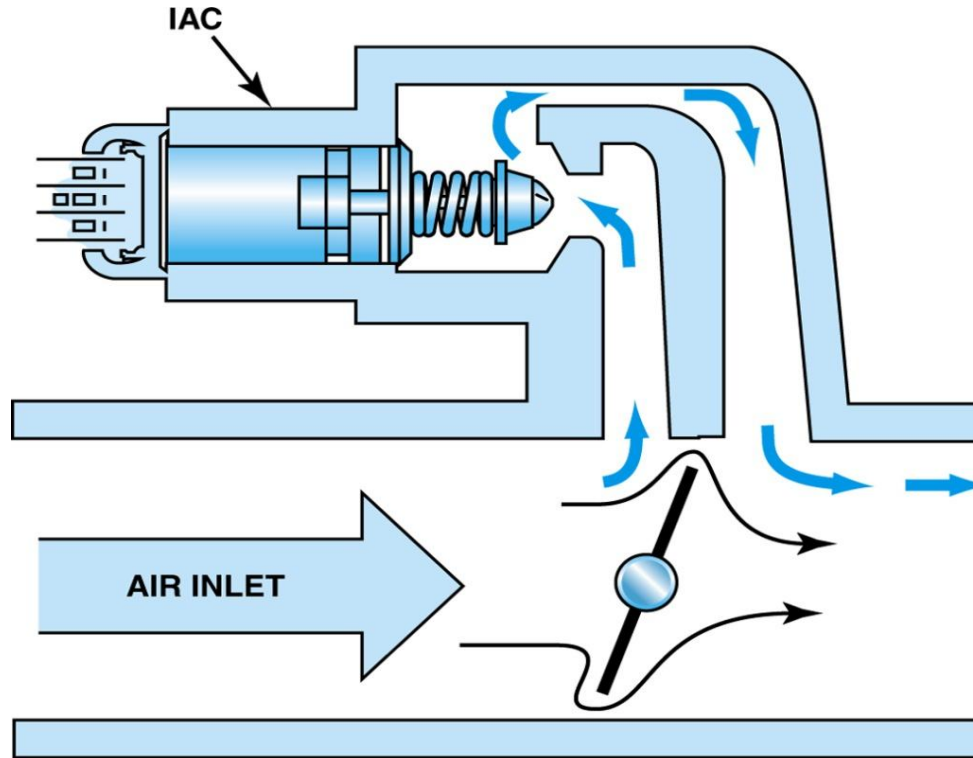




IDLE CONTROL

- Port fuel-injection systems generally use an auxiliary air bypass.

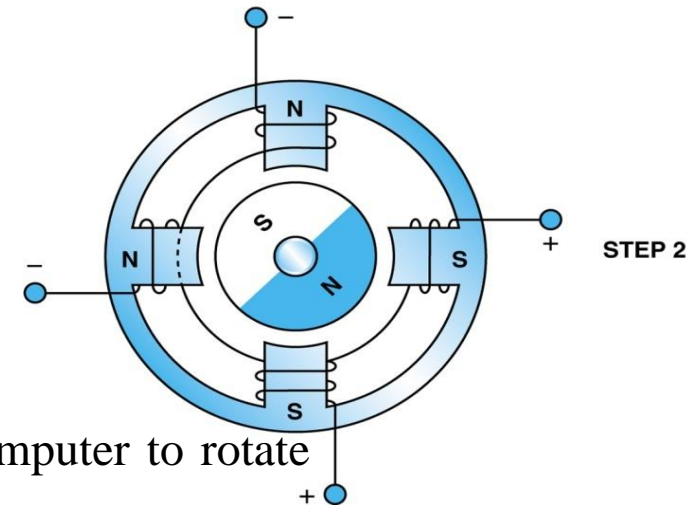
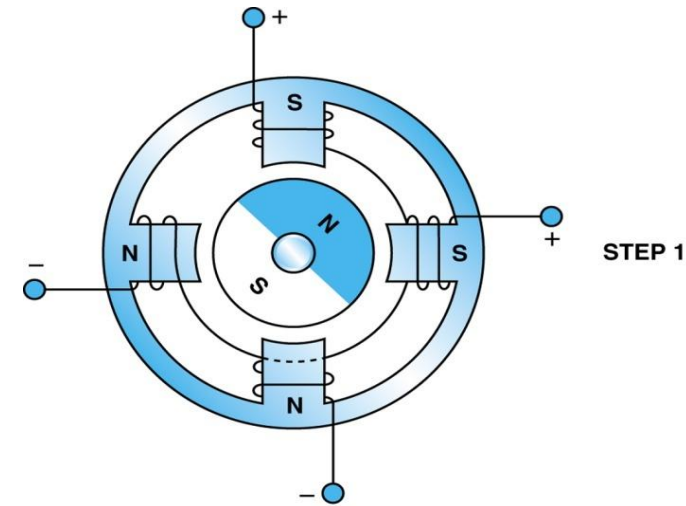


The small arrows indicate the air bypassing the throttle plate in the closed throttle position. This air is called minimum air. The air flowing through the IAC is the airflow that determines the idle speed.



STEPPER MOTOR OPERATION

- Stepper motors are direct-current motors that move in fixed steps or increments from de-energized (no voltage) to fully energized (full voltage).
- A stepper motor often has as many as 120 steps of motion.



Most stepper motors use four wires, which are pulsed by the computer to rotate the armature in steps.

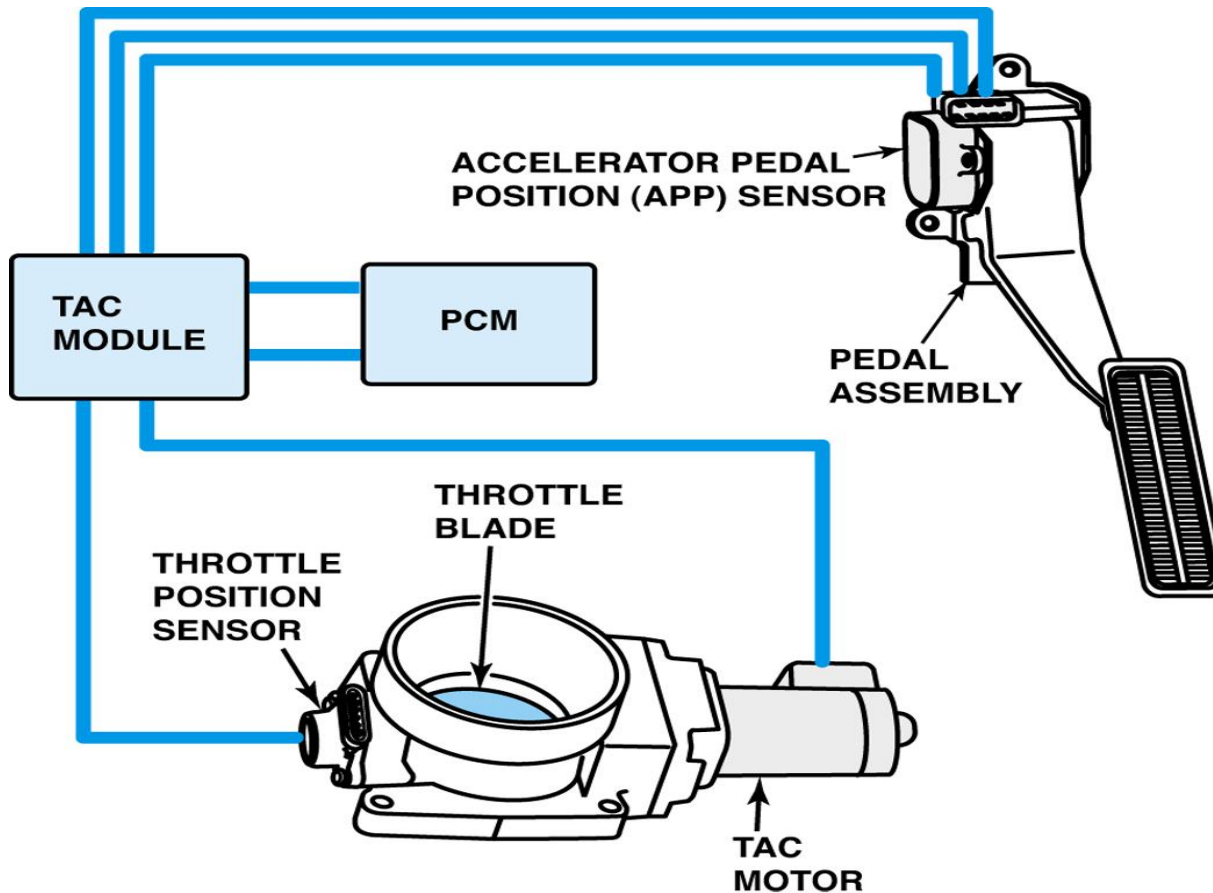


ELECTRONIC THROTTLE CONTROL

- Electronic throttle control (ETC) systems, used by some manufacturers, replace the idle air control and also serve as a cruise control servo.
- This system eliminates the mechanical linkage between the accelerator pedal and the throttle plates.
- A typical electronic throttle control system includes the following components:
 - Accelerator pedal position (APP) sensor
 - Throttle valve actuator
 - Throttle position sensor
 - Throttle actuator module (or PCM)



ELECTRONIC THROTTLE CONTROL



A GM electronic throttle control system showing the APP and TP sensors and the DC throttle actuator control (TAC) module and PCM. In many systems the motor control is located inside the PCM.