Next Generation Engine Management Part 1, Speed Density Operation and Diagnosis

Course Code 0831124

LINEAR SOLENOID IDLE AIR CONTROL VALVE (LSIAC)

The Linear Solenoid Idle Air Control (LSIAC) Valve is a two-wire air bypass solenoid controlled by the PCM. It was first used on the 2001 RS and PL. The PCM uses a high-side driver to regulate current flow to the LSIAC with a duty cycle of 10 - 90% at 1.5 - 2.5 kHz.

The biggest advantage to the LSIAC valve is quick response: 20 ms from closed to full open, versus 200 ms on the old style IAC motor. This results in more accurate idle air control and less tendency for idle undershoot.

The PCM also provides a path to ground. Current flow on this ground circuit is monitored to determine the position of the LSIAC. The PCM compares the target current flow against the actual current flow to determine LSIAC position, rather than counting "steps" as in the old style IAC motor.

Table 8 Typical LSIAC Values

LSIAC Condition	LSIAC Current (ma)
Fully Closed	180-200
Engine Idle	300-450
Engine at Light Cruise	500-700
Fully Open	900-950

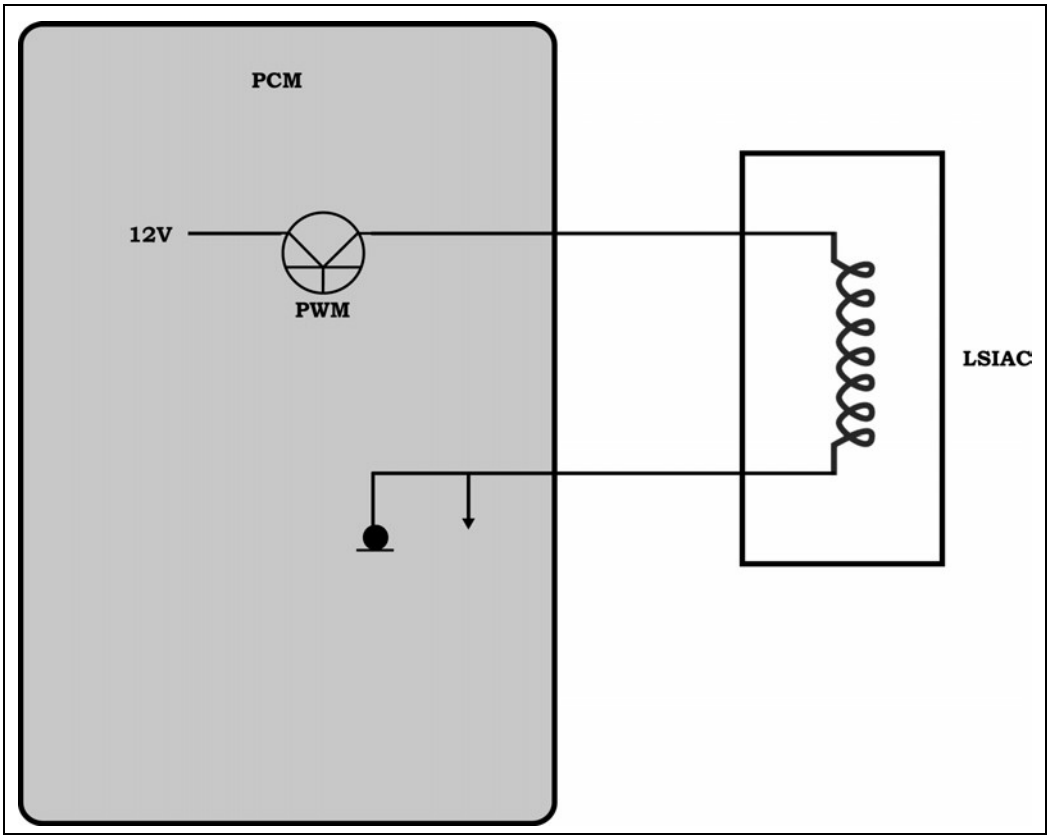

Figure 82 Linear Solenoid Idle Air Control Valve

IDLE AIR CONTROL (IAC) STEPPER MOTOR (JTEC AND SBEC)

The PCM controls circuit polarity to control direction of the IAC stepper motor and maintain target engine idle speed. The IAC motor is capable of 255 total steps from fully closed to fully open. The IAC regulates the amount of air bypassing the throttle blade. A pintle on the IAC stepper motor moves into a passage in the throttle body, controlling the air flow through the passage.

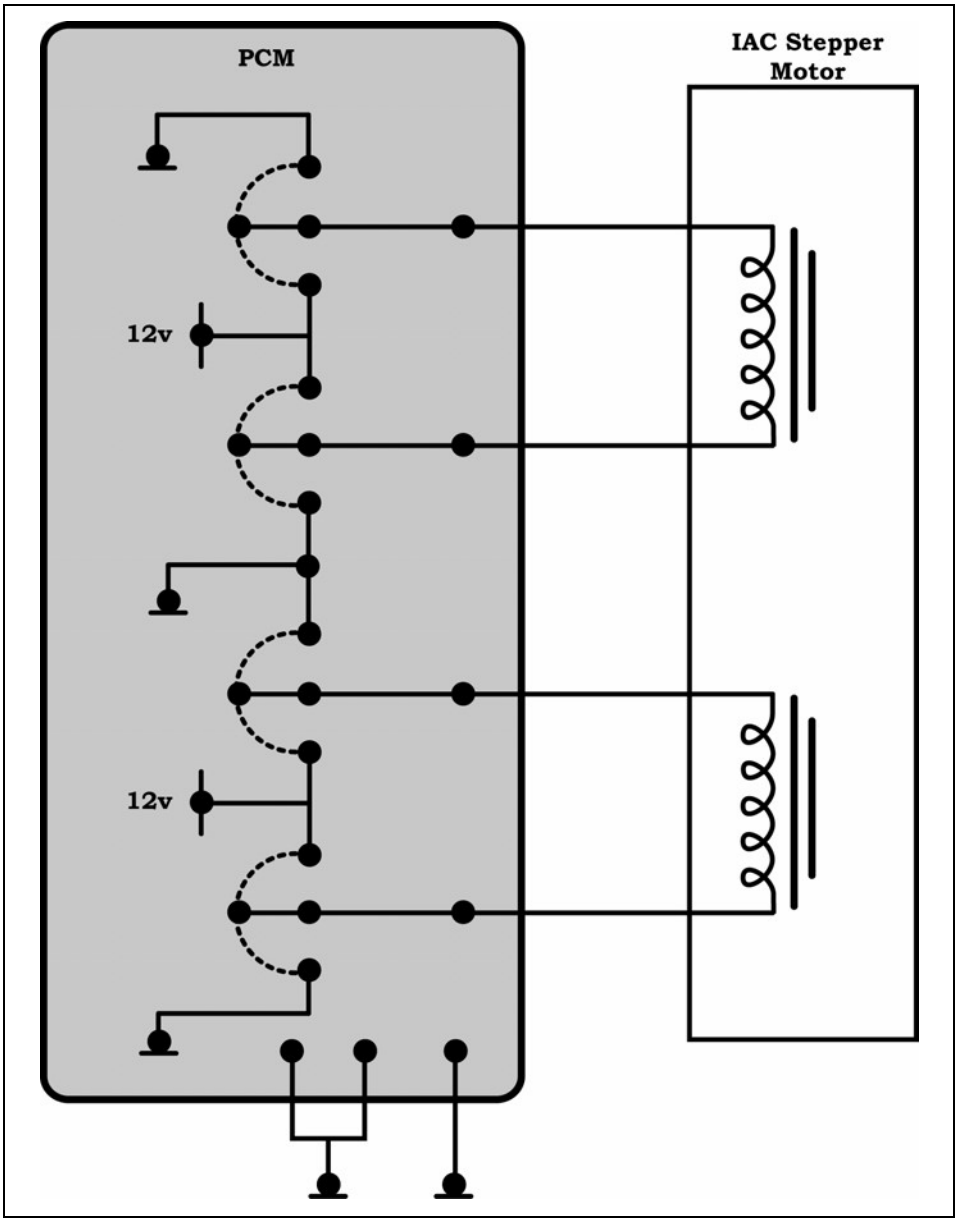

Figure 83 IAC Stepper Motor

IAC Stepper Motor Diagnostics

Typically, a DTC is set when the PCM senses a short to ground or battery voltage on any of the four driver circuits for at least 2.75 sec when the stepper motor is active. With JTEC, open circuits are diagnosed if they are present at key–ON. If the driver circuit opens while the engine is running, it will not be diagnosed until the next key–ON cycle.

Any time the IAC stepper motor or its circuit is serviced, the IAC memory must be updated. Use the DRB III to "Reset IAC". This ensures that the PCM can identify step 0. Also make sure that when the IAC Stepper Motor is installed into the throttle body that the passage is clear of debris and that the pintle is in the retracted position. This will ensure that the pintle and seat are not damaged when the IAC motor is installed.

LSIAC AND IAC AIR FLOW MANAGEMENT

Target Idle speed is mainly determined by the following inputs:

- TPS
- ECT sensor
- Gear position (P/N Switch)

Other factors affecting Target Idle speed may include:

- Battery voltage
- Ambient/Battery temperature sensor
- VSS
- MAP sensor

When engine rpm is above idle speed, the LSIAC and IAC are used for the following functions:

- Off–idle dashpot
- Deceleration air flow control

Under all engine operating conditions, the PCM will compensate for A/C compressor load by opening the passage slightly before the compressor is engaged so that engine rpm does not dip down when the compressor engages.