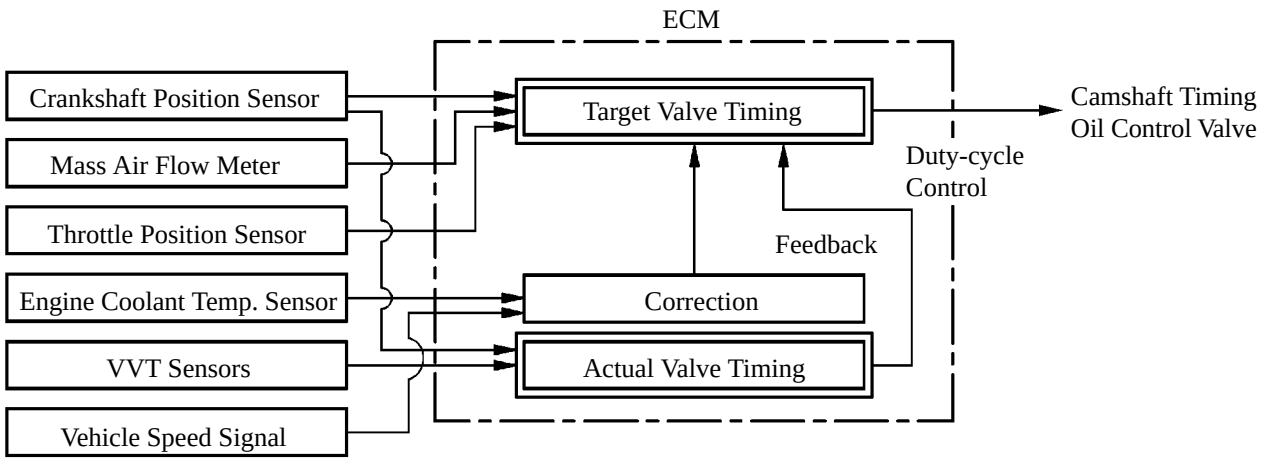
VVT-i (Variable Valve Timing-intelligent) System

1) General

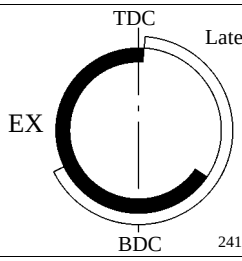
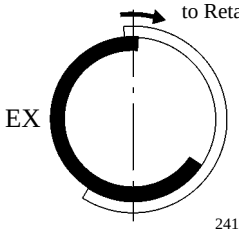
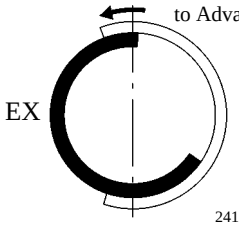
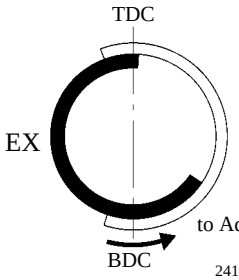
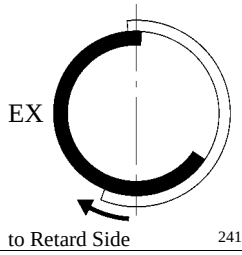
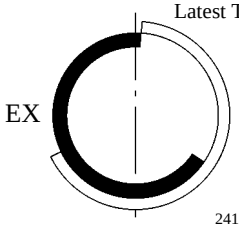
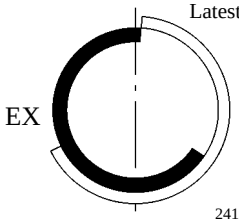
■ The VVT-i system is designed to control the intake camshaft within a range of 60° (of Crankshaft Angle) to provide valve timing that is optimally suited to the engine condition. This improves torque in all the speed ranges as well as increasing fuel economy, and reducing exhaust emissions.



■ Using the engine speed, intake air volume, throttle position and engine coolant temperature, the ECM can calculate optimal valve timing for each driving condition and controls the camshaft timing oil control valve. In addition, the ECM uses signals from the camshaft position sensor and the crankshaft position sensor to detect the actual valve timing, thus providing feedback control to achieve the target valve timing.



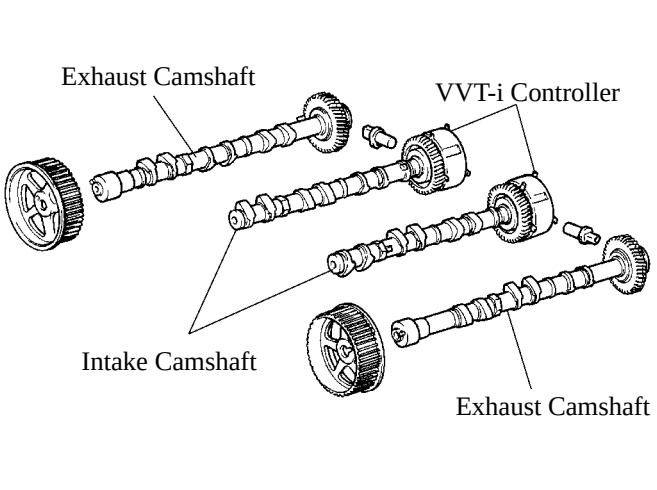
2) Effectiveness of the VVT-i System

Operation State	Objective	Effect
During Idling	 Eliminating overlap to reduce blow back to the intake side	■ Stabilized idling rpm ■ Better fuel economy
At Light Load	 Decreasing overlap to eliminate blow back to the intake side.	Ensured engine stability
At Medium Load	 Increasing overlap to increase internal EGR to reduce pumping loss	■ Better fuel economy ■ Improved emission control
In Low to Medium Speed Range with Heavy Load	 Advancing the intake valve close timing for volumetric efficiency improvement	Improved torque in low to medium speed range
In High Speed Range with Heavy Load	 Retarding the intake valve close timing for volumetric efficiency improvement	Improved output
At Low Temperatures	 Eliminating overlap to prevent blow back to the intake side leads to the lean burning condition, and stabilizes the idling speed at fast idle	■ Stabilized fast idle rpm ■ Better fuel economy
■ Upon Starting ■ Stopping the Engine	 Eliminating overlap to minimize blow back to the intake side	Improved startability

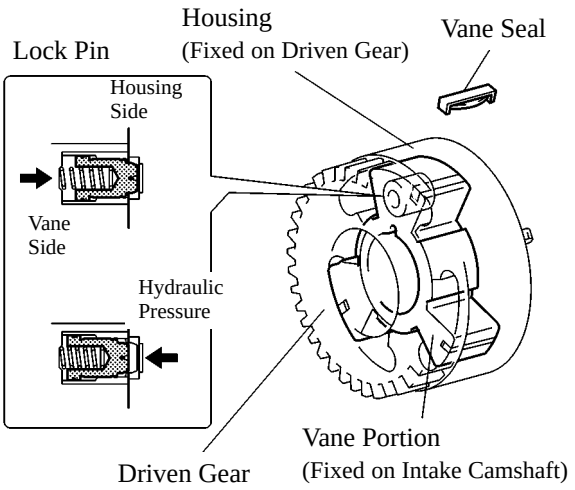
3) Construction

a. VVT-i Controller

This controller consists of the housing driven from the exhaust camshaft and the vane coupled with the intake camshaft.
The oil pressure sent from the advance or retard side path at the intake camshaft causes rotation in the VVT-i controller vane circumferential direction to vary the intake valve timing continuously.
When the engine is stopped, the intake camshaft will be in the most retarded state to ensure startability.
When hydraulic pressure is not applied to the VVT-i controller immediately after the engine has been started, the lock pin locks the movement of the VVT-i controller to prevent a knocking noise.



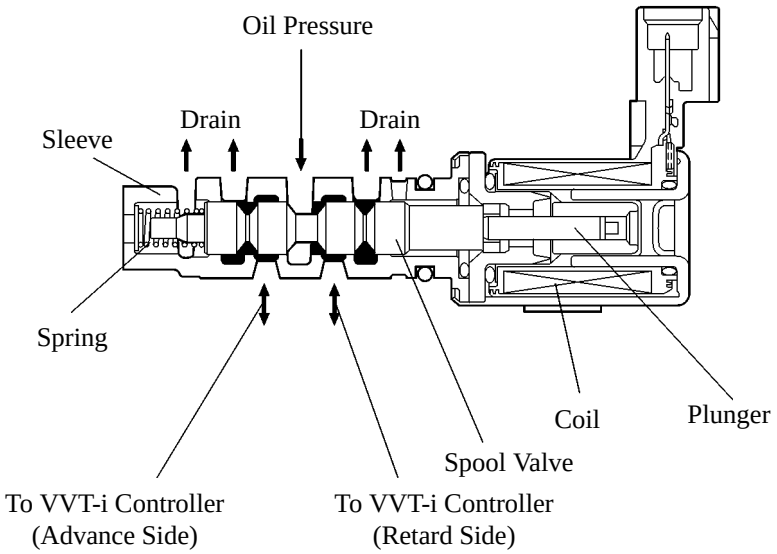
157EG24



170EG05

b. Camshaft Timing Oil Control Valve

This camshaft timing oil control valve controls the spool valve position in accordance with the duty-cycle control from the ECM. This allows hydraulic pressure to be applied to the VVT-i controller advance or retard side. When the engine is stopped, the camshaft timing oil control valve is in the most retarded state.

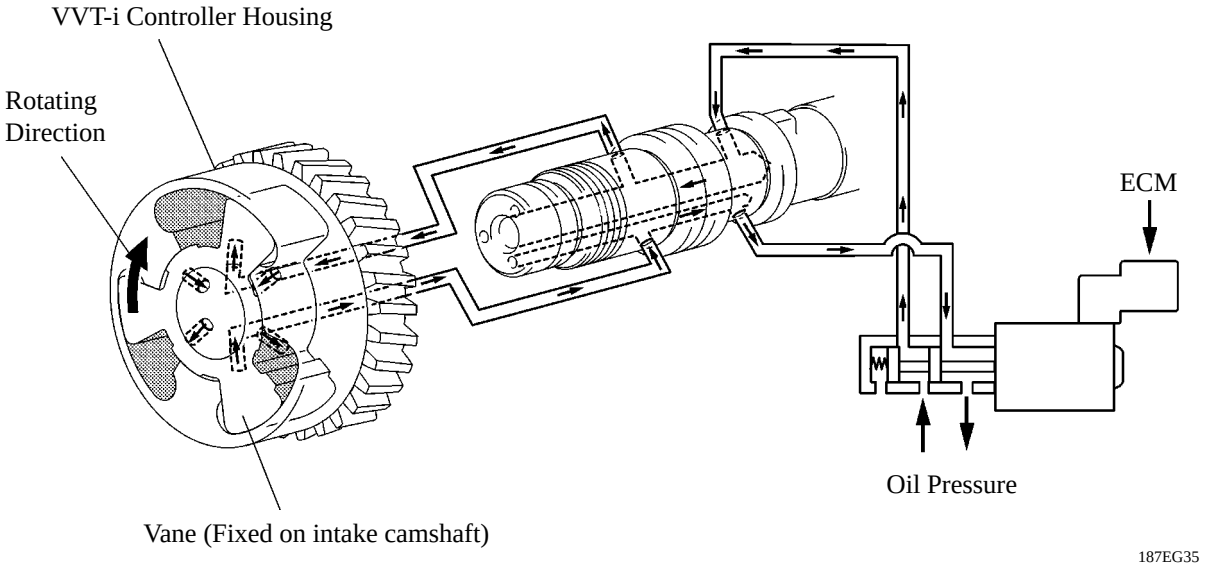


253EG17

4) Operation

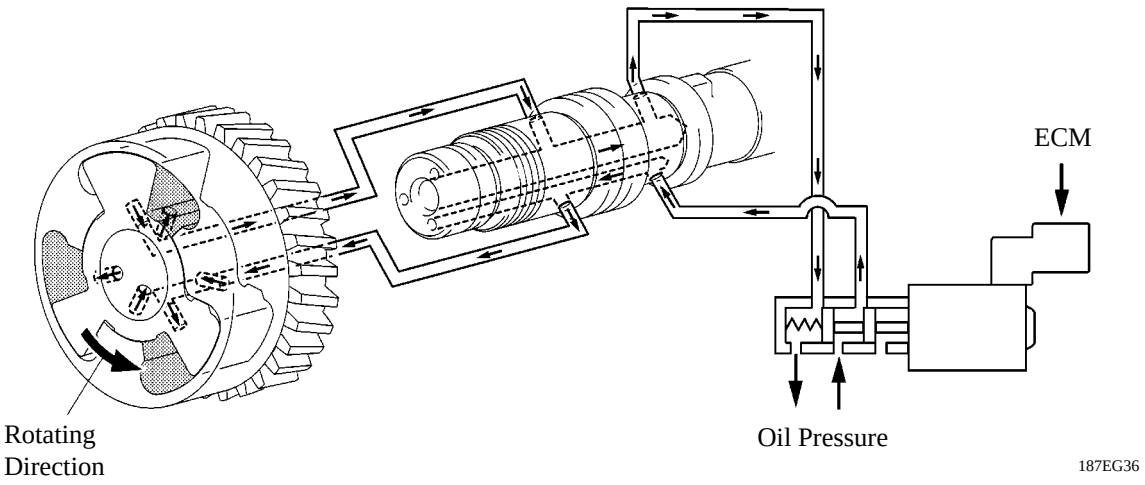
a. Advance

When the camshaft timing oil control valve is positioned as illustrated below by the advance signals from the ECM, the resultant oil pressure is applied to the vane chamber of advance side to rotate the camshaft in the timing advance direction.



b. Retard

When the camshaft timing oil control valve is positioned as illustrated below by the retard signals from the ECM, the resultant oil pressure is applied to the vane chamber of retard side to rotate the camshaft in the timing retard direction.



c. Hold

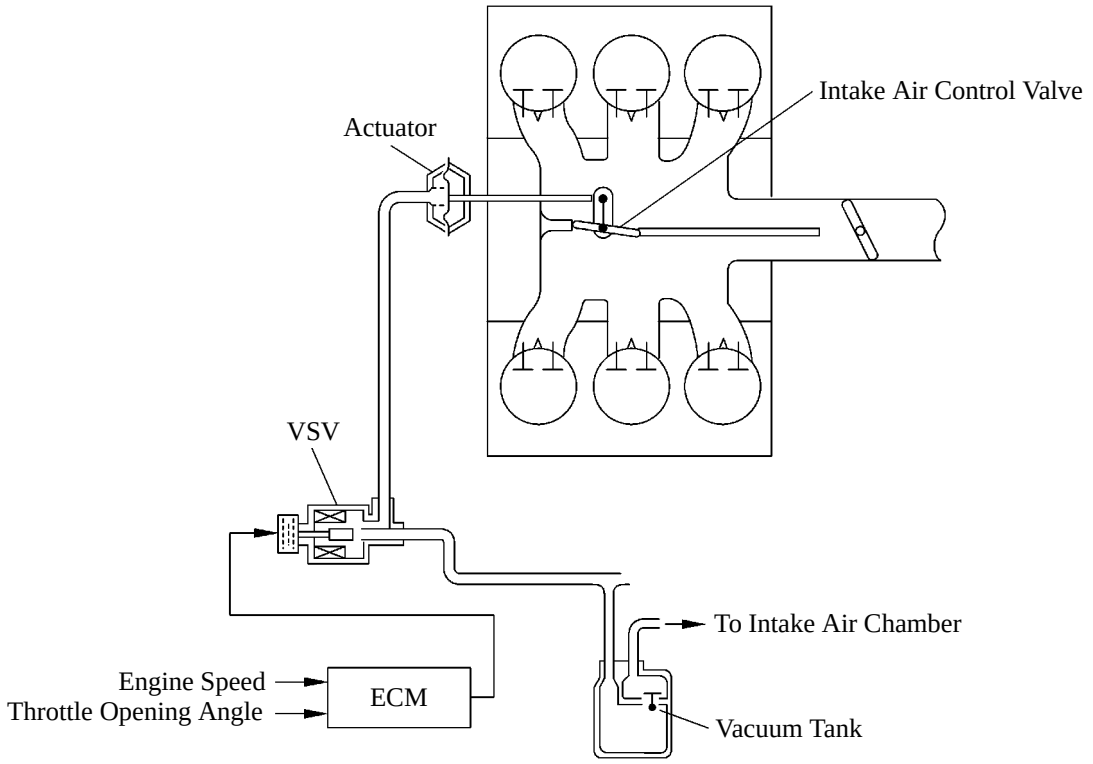
After reaching the target timing, the valve timing is held by keeping the camshaft timing oil control valve in the neutral position unless the traveling state changes.
This adjusts the valve timing at the desired target position and prevents the engine oil from running out when it is unnecessary.

ACIS (Acoustic Control Induction System)

1) General

The ACIS is realized by using a bulkhead to divide the intake manifold into 2 stages, with an intake air control valve in the bulkhead being opened and closed to vary the effective length of the intake manifold in accordance with the engine speed and throttle valve opening angle. This increases the power output in all ranges from low to high speed.

▶ System Diagram ◀

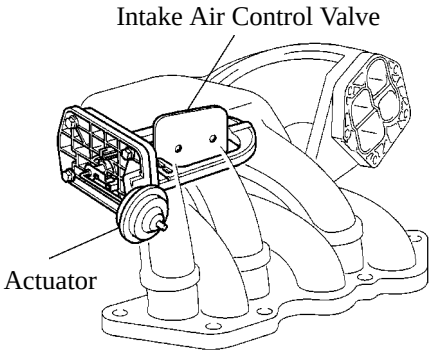


208EG45

2) Construction

a. Intake Air Control Valve

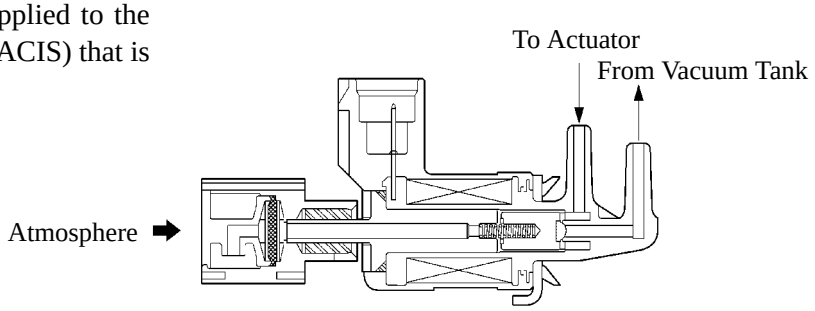
The intake air control valve, which is provided in the intake air chamber, open and close to change the effective length of the intake manifold in two stages.



241EG16

b. VSV (Vacuum Switching Valve)

Controls the vacuum that is applied to the actuator by way of the signal (ACIS) that is output by the ECM.



208EG47

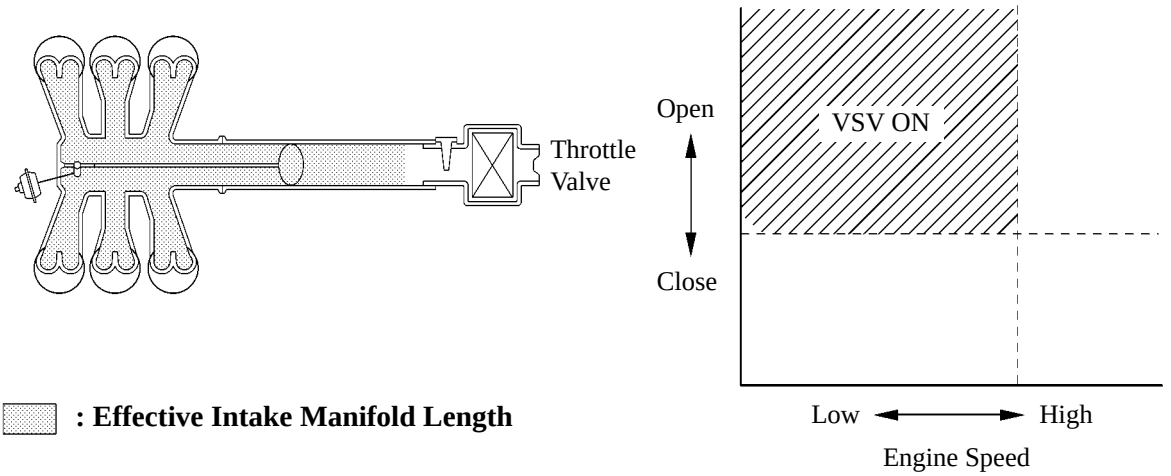
c. Vacuum Tank

Equipped with an internal check valve, the vacuum tank stores the vacuum that is applied to the actuator in order to maintain the intake air control valve fully closed even during low-vacuum conditions.

3) Operation

a. When the Intake Control Valve Closes (VSV ON)

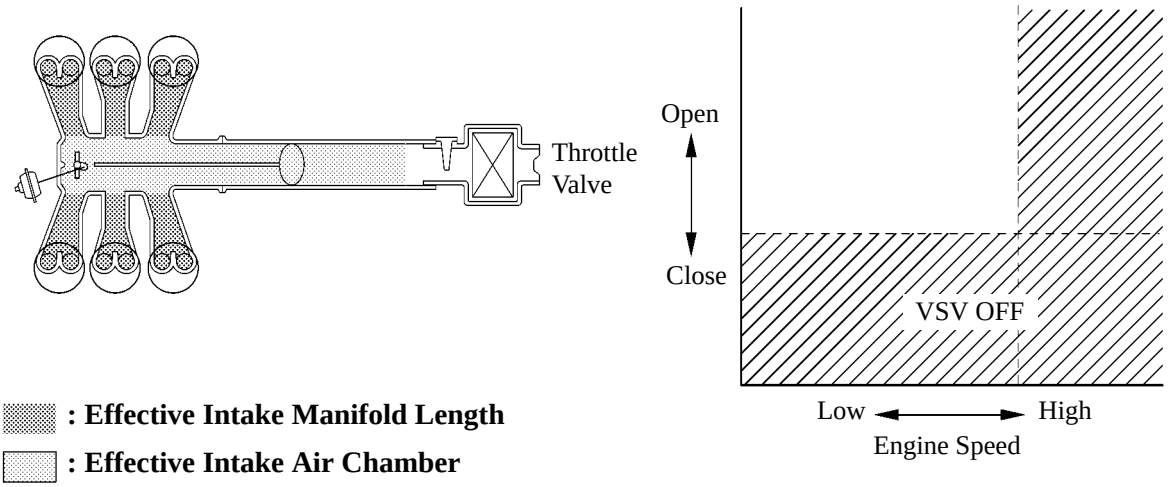
The ECM activates the VSV to match the longer pulsation cycle so that the negative pressure acts on the diaphragm chamber of the actuator. This closes the control valve. As a result, the effective length of the intake manifold is lengthened and the intake efficiency in the low-to-medium speed range is improved due to the dynamic effect of the intake air, thereby increasing the power output.



257CA18

b. When the Intake Control Valve Open (VSV OFF)

The ECM deactivates the VSV to match the shorter pulsation cycle so that atmospheric air is led into the diaphragm chamber of the actuator and opens the control valve. When the control valve is open, the effective length of the intake air chamber is shortened and peak intake efficiency is shifted to the high engine speed range, thus providing greater output at high engine speeds.



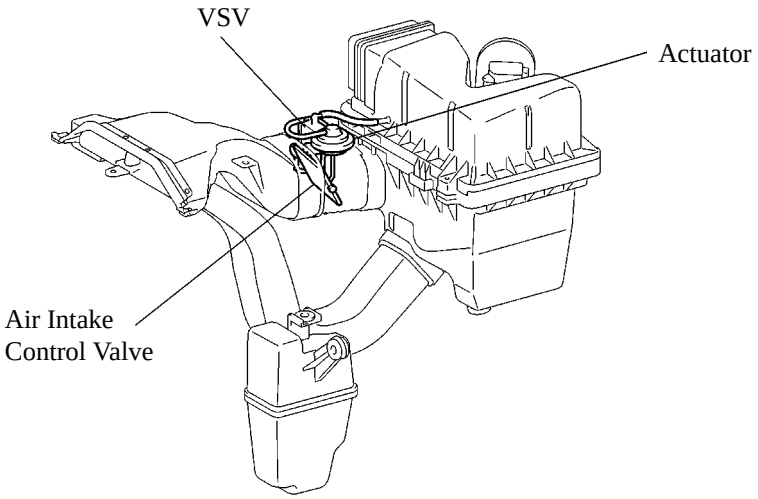
257CA19

Air Intake Control System

1) General

The air cleaner inlet is divided into two areas, and an air intake control valve and an actuator have been provided in one of the areas.
As a result, a reduction in intake noise in the low-speed range and an increase in the power output in the high-speed range have been realized.

▶ Layout of Components ◀

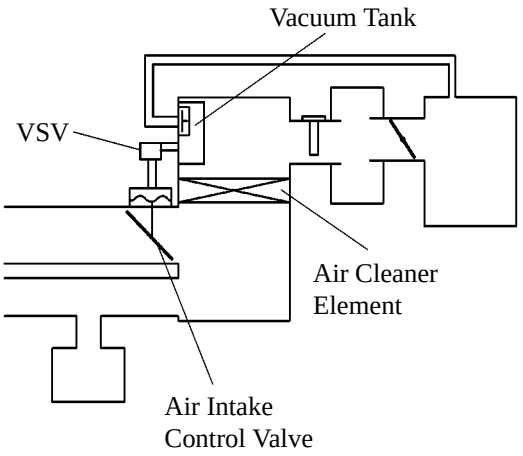


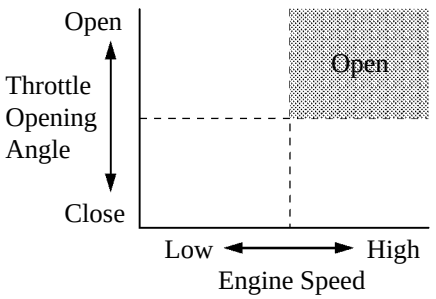
253EG08

2) Operation

■ When the engine is operating in the low- to mid-speed range, this control operates the air intake control valve to close one side of the air cleaner inlet. As a result, the intake area has been minimized and the intake noise has been reduced.

■ When the engine is operating in the high-speed range, this control operates the air intake control valve to open both sides of the air cleaner inlet. As a result, the intake area has been maximized and the intake efficiency has been improved.





Air Intake Control Valve Condition

208EG51

Fuel Pump Control System

For details, see page 24 in the 2AZ-FE engine section.

Diagnosis

- When the ECM detects a malfunction, the ECM makes a diagnosis and memorizes the failed section. Furthermore, the MIL (Malfunction Indicator Lamp) in the combination meter illuminates or blinks to inform the driver.
- The ECM will also store the DTCs of the malfunctions.
- The DTCs can be accessed the use of the hand-held tester.
- To comply with the OBD-II regulations, all the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes. Some of the DTCs have been further divided into smaller detection areas than in the past, and new DTCs have been assigned to them.
  For details, refer to the 2004 Camry Repair Manual (Pub. No. RM1063U).

Service Tip

To clear the DTC that is stored in the ECM, use a hand-held tester or disconnect the battery terminal or remove the EFI fuse for 1 minute or longer.

Fail-Safe

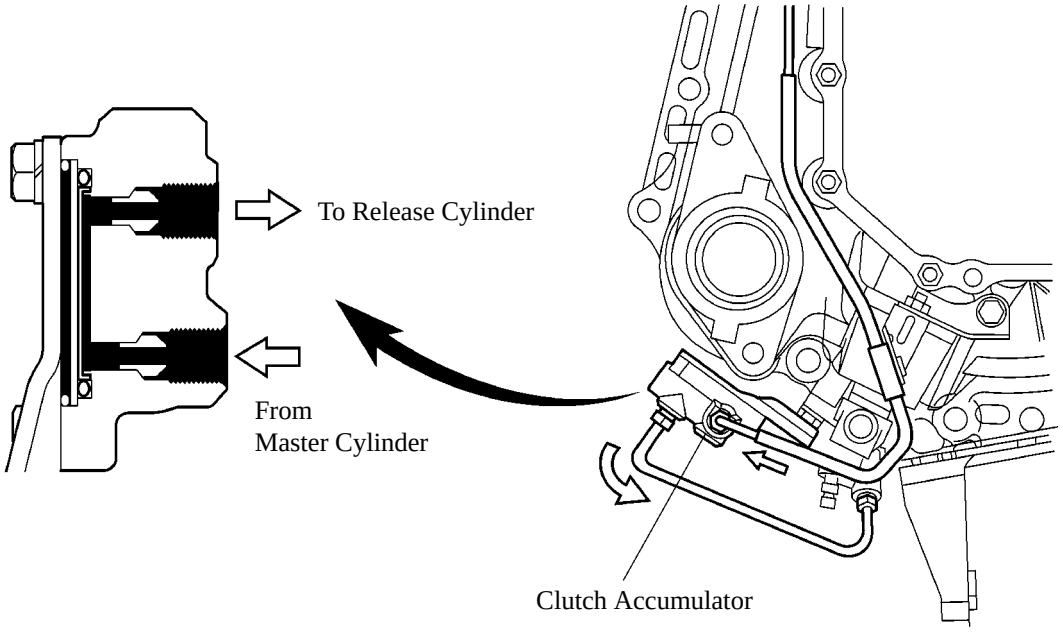
When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.

▶ Fail-Safe Chart ◀

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031, P0032, P0037, P0038, P0051, P0052, P0057, P0058	The heater circuit in which an abnormality is detected is turned off.	Ignition switch OFF.
P0100, P0102, P0103	Ignition timing is calculated from an engine speed and a throttle angle.	Return to normal condition.
P0110, P0112, P0113	Intake air temp. is fixed at 20°C (68°F).	Return to normal condition.
P0115, P0117, P0118	Engine coolant temp. is fixed at 80°C (176°F).	Return to normal condition.
P0120, P0122, P0123, P0220, P0222, P0223, P2135	Fuel cut intermittently when idle.	Return to normal condition and ignition switch OFF.
P0121	Fuel cut intermittently when idle.	Return to normal condition and ignition switch OFF.
P0325, P0327, P0328, P0330, P0332, P0333	Max. timing retardation.	Ignition switch OFF.
P0351, P0352, P0353, P0354, P0355, P0356	Fuel cut.	Return to normal condition.
P2102, P2103	Fuel cut intermittently when idle.	Return to normal condition and ignition switch OFF.
P2111, P2112	Fuel cut intermittently when idle.	Return to normal condition and ignition switch OFF.
P2119	Fuel cut intermittently when idle.	Return to normal condition and ignition switch OFF.

▶CLUTCH

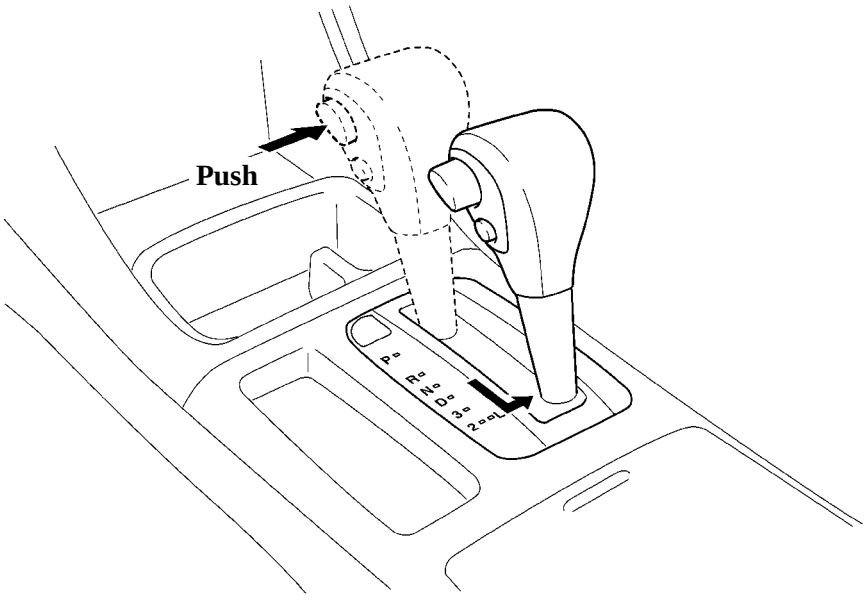
A clutch accumulator has been in the clutch tube, which is located between the clutch master cylinder and clutch release cylinder, in order to absorb the vibrations of the clutch fluid and enhance quiet operation.



258CA02

▶SHIFT CONTROL MECHANISM

The method for shifting the L gate type shift lever from the 2 position to the L position has been changed. Now, the shift button must be pushed while sliding the shift lever, in order to prevent a shift down that is not intended by the driver.



257CA13

◀BRAKE

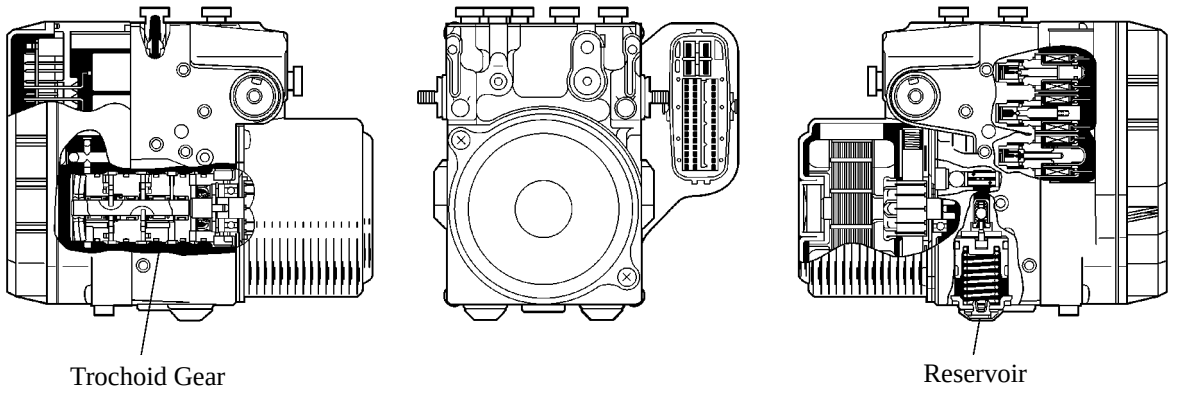
1. Brake Control System (ABS with EBD)

▶This model uses the CAN (Controller Area Network) communication system for communication between the skid control ECU, steering angle sensor and yaw rate & deceleration sensor.

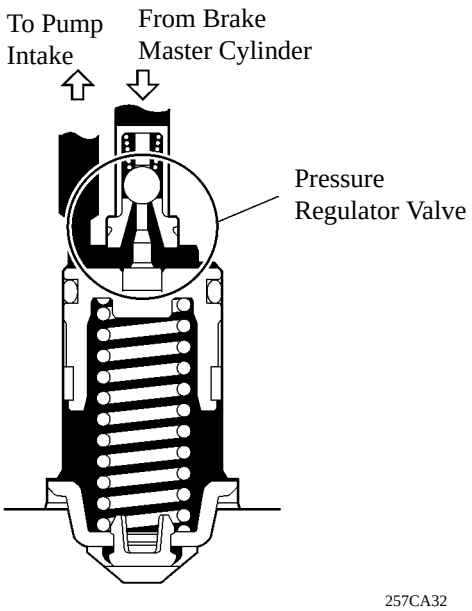
▶The “skid control ECU and brake actuator”, and the “yaw rate sensor and deceleration sensor”, are integrated units, respectively.

▶A trochoid gear type pump has been adopted for the pump in the brake actuator.

▶A pressure regulator valve has been adopted to regulate the pressure of the fluid that is supplied to the pump.



▶A pressure regulation valve has been adopted in the reservoir for the purpose of regulating the pressure of the fluid to be supplied to the pump and to close the passage between the pump and the master cylinder during braking.



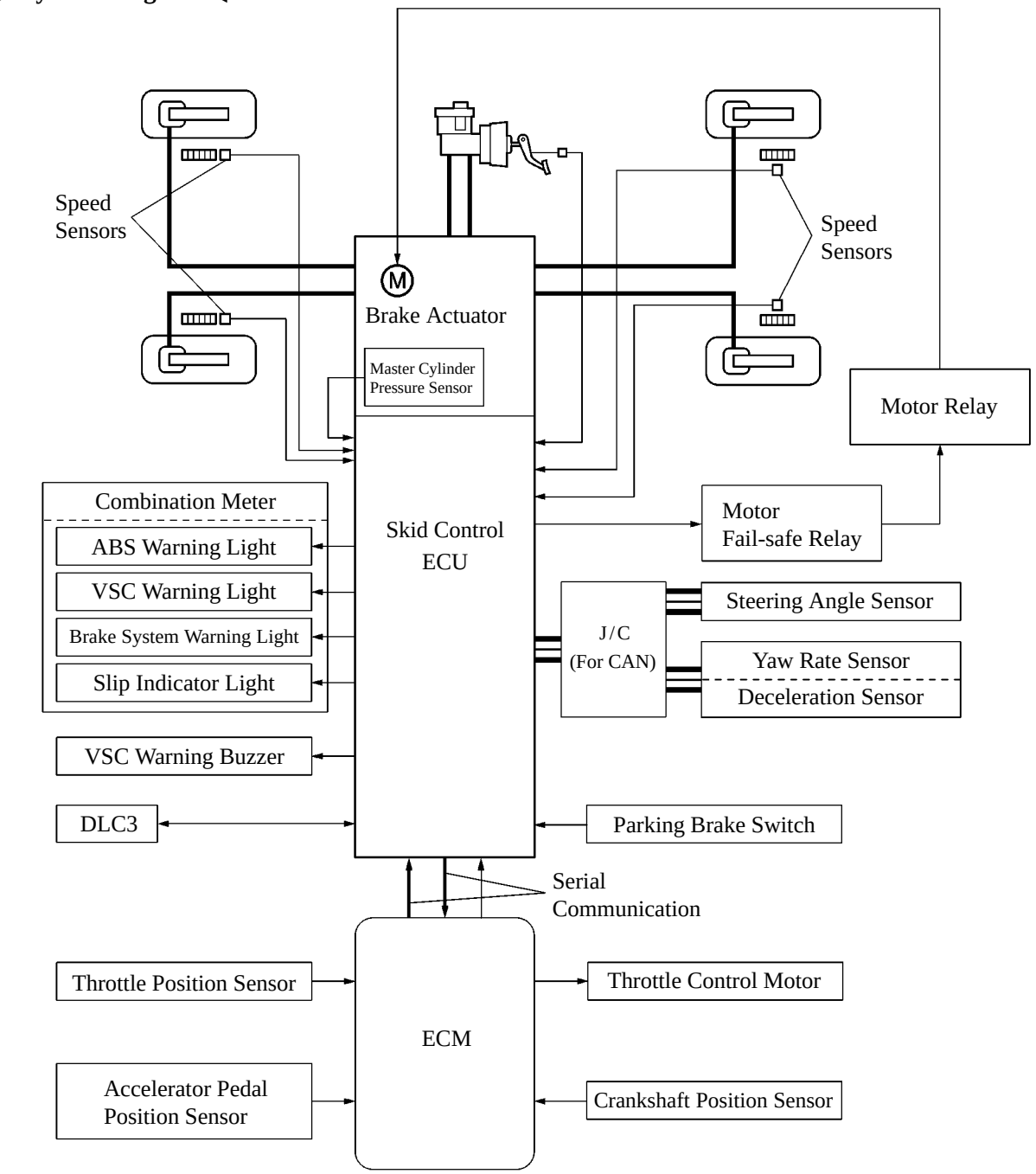
Reservoir Cross Section

2. Brake Control System (ABS with EBD, Brake Assist, TRAC and VSC)

General

- The Brake Control System, uses the CAN (Controller Area Network) communication system for communication between the skid control ECU, steering angle sensor and yaw rate & deceleration sensor.
- The “skid control ECU and brake actuator”, and the “yaw rate sensor and deceration sensor”, are integrated units, respectively.
- A trochoid gear type pump has been adapted for the pump in the brake actuator.
- A pressure regulator valve has been adapted to regulate the pressure of the fluid that is supplied to the pump.

▶ System Diagram ◀



: CAN (Controller Area Network)

Self-Diagnosis

If the CAN has communication error at ECU or sensors, multiple DTCs (Diagnostic Trouble Codes) are output simultaneously to indicate the malfunction location. For detail, see page page-93
For details on the DTC that are stored in skid control ECU memory and the DTC that are output through the sensor check function, see the 2004 Camry Repair Manual (Pub. No. RM1063U).

▶ DTC Chart (blinking ABS warning light) ◀

DTC No.		Detection Item	DTC No.		Detection Item
2-digit	5-digit		2-digit	5-digit	
94	U0121	Malfunction in CAN communication	95	U0124	Malfunction in CAN communication with deceleration sensor

▶ DTC Chart (blinking VSC warning light) ◀

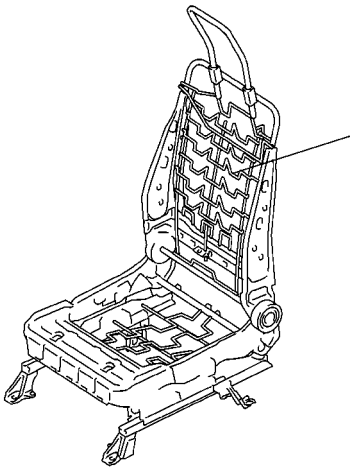
DTC No.		Detection Item	DTC No.		Detection Item
2-digit	5-digit		2-digit	5-digit	
62	U0123	Malfunction in CAN communication with yaw rate sensor	63	U0126	Malfunction in CAN communication with steering angle sensor

FRONT SEAT

1. Construction

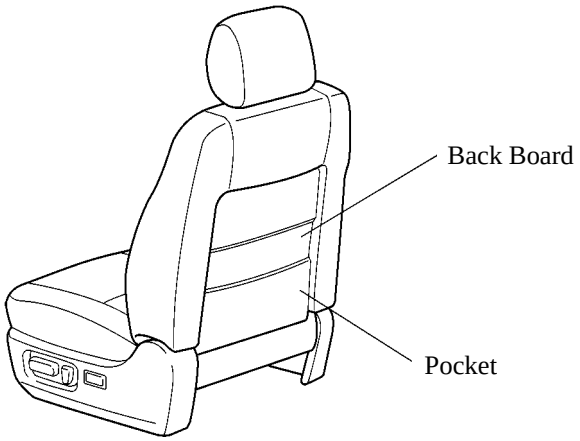
■ A newly constructed skeletal frame has been adopted in the front seats to realize weight reduction.

■ A flat matt skeletal frame has been adopted in the seat back in order to realize comfortable ride.



257CA07

■ A pocket has been provided on the backside of the front seats as standard equipment, in order to realize a luxurious appearance and improve utility.



257CA08

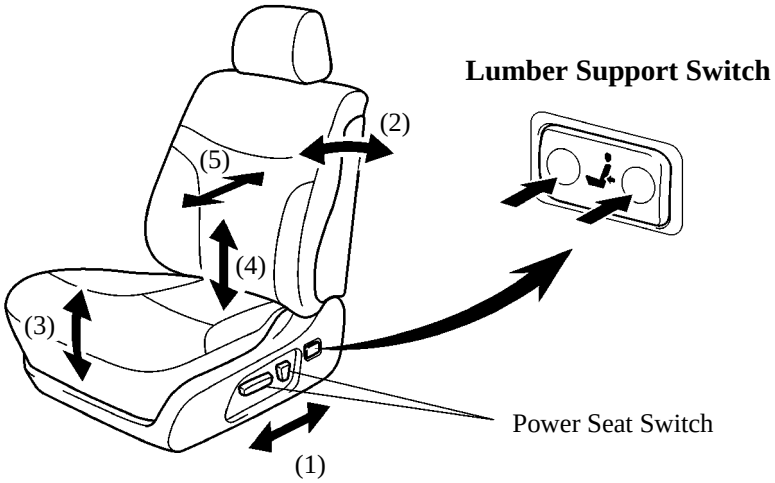
2. Power Seat

■ Only for the driver, power seat is all grade standard equipment except the 1MZ-FE engine SE grade.

■ A power lumbar support has been adopted on the ’04 Camry.

■ The following features are all for power functions.

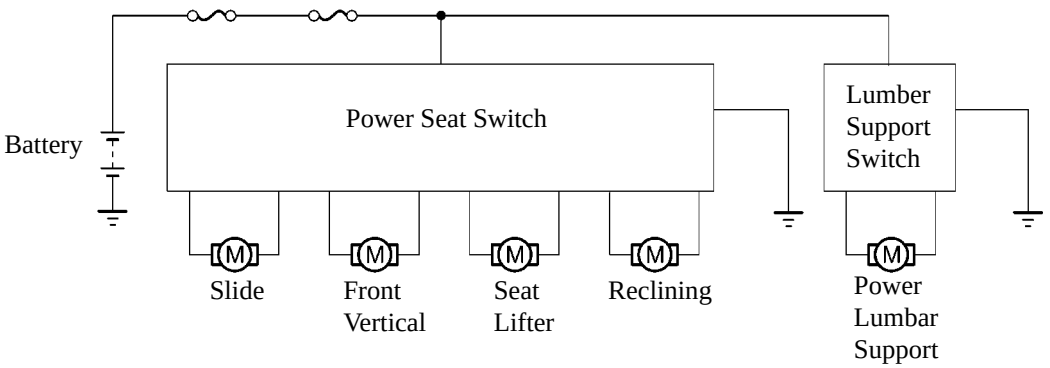
Power Adjustment Function			Stroke
(1)	Seat Slide	mm (in.)	240 (9.45)
(2)	Reclining	degrees	48
(3)	Front Vertical	mm (in.)	24 (0.94)
(4)	Seat Lifter	mm (in.)	45 (1.77)
(5)	Power Lumbar Support	mm (in.)	21 (0.80)



Driver Seat

257CA16

▶ System Diagram ◀



211BE41

MULTIPLEX COMMUNICATION

1. General

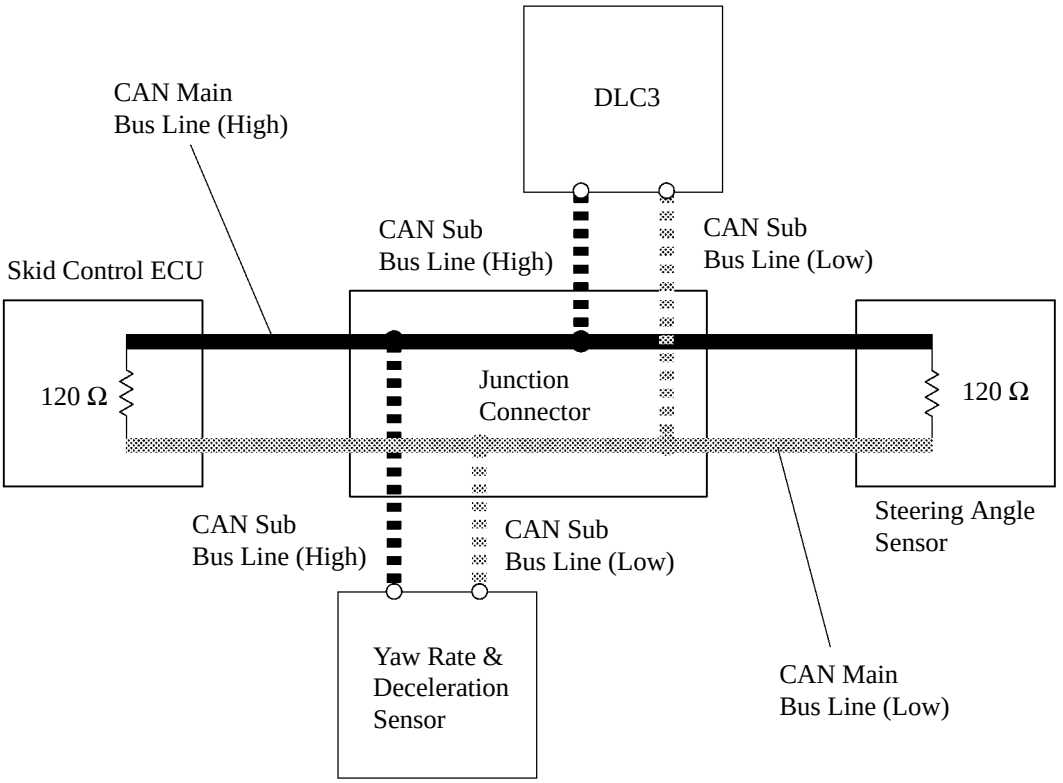
- The brake control system of the models equipped with VSC has adopted CAN (Controller Area Network) communication.
- CAN is a type of on-vehicle multiplex communication system that enables superior data communication and error detection between ECUs and sensors.
- CAN uses twisted-pair wires, which consist of two wires, CAN-H, and CAN-L, which have different voltages.
- The CAN in Camry is connected to the Skid Control ECU, steering angle sensor, yaw rate and deceleration sensor and DLC (Data Link Connector) 3.

▶ Characteristic ◀

- Simplifies the wiring harness routing because communication among the ECUs connected to CAN is made possible through the use of a pair of communication wires.
- Its communication speed is faster than the BEAN (Body Electronics Area Network) used on other models.

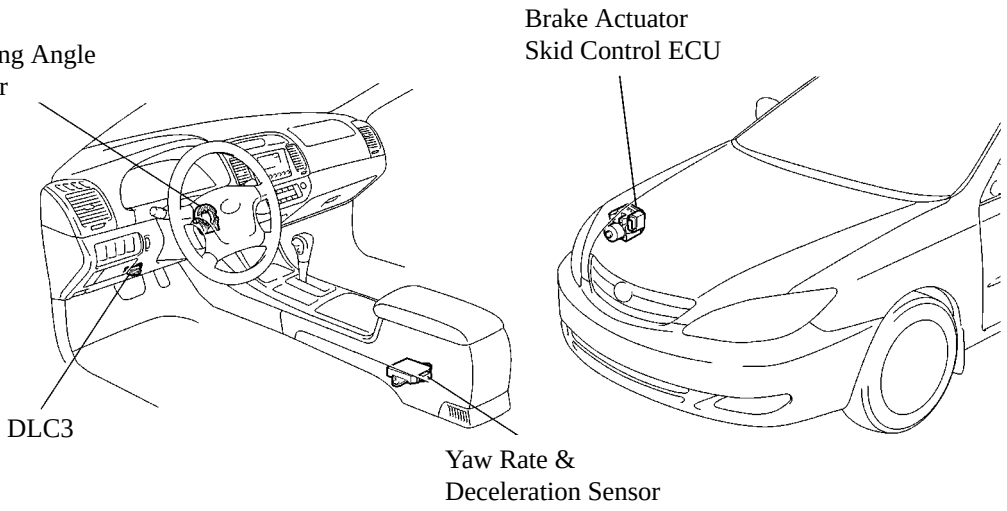
Communication Type	CAN	BEAN
Communication Speed	500 Kbps	MAX. 10 Kbps

▶ System Diagram ◀



243BE107

2. Layout of Main Components



257CA09

3. Diagnosis

■ If the CAN has communication error at ECU or sensor, DTCs (Diagnostic Trouble Codes) are output simultaneously to indicate the malfunction location.

■ The DTCs for CAN communication concerning the brake control system can be read by connecting the SST 09843-18040 to Tc and CG terminals of DLC3 connector, and observing the blinking of the ABS and VSC warning light (2-digit code) or by connecting a hand-held tester (5-digit code). For details, see the 2004 Camry Repair Manual (Pub No. 1063U).

▶ DTC Combination Chart ◀

DTC Code Output (from VSC ECU)	Mode
U0121/94, U0123/62 U0124/95, U0126/63	Skid Control ECU communication stop mode
U0123/62, U0124/95	Yaw rate and deceleration sensor communication stop mode
U0126/63	Steering angle sensor communication stop mode

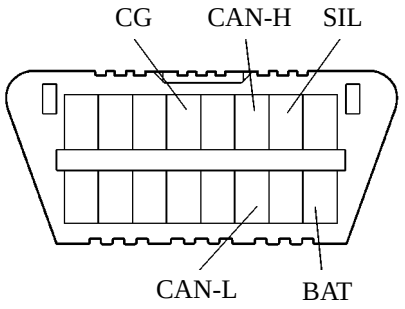
▶ DTC Chart ◀

DTC	Detection Item
U0121/94	Malfunction in CAN communication
U0123/62	Malfunction in CAN communication with yaw rate sensor
U0124/95	Malfunction in CAN communication with deceleration sensor
U0126/63	Malfunction in CAN communication with Steering angle sensor

■ DLC3 is equipped with CAN-H and CAN-L terminals for CAN diagnosis. It is possible to determine if there is an open or short on the main bus line by measuring the resistance value between these terminals. It is possible to determine if there is a short between the bus line - power supply/ground by measuring the resistance value between terminal CAN-H or CAN-L, and the BAT or CG terminal.

▶ CAN-H - CAN-L Inspection ◀

Resistance Value	Bus line condition
54 Ω ～ 67 Ω	■ Normal ■ Sub bus line open (except DLC3 bus line, DTC output) ■ Short between bus line ～ power supply/ground (Short in one area, DTC output)
more than 67 Ω	■ Sub bus line open (only DLC3 bus line, No DTC output) ■ Main bus line open
less than 54 Ω	■ Short between hus line



DLC3

241BE110

▶ Inspection for short between bus line - power supply/ground ◀

Inspection Item	Resistance Value	Bus line condition
■ DCAN-H～BAT ■ DCAN-L～BAT	more than 1 MΩ	No bus line malfunction if no DTC output
	less than 1 MΩ	Short between bus line ～ power supply/ground
■ DCAN-H～CG ■ DCAN-L～CG	more than 1 kΩ	No bus line malfunction if no DTC output
	less than 1 kΩ	Short between bus line ～ power supply/ground

■ If a communication malfunction occurs between the skid control ECU and the steering angle sensor or the yaw rate & deceleration sensor, the skid control ECU stops control of the VSC (Vehicle Stability Control).

■ If a communication malfunction occurs between the television camera ECU and the steering angle sensor, the television camera ECU stops control of the back guide monitor system.

■ For details of the CAN diagnosis system, see the 2004 Camry Repair Manual (Pub. No. RM1063U).

4. Fail-Safe

The fail-safe function provided for each system will operate if a failure occurs in the communication wire such as a short or an open circuit.

■ If CAN communication is disabled, the following fail-safe functions will operate on the ’04 Camry:

Communication Error	Fail-Safe
Skid Control ECU, Yaw Rate and Deceleration sensor and Steering angle sensor	■ Stops VSC and ABS functions ■ Illuminates VSC indicator light ■ Detects DTCs

SRS AIRBAG SYSTEM

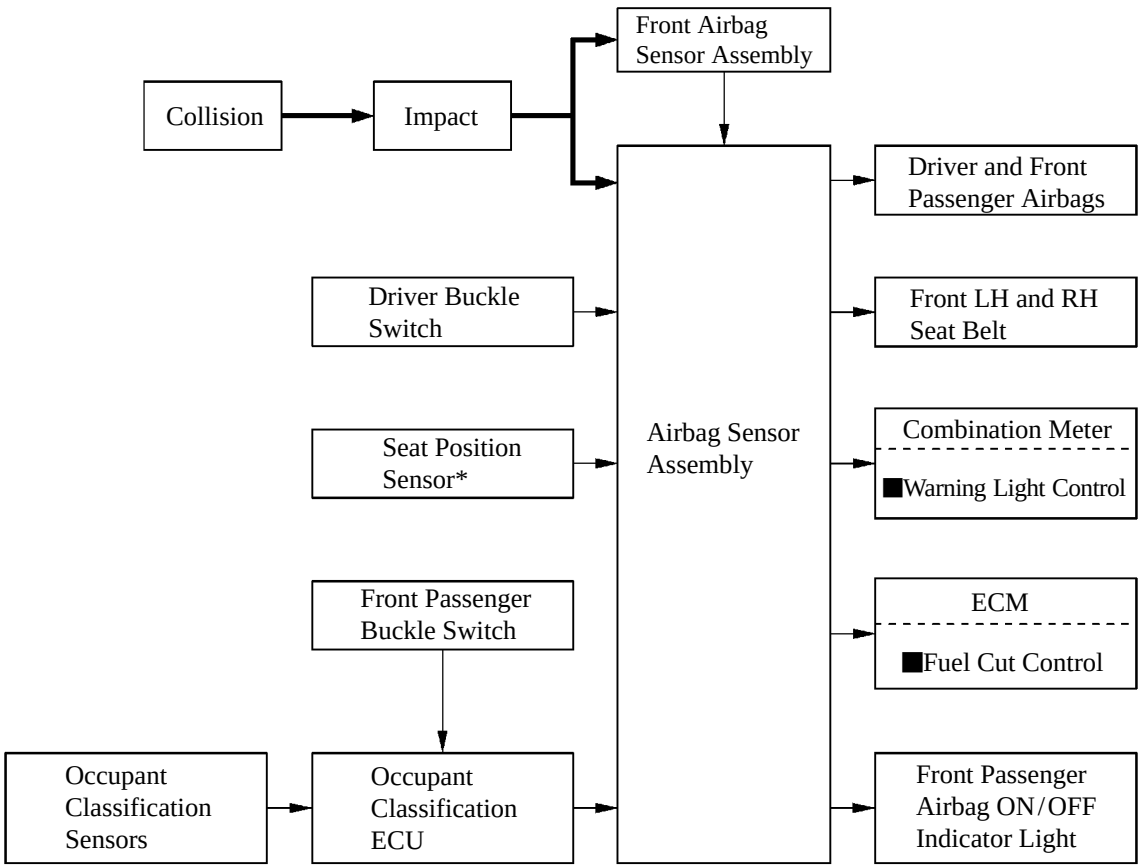
1. General

■ A front passenger occupant classification system has been adopted. This enables/disables the front passenger airbag and front passenger side airbag by determining whether or not there is a front passenger seat occupant, an adult or child (or child seat), based on the load applied to the passenger seat and the fitted condition of the front passenger seat belt.

■ The airbag sensor assembly uses a fuel cut control that stops the fuel pump when the any airbag is deployed.

2. System Diagram

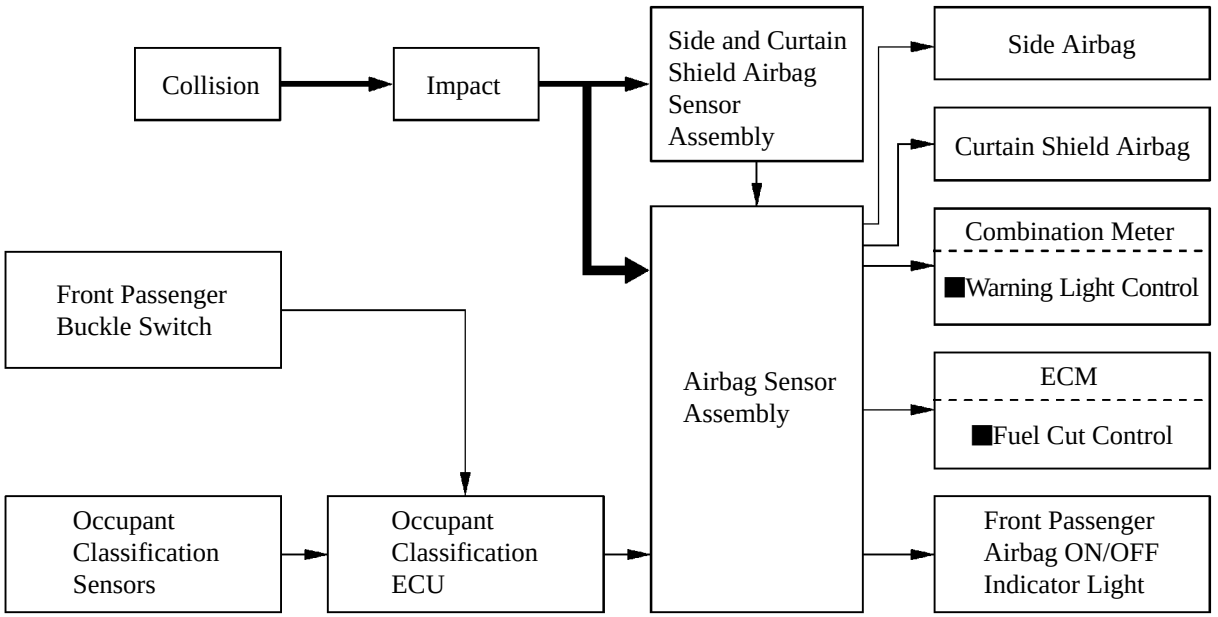
▶ Front Airbag Operation ◀



*: Only for Driver Seat

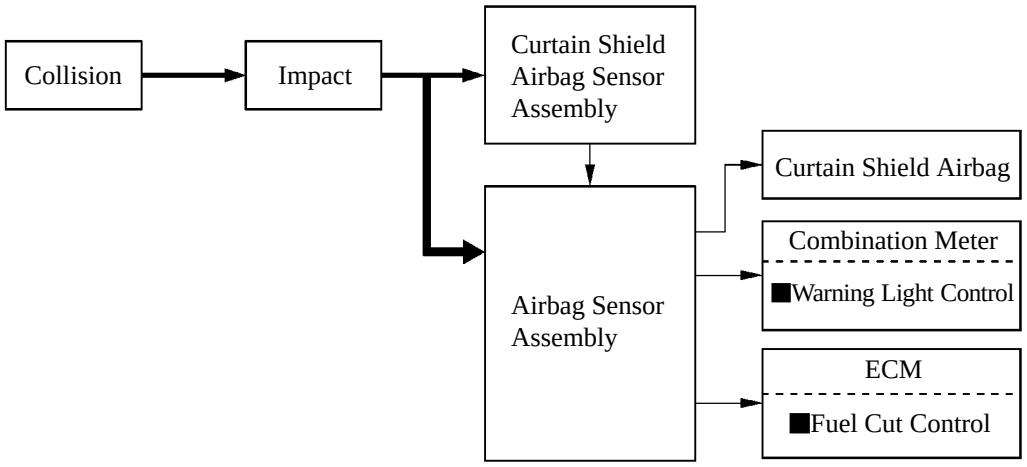
257CA21

▶ Side and Curtain Shield Airbag Operation ◀



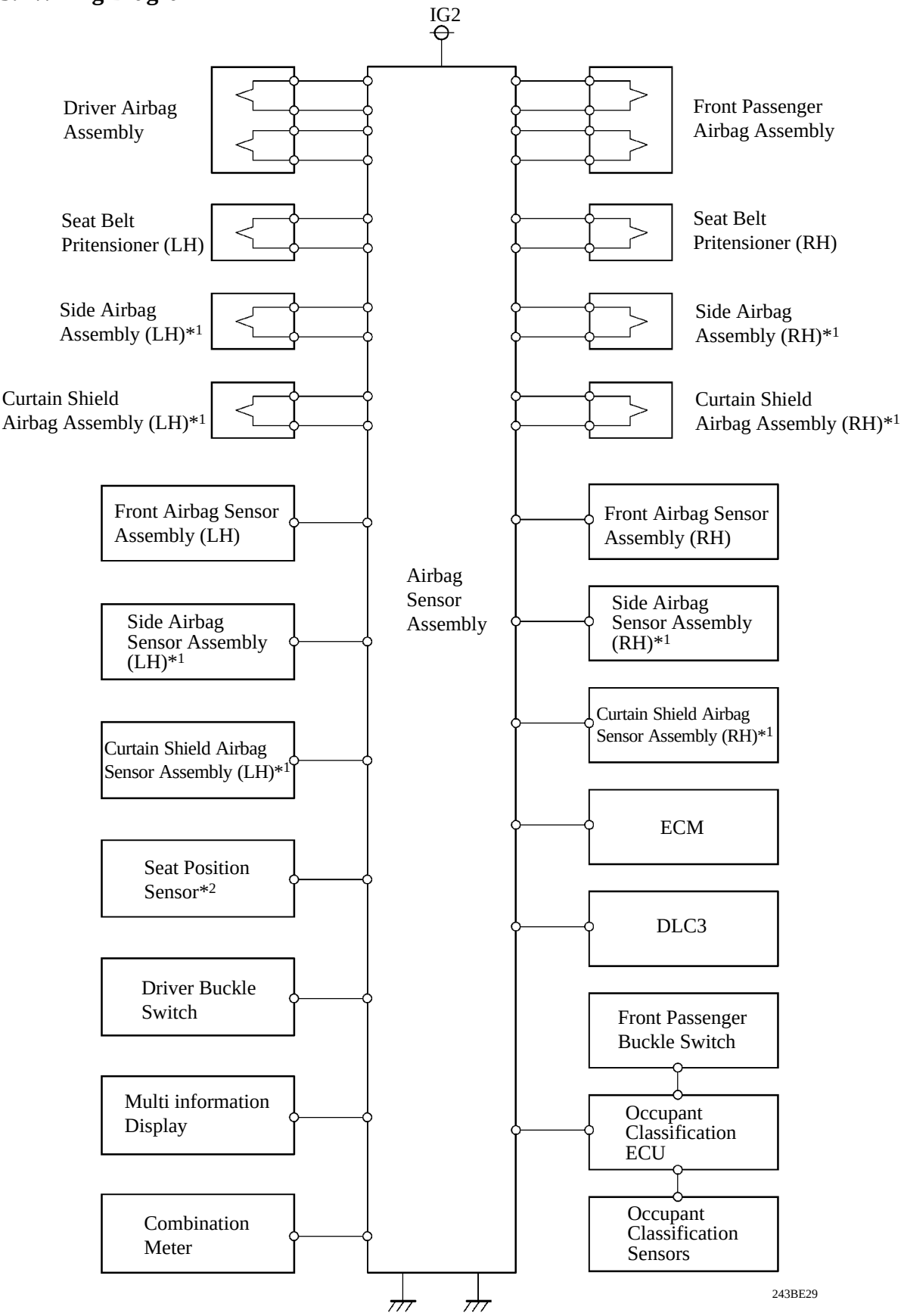
257CA22

▶ Curtain Shield Airbag Operation ◀



253BE28

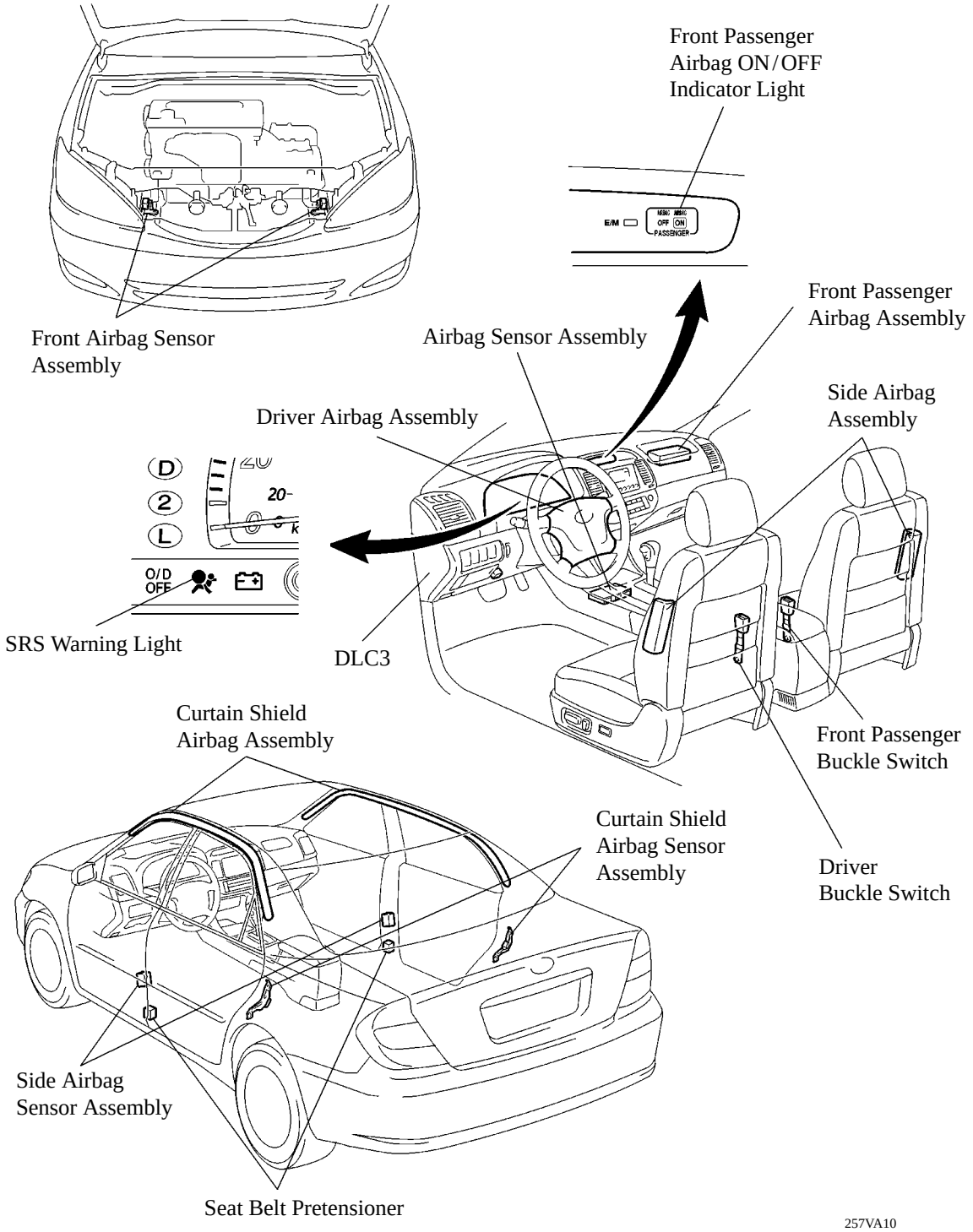
3. Wiring Diagram



*1: Model with side and curtain shield airbag system model.

*2: Only for Driver Seat.

4. Layout of Main Components



5. Front Passenger Occupant Classification System

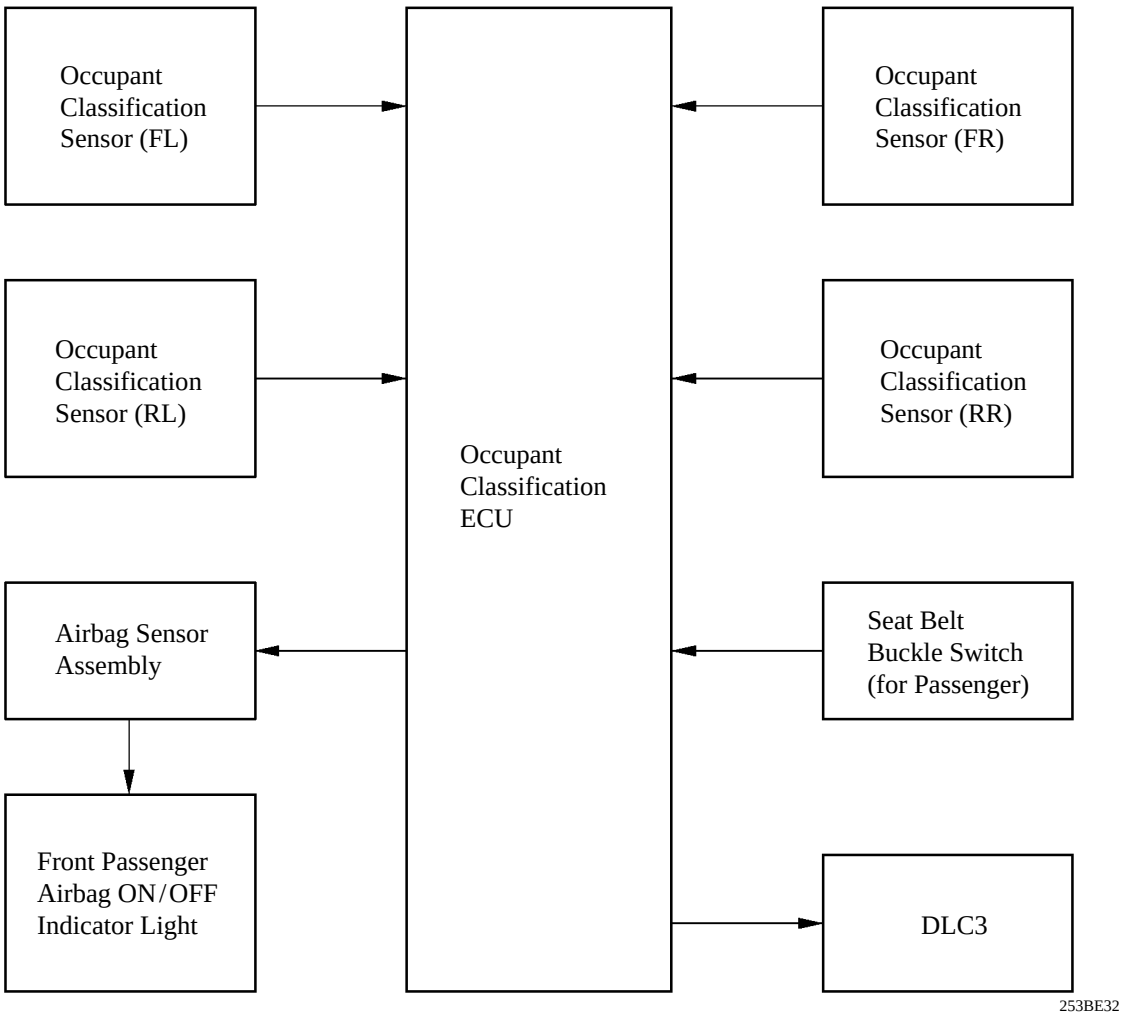
General

- In the front passenger occupant classification system, the occupant classification ECU calculates the weight of the occupant based on a signal from the occupant classification sensor. This system recognizes the occupant to be a child if it detects a weight of 36 kilograms (79.2 lbs.) or less, and disables the front and side airbags.
- This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the airbag OFF indicator light indicates the OFF condition of the front passenger airbag and front passenger side airbag.
- Occupant classification sensors also have a role as a occupant detection sensor in the seat belt reminder system.

Service Tip

- When installing items to the passenger seat or removing/installing the passenger seat, connect the hand-held tester and be sure to perform a system check (DTC Check) and perform a zero-point calibration of the sensor load value.
- If performing maintenance due to the SRS warning light being on constantly of due to a collision, in addition to the above item, check that the hand-held tester display value indicates within the range of 30 kg (66 lb) +/- 3 kg (6.6 lb) when a 30 kg (66 lb) weight is placed on the passenger seat. For details and caution notices on the above operation, see the 2004 Camry Repair Manual (Pub No. RM1063U)

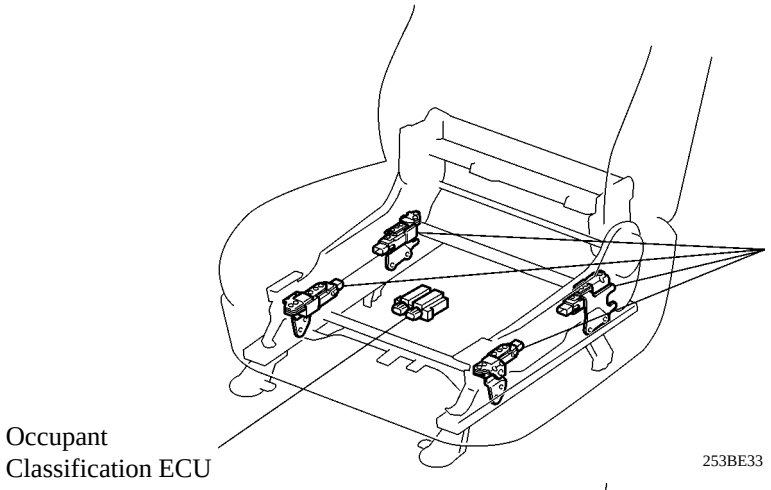
System Diagram

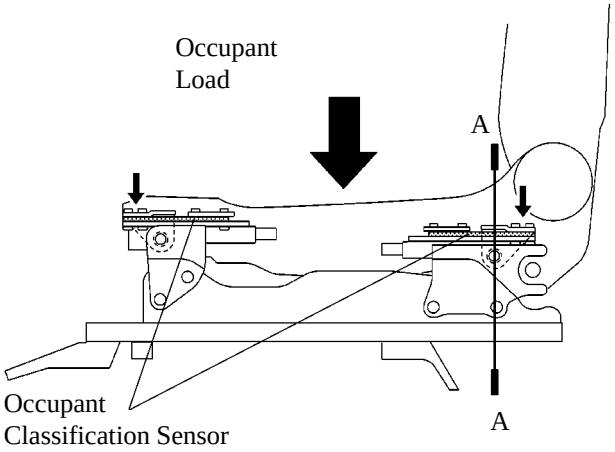


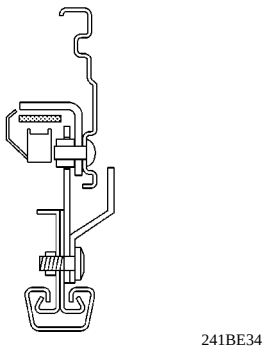
Construction and Operation

1) Occupant Classification Sensor

■ The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.

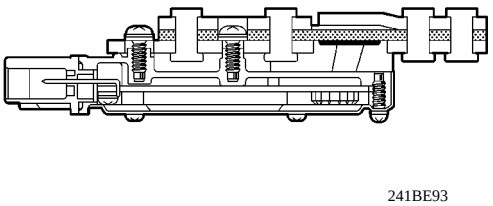




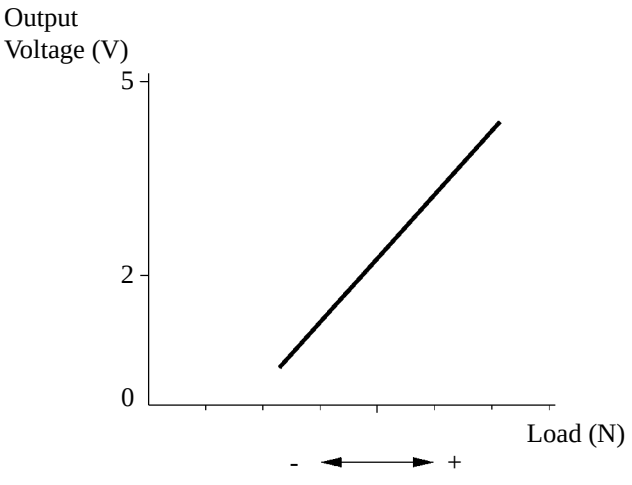


A - A Cross Section

■ The occupant classification sensors register a change in resistance value in response to a distortion. Accordingly, the occupant classification sensors output a voltage to the occupant classification ECU in response to the weight (load) of the front passenger seat occupant.



Cross Section



2) Occupant Classification ECU

■ The occupant classification ECU calculates the load applied to each sensor by the signals from the occupant classification sensors, and depending on whether the total value of the load values is heavier or lighter than the threshold value (36 kg, 79.2 lb), the ECU judges whether the occupant is a child or adult.

■ If the occupant classification ECU judges that the passenger seat occupant is a child, it prohibits operation of the front passenger airbag and front passenger side airbag, and lights up the airbag OFF indicator light. At this time the passenger seat belt occupation condition is judged by the seat belt buckle switch (for passenger) signal. If it is judged that the passenger seat belt is occupied, the occupant classification ECU judges that a child seat is installed, and even if the load applied to the seat increases, the occupant classification ECU constantly prohibits operation of the front passenger airbag and passenger side airbag.

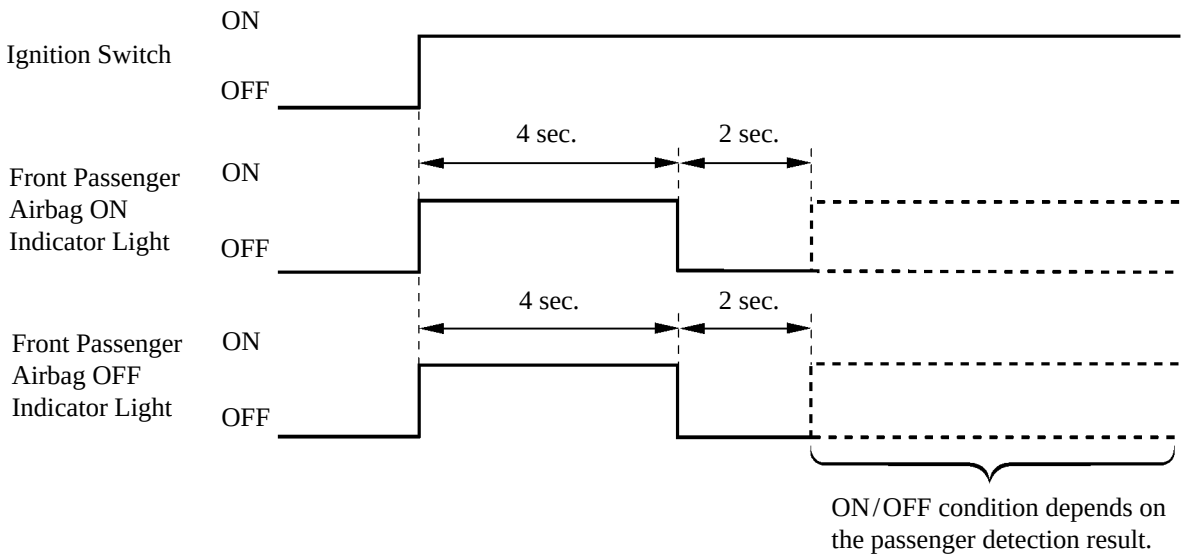
▶ Passenger's Airbag Operation condition ◀

° : Operate —: Not operate

Passenger's Airbag	Passenger's Seat Occupant		
	A Person of Adult Size	A Person of Child Size	Child Seat
Front	°	—	—
Side	°	—	—
Curtain Shield	°	°	°
Seat Belt Pretensioner	°	°	°

■ After the ignition switch is turned ON, the occupant classification ECU lights up the front passenger airbag ON/OFF indicator light based on the timing chart below in order to check the front passenger airbag ON/OFF indicator circuit.

▶ Timing Chart ◀



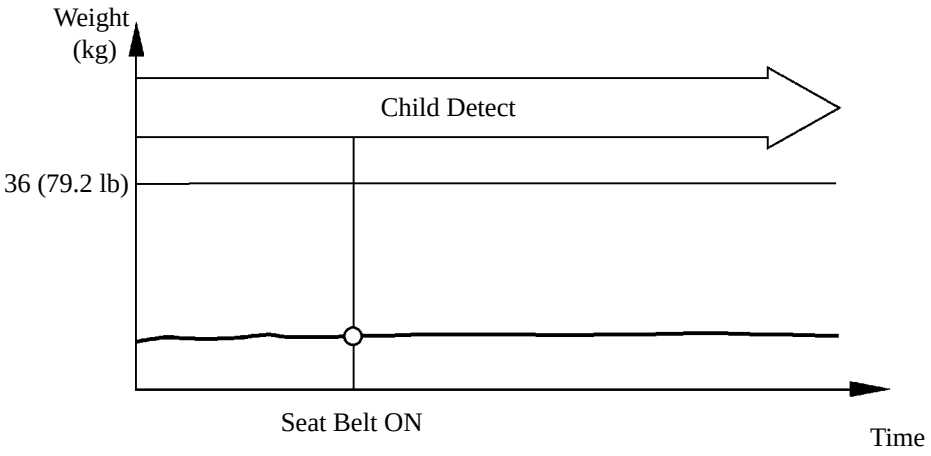
253BE80

3) Occupant Classification Method

The occupant classification ECU classifies the occupancy states as described below.

■ State of a child being seated

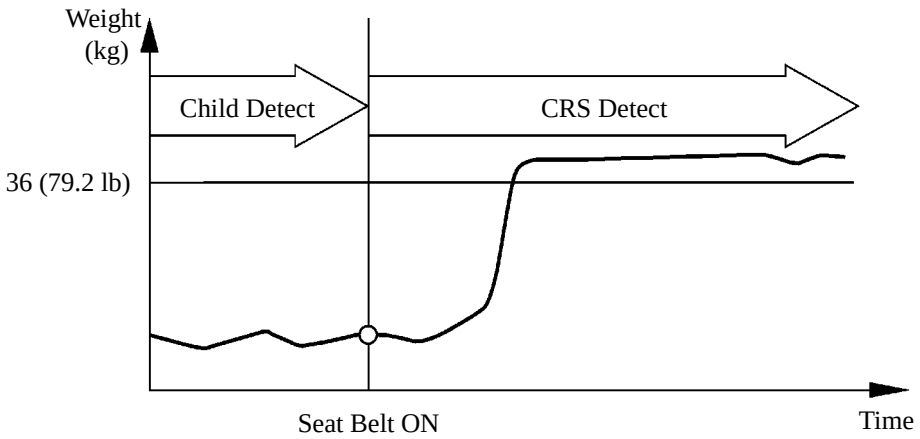
If the signal from the occupant classification sensor indicates a weight of 36 kg (79.2 lb) or less, the occupant classification ECU recognizes the occupant to be a child and turns ON the front passenger airbag OFF indicator light.



253BE71

■ State of CRS (Child Restraint System) being worn

When the occupant classification sensor detects the load of the CRS being placed on the front passenger seat, the occupant classification ECU recognizes the occupant to be a child. Thereafter, the occupant classification ECU recognizes that the CRS is being worn when the seat belt is engaged, and turns ON the front passenger airbag OFF indicator light. After the occupant classification ECU makes this recognition, it continues to recognize the presence of the CRS even if the total weight with the child seated exceeds 36 kg (79.2 lb), and continues to turn ON the front passenger airbag OFF indicator light. Even if the ignition switch is turned OFF and subsequently turned back ON, the occupant classification ECU will continue to recognize the presence of the CRS, provided that the seat belt continues to be engaged.



253BE72

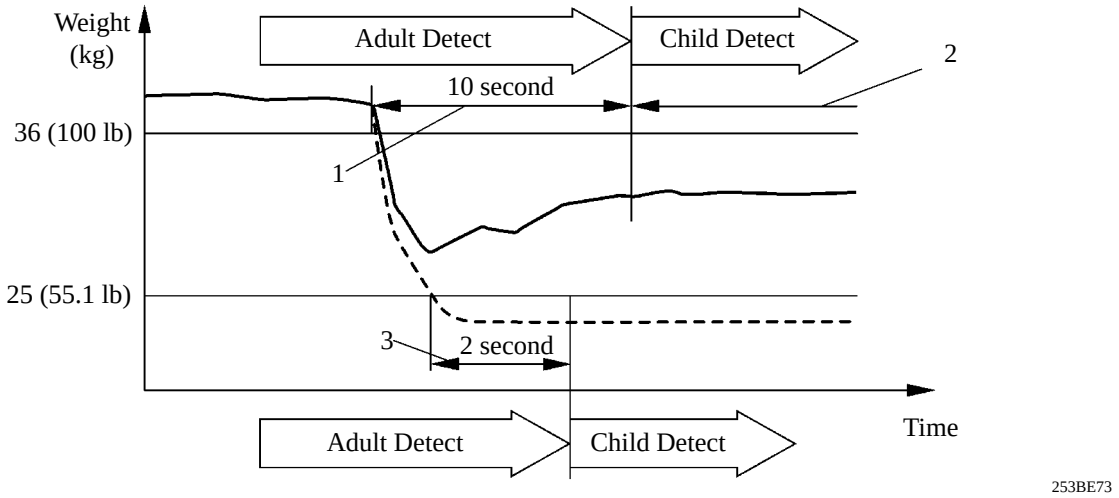
■ State of a load deviation

(example: an adult occupant assumes an improper seating posture by leaning against the console)

a. After the occupant classification ECU has recognized the occupant to be an adult, even if the seat load decreases below 36 kg (79.2 lb) because the occupant has leaned against the console, the ECU continues to recognize the occupant to be an adult, for 10 seconds.

b. If the seat load continues to be below 36 kg even after 10 seconds have elapsed, the recognition of the occupant classification ECU changes, determines the occupant to be a child, and turns ON the front passenger airbag OFF indicator light.

c. While the occupant classification ECU recognizes the occupant to be an adult, the seat load decreases below 25 kg (55.1 lb), and 2 seconds have elapsed, the occupant classification ECU changes its recognition of the occupant from an adult to child, and turns ON front passenger airbag OFF indicator light.



6. Diagnosis

■ If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light. Then, the DTCs (Diagnostic Trouble Codes) can be accessed by connecting a hand-held tester to the DLC3 terminal or the SST (09843-18040) to the Tc terminal of the DLC3 and reading the blinking of the SRS warning light. For further details, see the 2004 Camry Repair Manual (Pub. No. RM1063U).

■ The method for clearing (Not using the hand-held tester) DTCs of the SRS airbag system has been changed.

■ If SRS Airbag deploys, the airbag sensor assembly will turn on the airbag warning light. However, different from the ordinary diagnosis function, DTC will not be memorized. The airbag warning light can be only tuned off by changing the airbag sensor assembly to the new one.

■ The DTCs listed below have been added.

▶ Added DTC Chart of SRS Airbag System ◀

DTC No.		Detection Item	DTC No.		Detection Item
13	B1610	Front airbag sensor (RH) Malfunction	53	B1810	Short in D squib (Dual stage-2nd step) circuit
14	B1615	Front airbag sensor (LH) malfunction		B1811	Open in D squib (Dual-stage 2nd step) circuit
21	B1620	Side airbag sensor assembly (D seat side)		B1812	Short in D squib (Dual-stage 2nd step) circuit (to ground)
22	B1625	Side air bag sensor assembly (P seat side)		B1813	Short in D squib (Dual-stage 2nd step) circuit (to +B)
23	B1630	Curtain shield airbag sensor (D seat side) malfunction	54	B1815	Short in P squib (Dual stage-2nd step) circuit
24	B1635	Curtain shield airbag sensor (P seat side) malfunction		B1816	Open in P squib (Dual-stage 2nd step) circuit
32	B1650	Occupant detection system malfunction		B1817	Short in P squib (Dual-stage 2nd step) circuit (to ground)
35	B1653	Seat position sensor assembly malfunction		B1818	Short in P squib (Dual-stage 2nd step) circuit (to +B)
37	B1655	Seat belt buckle switch (D seat side) malfunction	55	B1820	Short in side squib (D seat side) circuit
43	B1660	Open in D squib (2nd step) circuit		B1821	Open in side squib (D seat side) circuit
51	B1800	Short in D squib circuit		B1822	Short in side squib (D seat side) circuit (to ground)
	B1801	Open in D squib circuit		B1823	Short in side squib (D seat side) circuit (to +B)
	B1802	Short in D squib circuit (to ground)	56	B1825	Short in side squib (P seat side) circuit
	B1803	Short in D squib circuit (to +B)		B1826	Open in side squib (P seat side) circuit
52	B1805	Short in P squib circuit		B1827	Short in side squib (P seat side) circuit (to ground)
	B1806	Open in P squib circuit		B1828	Short in side squib (P seat side) circuit (to +B)
	B1807	Short in P squib circuit (to ground)	57	B1830	Short in curtain shield airbag (D seat side) squib circuit
	B1808	Short in P squib circuit (to +B)		B1831	Open in curtain shield airbag (D seat side) squib circuit

57	B1832	Short in curtain shield airbag (D seat side) circuit (to ground)	73	B1902	Short in P/T squib (D seat side) circuit (to ground)
	B1833	Short in curtain shield airbag (D seat side) circuit (to +B)		B1903	Open in P/T squib (D seat side) circuit (to +B)
58	B1835	Short in curtain shield airbag (P seat side) circuit	74	B1905	Short in P/T squib (P seat side) circuit
	B1836	Open in curtain shield airbag (P seat side) circuit		B1906	Open in P/T squib (P seat side) circuit
	B1837	Short in curtain shiel airbag (P seat side) circuit (to ground)		B1907	Short in P/T squib (P seat side) circuit (to ground)
	B1838	Short in curtain shield airbag (P seat side) circuit (to +B)		B1908	Open in P/T squib (P seat side) circuit (to +B)
73	B1900	Short in P/T squib (D seat side) circuit			
	B1901	Open in P/T squib (D seat side) circuit			

▶ DTC Chart of Front Passenger Occupant Classification System ◀

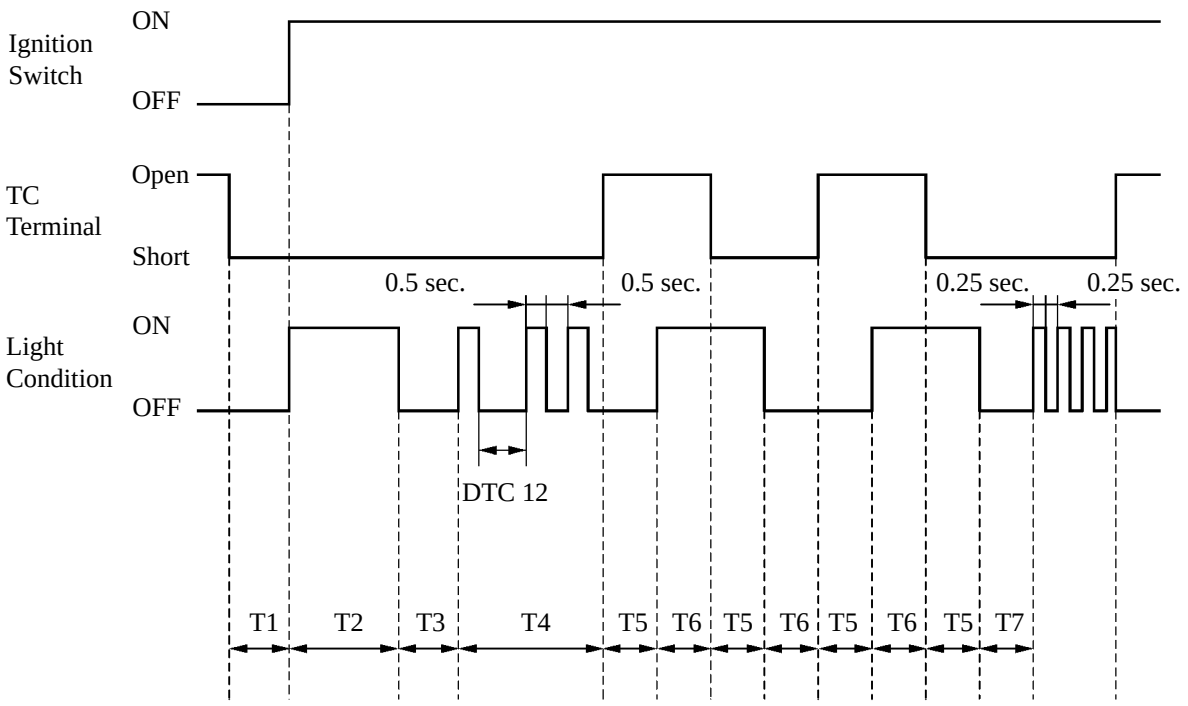
DTC No.2	Detection Item	DTC No.	Detection Item
B1771	Buckle switch malfunction	B1786	Front right side sensor crashdetecition
B1780	Front left side sensor malfunction	B1787	Rear left side sensor crashdetection
B1781	Front right side sensor malfunction	B1788	Rear right side sensor crashdetection
B1782	Rear left side sensor malfunction	B1790	Airbag ECU communication line malfunction
B1783	Rear right side sensor malfunction	B1793	Weight sensor power supply line malfunction
B1785	Front left side sensor crashdetection	B1795	Occupant classification ECU malfunction

Service Tip

DTC Clearance (Not using hand-held tester)

The DTCs are cleared by opening and shorting the Tc and CG (or ground) terminals of the DLC3 in accordance with the timing chart shown below.

1) Using SST (09843-18040), connect terminal TC and CG terminal of the DLC3.
2) Disconnect terminal TC of DLC3 within 10 seconds after the DTCs appear, and check if the SRS warning light come on within 3 seconds.
3) Within 2 seconds to 4 seconds after SRS warning light come on, reconnect the Tc and CG terminals of the DLC3.
4) SRS warning light goes off 3 seconds after re-connecting the Tc and CG terminals of the DLC3. Then disconnect the terminal TC of the DLC3 within 2 to 4 seconds after the SRS warning light goes off.
5) Warning light comes on within 3 seconds after re-disconnecting the Tc and CG terminals of the DLC3.
6) Within 2 seconds to 4 seconds after the SRS warning light comes on, reconnect the Tc and CG terminal of the DLC3.
7) SRS warning light goes off 3 seconds after reconnecting the Tc and CG terminals of the DLC3.
8) Normal codes appears 1 seconds after the SRS warning light goes off.

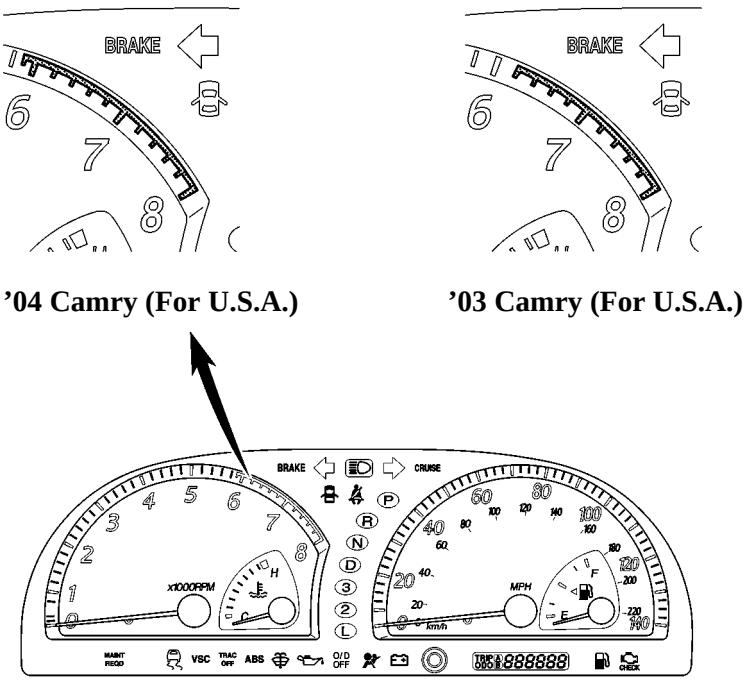


T1: 0 - ∞ second
T2: approx. 6 seconds
T3: 3 - 5 seconds
T4: 3 - 10 second
T5: 2 - 4 seconds
T6: 1 - 5 seconds
T7: within 1 seconds

237BE34

◀COMBINATION METER

▶The red zone area in the tachometer of the combination meter has been changed on the 3MZ-FE engine model for optimization.



'04 Camry (For U.S.A.) **'03 Camry (For U.S.A.)**

257CA12

▶An oil replacement reminder light has been added to the combination meter for U.S.A. model, which will light or flash to remind the driver to change the engine oil depending on the vehicle driving distance.

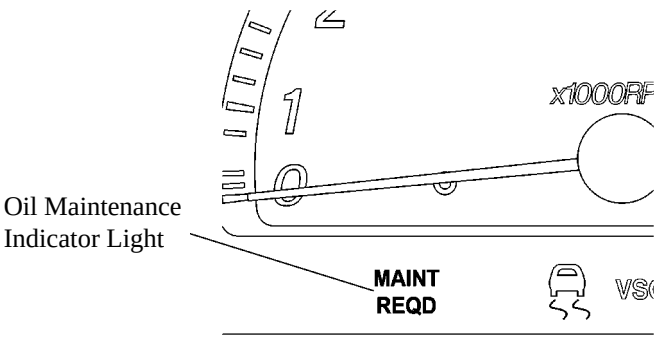
▶The oil maintenance indicator light flashes during 4500 - 5000 mile, and keeps on lightning at 5000 mile.

▶To reset, refer to the following service tip.

Service Tip

The accumulated mileage memorized in the meter ECU can be reset by the following procedures.

1) Turn the ignition on and make sure that the ODO/TRIP display screen is in the ODO mode. (reset procedure will not work in the TRIP mode)
2) Turn the ignition off. While pressing the ODO/TRIP switch button, turn the ignition on. (Note: hold the button down throughout the entire reset procedure)
3) Continue and push the ODO/TRIP switch button over 5 seconds.
4) Reset operation is completed in 5 seconds.



257CA17

- MEMO -

MAJOR TECHNICAL SPECIFICATIONS

Item \ Area				U.S.A. and Canada			
Body Type				4-Door Sedan			
Vehicle Grade				LE		xLE	SE
Model Code				ACV30L-AEMNKA	ACV30L-A (C) EPNKA	ACV30L-A (C) EPGKA	ACV30L-AEMSKA
Major Dimensions & Vehicle Weights	Overall	Length	mm (in.)	4805 (189.2)	4805 (189.2)	4805 (189.2)	4805 (189.2)
		Width	mm (in.)	1795 (70.7)	1795 (70.7)	1795 (70.7)	1795 (70.7)
		Height	mm (in.)	1490 (58.7)	1490 (58.7)	1490 (58.7)	1490 (58.7)
	Wheel Base		mm (in.)	2720 (107.1)	2720 (107.1)	2720 (107.1)	2720 (107.1)
	Tread	Front	mm (in.)	1545 (60.8)	1545 (60.8)	1545 (60.8)	1545 (60.8)
		Rear	mm (in.)	1535 (60.4)	1535 (60.4)	1535 (60.4)	1535 (60.4)
	Effective Head Room	Front	mm (in.)	995 (39.2)	995 (39.2)	995 (39.2)	995 (39.2)
		Rear	mm (in.)	975 (38.4)	975 (38.4)	975 (38.4)	975 (38.4)
	Effective Leg Room	Front	mm (in.)	1055 (41.5)	1055 (41.5)	1055 (41.5)	1055 (41.5)
		Rear	mm (in.)	960 (37.8)	960 (37.8)	960 (37.8)	960 (37.8)
	Shoulder Room	Front	mm (in.)	1460 (57.5)	1460 (57.5)	1460 (57.5)	1460 (57.5)
		Rear	mm (in.)	1440 (56.7)	1440 (56.7)	1440 (56.7)	1440 (56.7)
	Overhang	Front	mm (in.)	945 (37.2)	945 (37.2)	945 (37.2)	945 (37.2)
		Rear	mm (in.)	1140 (44.9)	1140 (44.9)	1140 (44.9)	1140 (44.9)
	Min. Running Ground Clearance		mm (in.)	150 (5.9)	150 (5.9)	150 (5.9)	150 (5.9)
	Angle of Approach		degrees	15.2▶	15.2▶	15.2▶	15.2▶
	Angle of Departure		degrees	16.6▶	16.6▶	16.6▶	16.6▶
	Curb Weight	Front	kg (lb)	835 (1841)*4, 845 (1863)*5	865 (1907)*4, 870 (1918)*5	875 (1929)*4, 885 (1951)*5	845 (1863)
		Rear	kg (lb)	580 (1279)*4, 590 (1301)*5	575 (1268)*4, 585 (1290)*5	590 (1301)*4, 605 (1334)*5	590 (1301)
		Total	kg (lb)	1415 (3120)*4, 1435 (3164)*5	1440 (3175)*4, 1455 (3208)*5	1465 (3230)*4, 1490 (3285)*5	1435 (3164)
	Gross Vehicle Weight	Front	kg (lb)	955 (2105)*4, 960 (2116)*5	980 (2161)*4, 985 (2172)*5	990 (2183)*4, 1000 (2205) *5	960 (2116)
		Rear	kg (lb)	900 (1984)*4, 910 (2006)*5	895 (1973)*4, 905 (1995)*5	910 (2006)*4, 925 (2039)*5	910 (2006)
		Total	kg (lb)	1885 (4090)*4, 1870 (4123)*5	1875 (4134)*4, 1890 (4167)*5	1900 (4189)*4, 1925 (4244)*5	1870 (413)
	Fuel Tank Capacity		ℓ (US.gal., Imp.gal.)	70 (18.5, 15.4)	70 (18.5, 15.4)	70 (18.5, 15.4)	70 (18.5, 15.4)
	Luggage Compartment Capacity		m^3 (cu.ft.)	14.1 (497.9)	14.1 (497.9)	14.1 (497.9)	14.1 (497.9)
Performance	Max. Speed		km / h (mph)	190 (118)	190 (118)	190 (118)	190 (118)
	Max. Cruising Speed		km / h (mph)	—	—	—	—
	Acceleration	0 to 60 mph	sec.	9.1	9.9	9.9	9.1
		0 to 400 m	sec.	—	—	—	—
	Max. Permissible Speed	1st Gear	km / h (mph)	52 (32)	64 (40)	65 (41)	53 (33)
		2nd Gear	km / h (mph)	89 (55)	115 (71)	118 (73)	92 (57)
		3rd Gear	km / h (mph)	137 (85)	—	—	141 (88)
		4th Gear	km / h (mph)	189 (117)	—	—	194 (120)
	Turning Diameter (Outside Front)	Wall to Wall	m (ft.)	11.4 (37.4)	11.4 (37.4)	12.0 (39.4)	12.0 (39.4)
		Curb to Curb	m (ft.)	10.6 (34.8)	10.6 (34.8)	11.2 (36.7)	11.2 (36.7)
Engine	Engine Type			2AZ-FE	2AZ-FE	2AZ-FE	2AZ-FE
	Valve Mechanism			16-Valve, DOHC	16-Valve, DOHC	16-Valve, DOHC	16-Valve, DOHC
	Bore x Stroke		mm (in.)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)
	Displacement		cm^3 (cu.in.)	2362 (144.2)	2362 (144.2)	2362 (144.2)	2362 (144.2)
	Compression Ratio			9.6 : 1	9.6 : 1	9.6 : 1	9.6 : 1
	Fuel System			SFI	SFI	SFI	SFI
	Octane Rating			87 or Higher	87 or Higher	87 or Higher	87 or Higher
	Max. Output (SAE-NET)		kW / rpm (HP@rpm)	119 / 5600 (159@5600)	119 / 5600 (159@5600)	119 / 5600 (159@5600)	119 / 5600 (159@5600)
	Max. Torque (SAE-NET)		N·m / rpm (lb-ft@rpm)	221 / 4000 (163@4000)	221 / 4000 (163@4000)	221 / 4000 (163@4000)	221 / 4000 (163@4000)
Engine Electrical	Battery Capacity (5HR)		Voltage & Amp. hr.	12-48*1, 12-55*2	12-48*1, 12-55*2	12-48*1, 12-55*2	12-48*1, 12-55*2
	Alternator Output		Watts	960	960	960	960
	Starter Output		kW	1.6	1.6	1.6	1.6
Chassis	Clutch Type			Dry, Single Plate Diaphram	—	—	Dry, Single Plate Diaphram
	Transmission Type			E351	U241E	U241E	E351
	Transmission Gear Ratio	In First		3.538	3.943	3.943	3.538
		In Second		2.045	2.197	2.197	2.045
		In Third		1.333	1.413	1.413	1.333
		In Fourth		0.972	1.020	1.020	0.972
		In Fifth		0.731	—	—	0.731
		In Reverse		3.583	3.145	3.145	3.583
	Differential Gear Ratio			—	—	—	—
	Differential Gear Side			3.944	2.740	2.740	3.944
	Brake Type	Front		Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
		Rear		Drum	Drum	Solid Disc	Solid Disc
	Parking Brake Type			Leading Trailing	Leading Trailing	Duo-Servo	Duo-Servo
	Brake Booster Type and Size		in.	Single 10.5”	Single 10.5”	Single 10.5”	Single 10.5”
	Proportioning Valve Type			Dual-P Valve*3	Dual-P Valve*3	—	Dual-P Valve*3
	Suspension Type	Front		MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
		Rear		MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
	Stabilizer Bar	Front		Standard	Standard	Standard	Standard
		Rear		Standard	Standard	Standard	Standard
	Steering Gear Type			Rack & Pinion	Rack & Pinion	Rack & Pinion	Rack & Pinion
	Steering Gear Ratio (Overall)			15.8 : 1	15.8 : 1	16.0 : 1	16.0 : 1
	Power Steering Type			Integral Type	Integral Type	Integral Type	Integral Type

*1: Set Option without Cold Area Spec.*4: Produced TMC
*2: Set Option with Cold Area Spec.*5: Produced TMMK
*3: Without ABS

U.S.A. and Canada			
4-Door Sedan			
SE	LE	XLE	SE
ACV30L-A (C) EPSKA	MCV30L-A (C) EANKA	MCV30L-A (C) EAGKA	MCV31L-AEASKA
4805 (189.2)	4805 (189.2)	4805 (189.2)	4805 (189.2)
1795 (70.7)	1795 (70.7)	1795 (70.7)	1795 (70.7)
1490 (58.7)	1490 (58.7)	1490 (58.7)	1490 (58.7)
2720 (107.1)	2720 (107.1)	2720 (107.1)	2720 (107.1)
1545 (60.8)	1545 (60.8)	1545 (60.8)	1545 (60.8)
1535 (60.4)	1535 (60.4)	1535 (60.4)	1535 (60.4)
995 (39.2)	995 (39.2)	995 (39.2)	995 (39.2)
975 (38.4)	975 (38.4)	975 (38.4)	975 (38.4)
1055 (41.5)	1055 (41.5)	1055 (41.5)	1055 (41.5)
960 (37.8)	960 (37.8)	960 (37.8)	960 (37.8)
1460 (57.5)	1460 (57.5)	1460 (57.5)	1460 (57.5)
1440 (56.7)	1440 (56.7)	1440 (56.7)	1440 (56.7)
945 (37.2)	945 (37.2)	945 (37.2)	945 (37.2)
1140 (44.9)	1140 (44.9)	1140 (44.9)	1140 (44.9)
150 (5.9)	150 (5.9)	150 (5.9)	150 (5.9)
15.2▶	15.2▶	15.2▶	15.2▶
16.6▶	16.6▶	16.6▶	16.6▶
870 (1918)	930 (2050)*4, 935 (2061)*5	950 (2094)	950 (2094)*4, 960 (2116)*5
590 (1301)	575 (1268)*4, 585 (1290)*5	605 (1334)	595 (1312)*4, 605 (1334)*5
1460 (3219)	1505 (3318)*4, 1520 (3351)*5	1555 (3428)	1545 (3406)*4, 1565 (3450)*5
990 (2183)	1045 (2304)*4, 1050 (2315)*5	1065 (2348)	1085 (2392)
910 (2006)	895 (1973)*4, 905 (1995)*5	925 (2039)	935 (2061)
1900 (4189)	1940 (4277)*4, 1955 (4310)*5	1990 (4387)	2020 (4453)
70 (18.5, 15.4)	70 (18.5, 15.4)	70 (18.5, 15.4)	70 (18.5, 15.4)
14.1 (497.9)	14.1 (497.9)	14.1 (497.9)	14.1 (497.9)
—	—	—	
—	—	—	
9.9	8.1	8.1	7.2
—	—	—	
65 (41)	64 (40)	66 (41)	47
118 (73)	116 (72)	119 (74)	85
—	—	—	133
—	—	—	
12.0 (39.4)	11.4 (37.4)	12.0 (39.4)	
11.2 (36.7)	10.6 (34.8)	11.2 (36.7)	
2AZ-FE	1MZ-FE	1MZ-FE	3MZ-FE
16-Valve, DOHC	24-Valve, DOHC	24-Valve, DOHC	24-Valve, DOHC
88.5 x 96.0 (3.48 x 3.78)	87.5 x 83.0 (3.44 x 3.27)	87.5 x 83.0 (3.44 x 3.27)	92.0 x 83.0 (3.62 x 3.27)
2362 (144.2)	2995 (182.8)	2995 (182.8)	3311(202.1)
9.6 : 1	10.5 : 1	10.5 : 1	10.8 : 1
SFI	SFI	SFI	SFI
87 or Higher	87 or Higher	87 or Higher	87 or Higher
117 / 5600 (157@5600)	156 / 5800 (210@5800)	156 / 5800 (210@5800)	169 / 5600 (225@5600)
220 / 4000 (162@4000)	298 / 4400 (220@4400)	298 / 4400 (220@4400)	179 / 3600 (240@3600)
12-48*1, 12-55*2	12-48*1, 12-55*2	12-48*1, 12-55*2	12-48*1, 12-55*2
960	1200	1200	1200
1.6	1.6	1.6	1.7
—	—	—	—
U241E	U151E	U151E	U151E
3.943	4.235	4.235	4.235
2.197	2.360	2.360	2.360
1.413	1.517	1.517	1.517
1.020	1.047	1.047	1.047
—	0.756	0.756	0.756
3.145	3.378	3.378	3.378
—	1.096	1.096	1.096
2.740	3.219	3.219	3.219
Ventilated Disc	Ventilated Disc	Ventilated Disc	Ventilated Disc
Solid Disc	Solid Disc	Solid Disc	Solid Disc
Duo-Servo	Duo-Servo	Duo-Servo	Duo-Servo
Single 10.5”	Single 10.5”	Single 10.5”	Single 10.5”
Dual-P Valve*3	—	—	—
MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
MacPherson Strut	MacPherson Strut	MacPherson Strut	MacPherson Strut
Standard	Standard	Standard	Standard
Standard	Standard	Standard	Standard
Rack & Pinion	Rack & Pinion	Rack & Pinion	Rack & Pinion
16.0 : 1	15.8 : 1	16.0 : 1	16.0 : 1
Integral Type	Integral Type	Integral Type	Integral Type

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