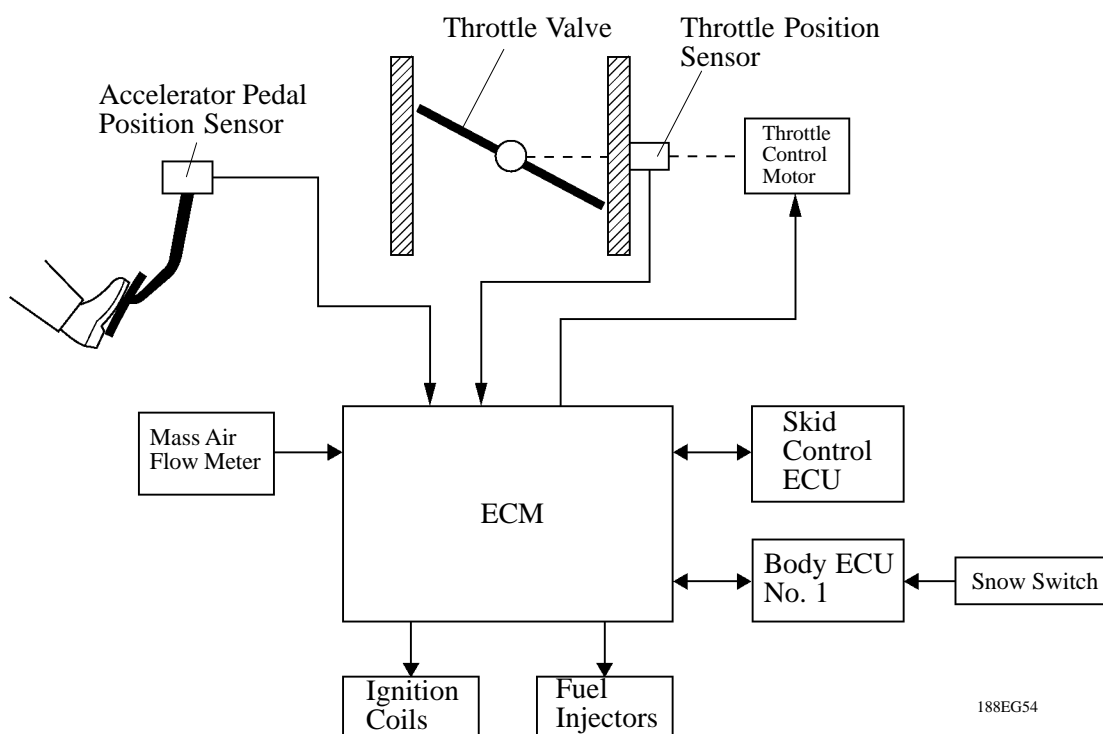


ETCS-i (Electronic Throttle Control System-intelligent)

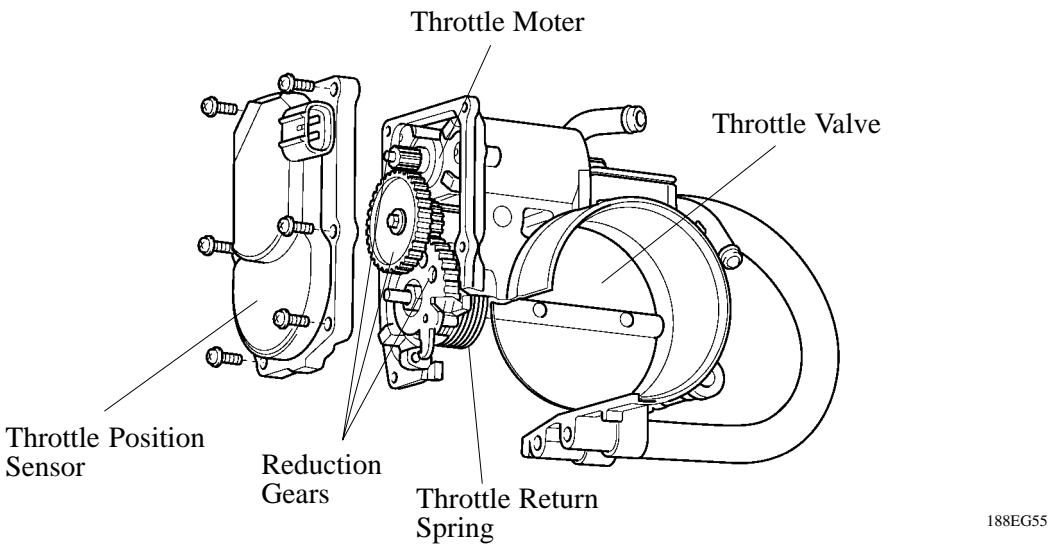
1) General

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- The ETCS-i system, which realizes excellent throttle control in all the operating ranges, has been adopted. However, in the 3UZ-FE engine on the '01 GS430, the accelerator cable has been discontinued, and an accelerator position sensor has been provided on the accelerator pedal. Accordingly, the limp-mode control during the fail-safe mode has been changed.
- In the conventional throttle body, the throttle valve opening is determined invariably 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 (Intake Air Control) system, the snow mode control, the cruise control system, the TRAC (Traction Control) system and the VSC (Vehicle Skid Control) system.
- The torque-activated power train control has been newly adopted. This control enables the engine to generate the necessary torque as desired by the driver, as well as to realize a smooth engine output characteristic.

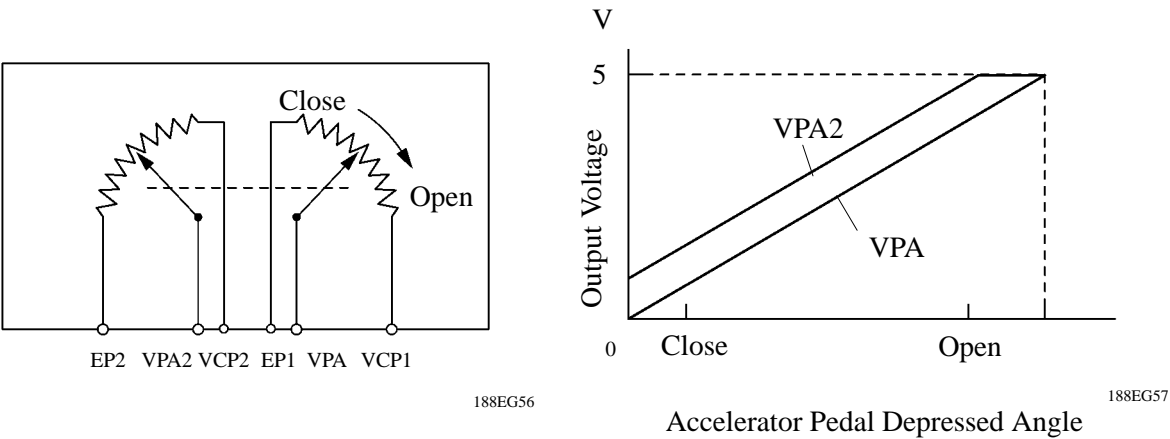


2) Construction



a. Accelerator Pedal Position Sensor

The accelerator pedal position sensor is attached to the accelerator pedal. 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 an offset voltage.

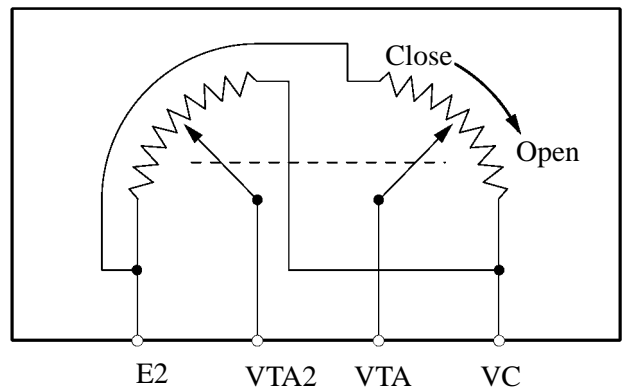


b. Throttle Position Sensor

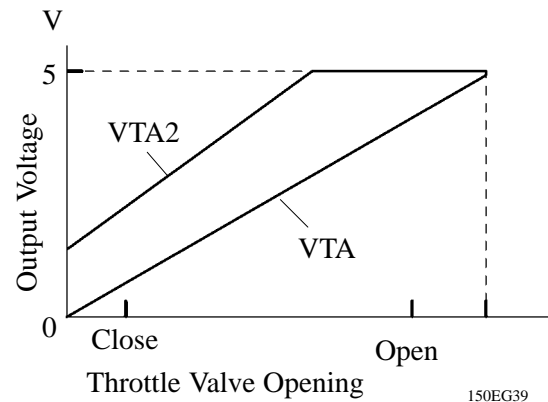
The throttle position sensor is attached to the throttle body.

This sensor converts the throttle valve opening angles into electric signals with two differing characteristics and outputs them to the ECM. One is the VTA signal that linearly outputs the voltage along the entire range of the throttle valve opening angle. The other is the VTA2 signal that outputs an offset voltage.

1



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c. 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 angle of the throttle valve.

3) Operation

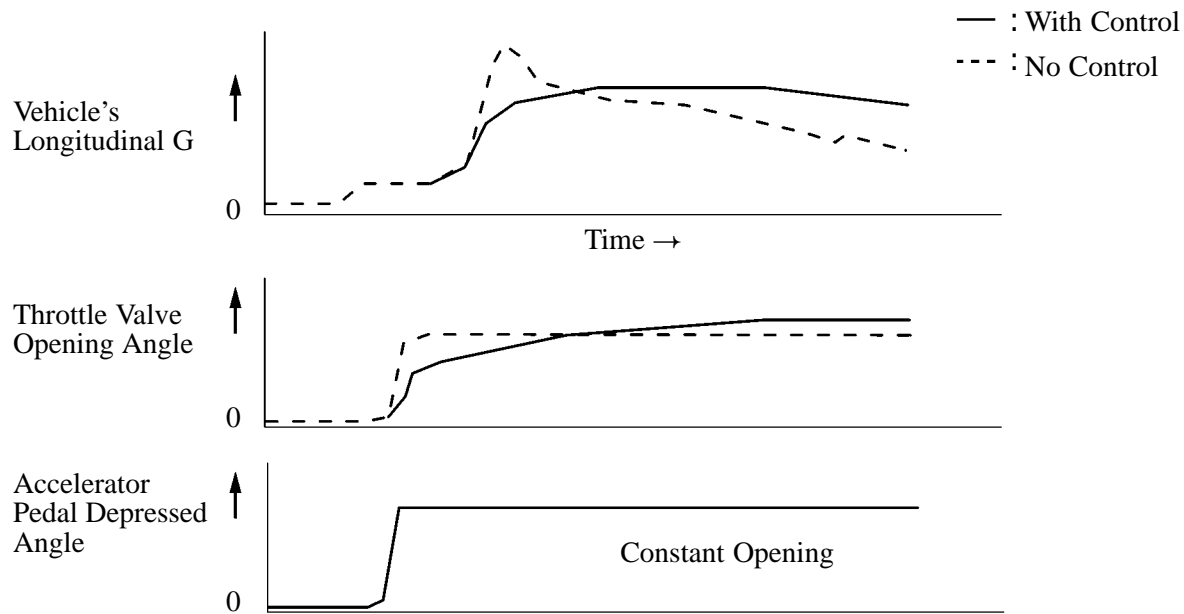
The ECM drives the throttle control motor by determining the target throttle valve opening in accordance with the respective operating condition.

In addition to the controls listed below, torque-activated power train control has been newly adopted in the GS430.

- a. Torque Activated Power Train Control ← New Control
- b. Normal-mode Control and Snow-mode Control
- c. Idle Speed Control
- d. Shift Shock Reduction Control
- e. TRAC Throttle Control
- f. VSC Coordination Control
- g. Cruise Control

a. Torque Activated Power Train Control

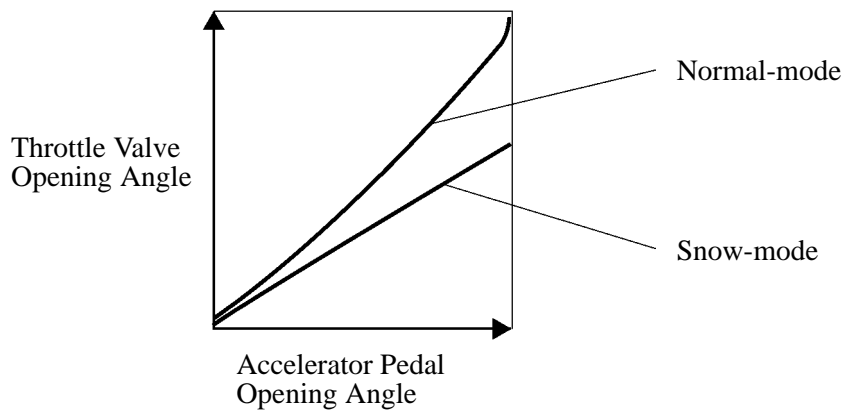
Controls the throttle to an optimal throttle valve opening that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed. As a result, excellent throttle control and comfort in all operating ranges, as well as smooth startoff acceleration and elastic acceleration have been achieved.



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b. Normal-mode Control and Snow-mode 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.
- In situations in which low- μ surface conditions can be anticipated, such as when driving in the snow, the throttle valve can be controlled to help vehicle stability while driving over the slippery surface. This is accomplished by turning on the snow switch, which in response to the amount of the accelerator pedal effort that is applied, reduces the engine output from that of the normal driving level.



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Conceptual Diagram

c. Intake Air Control

Controls the ECM and the throttle valve in order to constantly effect ideal idle speed control.

d. Shift Shock Reduction Control

The throttle control is synchronized to the ECT (Electronically Controlled Transmission) control during the shifting of the transmission in order to reduce the shift shock.

e. 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.

f. 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.

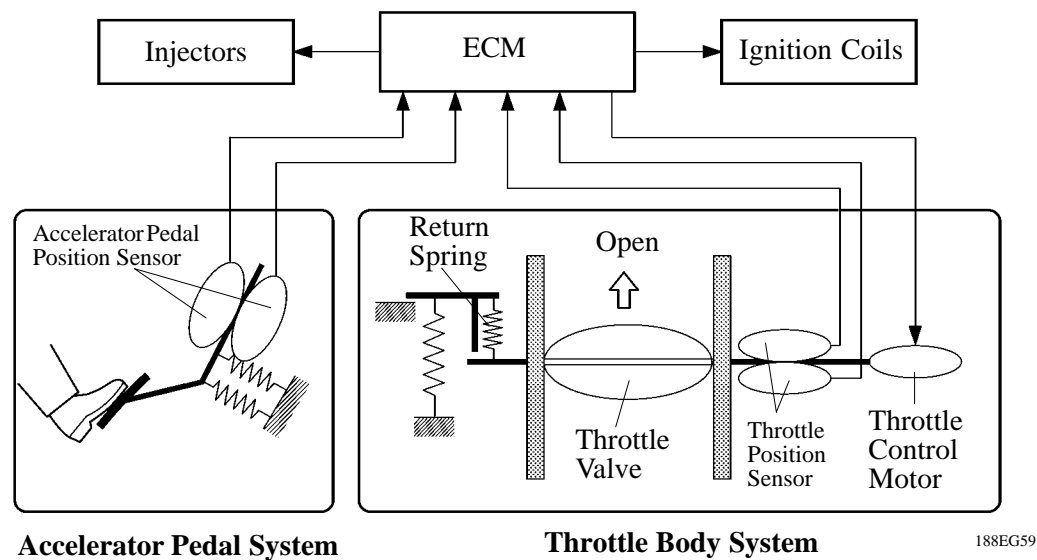
g. Cruise Control

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

4) Fail-Safe

If an abnormal condition occurs with the ETCS-i system, the MIL in the combination meter illuminates to inform the driver. The accelerator pedal position sensor comprises two sensor circuits. Therefore, if an abnormal condition occurs in the accelerator pedal position sensor, and the ECM detects the abnormal voltage difference of the signals between these two sensor circuits, the ECM transfers to the limp mode by limiting the maximum opening angle of the throttle valve.

If an abnormal condition occurs in the throttle body system which comprises two sensor circuits, the ECM detects the abnormal voltage difference of the signals between these two circuits and cuts off the current to the throttle motor, causing the throttle valve to close. However, when the throttle motor is OFF, because a return spring is provided in the throttle valve, the force of the spring keeps the throttle valve slightly open from the fully closed state. In this state, fuel injection cutoff control and ignition timing retard control are effected in accordance with the accelerator opening, thus enabling the vehicle to be operated within the range of idling and limp mode.



5) Diagnosis

The diagnostic trouble codes can be output via DLC3 to an OBD-II scan tool or a LEXUS hand-held tool. For details, refer to the '01 GS430/300 Repair Manual (Pub. No. RM791U).