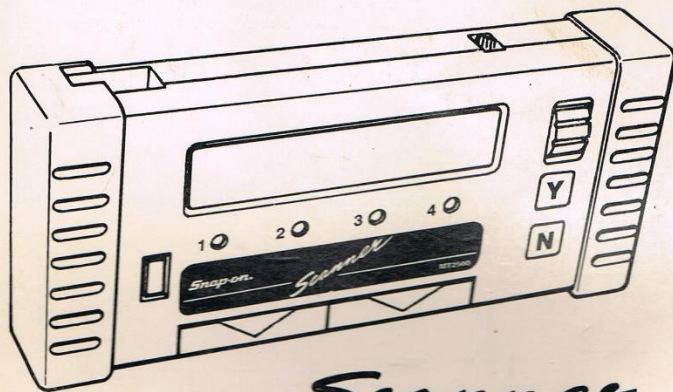


General Motors Reference Manual

Seventh Edition



Scanner

Snap-on®

General Motors Reference Manual

Seventh Edition
April 1995

Snap-on®

Throttle Position and Idle Control Parameters

These parameters indicate the position of the throttle and the operating condition of various idle speed control devices. Some of these parameters also indicate PCM command to idle control and throttle control devices.

TPS(V) X.XX (range: 0 to 5.1 volts)
TP SENSOR(V) XXX

In compliance with SAE J1930, the term TP SENSOR replaces TPS for 1993 models. Data lists for 1992 and earlier models still use the term TPS.

The throttle position sensor (TPS) produces a voltage signal proportional to the throttle position. The signal tells the PCM how wide the throttle is open: Low voltage at closed throttle, high voltage at wide-open throttle. The full range of the TPS voltage readings available to the PCM is 0 to approximately 5.1 volts. A typical TPS voltage range might be approximately 0.5 volt at idle to 4.5 volts at wide-open throttle.

THROTTLE (°) XX.X (range: -9.8° to 90.0°)
THROTTLE (%) XXX (range: 0% to 100%)

These analog parameters are values calculated by the PCM from throttle position sensor (TPS) voltage. They are displayed on many 1986 and later fuel-injected vehicles to indicate the amount of throttle opening.

Cadillacs display these values as degrees. THROTTLE(°) 82 or more indicates wide-open throttle. Closed-throttle readings will vary because of the idle speed control (ISC) motor position and throttle body adjustments.

All other vehicles that display this parameter show it as a percentage from 0 to 100. The THROTTLE(%) parameter usually appears on a car with an autoranging TPS. The PCM resets the 0 to 100 percent range in relation to TPS voltage as new minimum and maximum TPS voltages are sensed by the system. THROTTLE % is often used to determine transmission shift pattern and mainline pressure.

PEDAL POS 1(V) X.XX (range: 0.00 to 5.00 volts)
PEDAL POS 2(V) X.XX **PEDAL POS 3(V) X.XX**

These analog parameters are throttle position sensor inputs used by the PCM to determine the throttle demand requested by the driver. Parameter readings during normal operation should read, as follows:

- PEDAL POS 1 — 0.35 to 0.95 volts at idle, above 4.00 volts at WOT
- PEDAL POS 2 — 4.50 volts at idle, decreasing to 1.00 volt at WOT
- PEDAL POS 3 — 4.00 volts at idle, decreasing to 2.50 volts at WOT.

If the PCM detects a fault in a single sensor signal, a current and history diagnostic trouble code (DTC) are set, and vehicle operation is unaffected. If the PCM detects faults in two sensor signals, a current and history diagnostic trouble code (DTC) are set, the SERVICE THROTTLE SOON lamp turns on, and some engine performance is lost. If the PCM detects faults in all three sensor signals, a current and history diagnostic trouble code (DTC) are set, the SERVICE THROTTLE SOON lamp turns on, and the PCM will only allow the vehicle to idle. If an intermittent fault occurs, the PCM only allows limited vehicle performance.

IDLE AIR CONTRL_XXX (range: 0 to 255)

The idle air control (IAC) parameter indicates the position of the IAC valve in the throttle body of a fuel-injected engine, either throttle body or port injected. The IAC valve controls the amount of air that bypasses the throttle at idle and thus the idle speed. The motor that drives the IAC valve has 255 positions, and IAC readings can vary from 0 to 255. A reading of 0 indicates that the motor has moved to its outer position and closed the IAC valve to cut off air. A high number indicates that the motor has moved inward to open the IAC valve and allow more idle air.

DESIRED IAC_XXX (range: 0 to 255)

DESIRED IAC is an internal PCM analog parameter that indicates what the PCM wants the idle air control (IAC) motor position to be. The IAC or IDLE AIR CNTRL reading shows what the IAC motor position *is*. The DESIRED IAC reading shows what it *should be*.

Compare the actual and desired IAC readings. They should be equal, or very close to each other. If the PCM detects a sudden change in engine conditions, such as A/C engagement or cooling fan operation, it may command a new desired IAC position. The actual IAC position reading may take a few seconds to respond.

IAC LEARNED_XXX (range: YES/NO)

IAC LEARNED is an internal PCM parameter on many 1988 and later Buick-built V-6 engines. IAC LEARNED indicates whether the idle air control (IAC) motor has learned the number of counts needed to produce a desired idle speed.

When the ignition is first turned on, IAC LEARNED should be NO. As the engine is accelerated and returned to idle, the IAC system should learn the number of counts for the required idle. The IAC LEARNED should then read YES until the engine is turned off.

Electrical and Ignition Parameters

These parameters indicate the condition of the vehicle electrical system. They also include input signals from the ignition system to the PCM and PCM output commands to control ignition timing.

BATTERY (V) __XX.X (range: 0 to 25.5 volts)

The engine control system has no specific sensor to measure battery voltage, but some PCM's calculate this analog parameter from a sensing circuit across the supply voltage circuit. Although the measurement range is 0 to 25.5 volts, the reading should be close to normal charging system regulated voltage with the engine running. This is typically 13.5 to 14.5 volts at idle. Check the reading against actual voltage measured at the battery or alternator. Check vehicle specifications for exact values.

Some Cadillacs read battery voltage at the fuel pump relay. The BATTERY (V) reading for these cars will be 00.0 when the engine is not running.

The battery voltage parameter is used principally for PCM self-diagnostics. Some PCM functions will be modified if voltage falls too low or rises too high. For example, if voltage drops below a minimum value, the PCM will try to recharge the battery by running the engine at a higher idle speed. This may affect the idle speed control, fuel metering, and ignition timing parameters.

HIGH BATTERY __XXX (range: YES/NO) LOW BATTERY __XXX

Some PCM's calculate these discrete parameters from a sensing circuit across the supply voltage circuit. HIGH BATTERY is YES when battery voltage is high, NO when it is normal. LOW BATTERY is YES when battery voltage is low, NO when it is normal.

On most vehicles, a HIGH BATTERY __YES condition causes the PCM to disable the output solenoids to protect the PCM from high current.

FUEL PUMP(V) __XX.X (range: 0 to 25.5 volts)

On some 1987 and later fuel-injected vehicles, this analog parameter indicates electrical system voltage present at the fuel pump relay. The PCM monitors fuel pump voltage through a voltage-sensing circuit. This reading indicates vehicle system voltage and the overall electrical load.

FUEL PUMP(V) should be close to the battery voltage reading with the engine running. When you turn the ignition on, FUEL PUMP(V) should indicate battery voltage for about 2 seconds. If you do not crank the engine in this time, the reading should return to 0. When the engine is not cranking or running, FUEL PUMP(V) should read 0 because the relay should be open to deenergize the fuel pump.

5V REF (V) __X.XX (range: 0 to 5.12)

On some vehicles, the scanner will display the reference voltage on which system sensors operate. The PCM monitors this voltage and provides the parameter on the data stream. The nominal reference voltage is 5.0 volts, but it may vary by a few tenths of a volt, depending on system calibration and charging system voltage.

IGN CYCLES __XX (range: 0 to 50)

The IGN CYCLES parameter on some late-model vehicles indicates the number of on-off cycles of the ignition since the last trouble code change. The IGNITION CYCLES counter in the PCM resets to zero under any of the following conditions:

- A new trouble code occurs
- Trouble codes are cleared
- Battery power is disconnected
- 50 ignition cycles occur with no other change in codes

After 50 ignition cycles with no change in trouble codes, the PCM erases all codes in memory and resets the counter to zero.

EST BYPASS LINE __XX (range: HI/LO)

This discrete parameter indicates whether or not the PCM is controlling ignition timing. When the engine is cranking, the electronic spark timing (EST) bypass line should be open. The ignition module controls timing, and EST BYPASS LINE should be LO. When the engine starts, the bypass line should close so that the PCM can control timing. EST BYPASS LINE should then read HI.

LO RES SIG(ms) __XXX.X (range: 0 to 999.9)

This analog parameter displays the time between low resolution sensor pulses. This signal is used in the angle base ignition timing systems of 1992 and later 5.7-liter high output (HO) Corvettes.

IGN REF PULSES __XXX (range: YES/NO)

On some 1988 and later vehicles, the PCM counts ignition 2X reference pulses during cranking to verify that it is getting synchronized ignition input signals. This counter resets to zero when the engine starts. IGN REF PULSES should read YES while cranking; NO when the engine starts.

1X REF PULSES __XXX (range: YES/NO)

On some 1988 and later vehicles, the PCM receives alternating ignition reference signals, called 1X and 2X pulses. The PCM uses this information to synchronize fuel injection with ignition and to control timing when the engine is running.

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Vehicles Without

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