Idle Control Tuning

Tuning the idle control on an Electromotive is difficult to layout with step-by-step instructions. The best thing to do is try to explain what each setting does, then cover some common problems and how to overcome them.

Much of this you will probably have heard before, bear with me:
The idle control system is, basically, treating IAC like a shock and spring for the RPM. The Idle RPM is the ride height, Error sensitivity is the spring and Rate-of-change Sensitivity is the shock.

We have two error sensitivities, one for when the RPM is below the idle RPM (Error Sensitivity +, as in this pushes the RPM UP), and one for when RPM is above the idle RPM (Error Sensitivity -, as in this pushes the RPM DOWN). Changing these values is like changing the spring rate on a shock. A higher rate will push hard on a smaller deviation from the ride height but it may oscillate in certain situations. The labels to the right of each entry box most clearly indicate which is which.

We have two Rate-of-Change Sensitivities, one is for when RPM is falling (Rate-of-Change Sensitivity (-), as in responds to negative change) and one is for when the RPM is increasing (Rate-of-Change Sensitivity +, as in responds to positive change). A higher number will work against change in the indicated direction (the labels to the right of the entry boxes most clearly indicate which is which). Like a shock that is too stiff, numbers that are too high can prevent the RPM from attaining the target and make the response sluggish.

The rest of the settings are as follows:
Min duty – This is the minimum dutycycle applied to a two or three-wire IAC (indicates the most closed the IAC will be commanded). A 4-wire IAC uses the difference between this and the Max duty to determine the range of motion for the IAC.

Max duty – This is the maximum dutycycle applied to a two or three-wire IAC (indicates the most open the IAC will be commanded). A 4-wire IAC uses the difference between this and the Max duty to determine the range of motion for the IAC.

Allow Idle motor to deactivate at minimum dutycycle – This checkbox option enables or disables turning the control coil of a two/three-wire IAC completely off when the minimum dutycycle is reached. Bosch idle valves often have a limp mode window that opens when the coil is turned off, these should not activate this option. Other IACs may activate this option to help improve their life expectancy. 4-wire IACs are not affected by this option.

Reset RPM – Labeled “RPM Above Which the IAC Resets”. This RPM is the cutoff RPM for controlling idle. Above this point the IAC will stop trying to control idle RPM and perform a reset. A two/three-wire IAC will simply turn off. A 4-wire IAC will crank all the way open and then move to the reset position (see below).

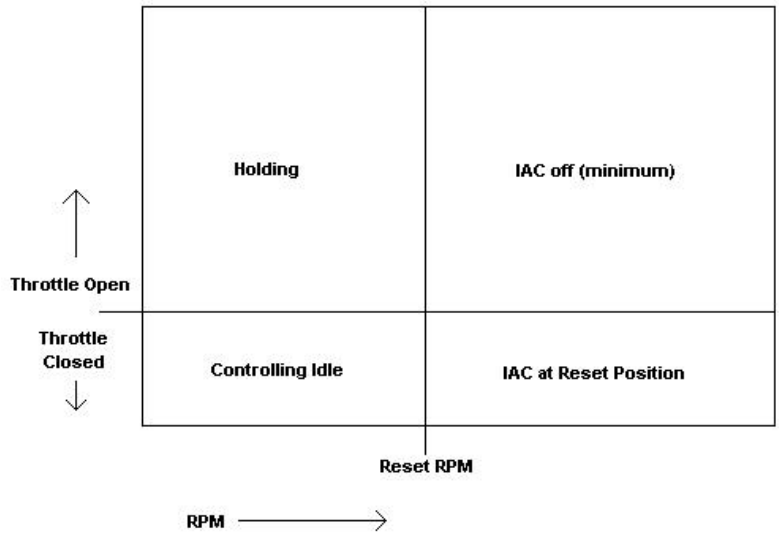
Reset Hystresis RPM – Labeled "RPM engine must drop below before resetting again". This is the RPM that the engine must drop below before another IAC reset can occur when passing from below the Reset RPM to above the Reset RPM. This setting has no effect on two/three wire IACs. It is only used with 4-wire IACs.

Idle Speed Reset position – The position in percentage (as seen on the monitor) where 0% is the minimum duty and 100% is the maximum duty that the IAC will assume when the engine RPM is above the Reset RPM and the throttle is fully closed. The IAC will begin moving from this point when it resumes controlling idle speed.

Idle Speed Choke Position – The position in percentage (as seen on the monitor) that IAC assumes when the engine is off and the ignition is on. This value is used to simply give the engine a little extra air to help start. This is never used during engine operation.

Idle Speed vs. Temperature Table – This tables sets the idle speed target for the given engine coolant temperature.

The Idle control has 4 modes (see below). Which mode the IAC is in depends on the current engine RPM and whether the TPS is fully closed or not. The RPM switch over is the reset RPM.



Common scenarios and their solutions:

"Engine stalls when the clutch is put in or when coming to a stop (sometimes/every time)"
This problem isn't always the fault of the IAC controls. Before changing anything else, ensure the throttle plate is adjusted properly. Then make sure the engine will idle clean, *when warm,* without stalling with the IAC blocked off. This will usually involve making sure the idle fuel mixture is correct and the timing is where it really needs to be. After this is all correct, enable the IAC. Adjusting the Reset position to 3-5% above the warm

idle position. Shoot for a Reset RPM about 1000-1500 RPM above idle for a 2/3-wire IAC and about 500 RPM above your shift point in light-normal driving conditions (as apposed to like-you-stole-it conditions). The higher your Reset RPM is above your idle RPM, the higher you'll need the Reset Position. Another trick is to play with the min and max duty values so that the IAC can't close enough to allow the engine to stall. I generally aim to have the engine idling warm with no more than 5% on the IAC position. This trick can also be used to work around a throttle that is not adjustable or can't be adjusted open enough (this really only happens on some OEM throttles).

"The RPM bounces or sticks at or near the Reset Position when coasting down or revving in neutral"
The reset position is too high. Reduce it.

"RPM is not reaching target"
This is most often associated with Error sensitivities that are too low. Begin increasing them. Test by driving around or revving the engine, not simply waiting for the RPM to change. Keep the changes small. Always start with the base sensitivity numbers (150,75,75,150 in that order top to bottom on the IAC page). If the numbers are reasonable, your using a 4-wire IAC, and the RPM is always too high the min and max duty values are too far apart and they need to be adjusted. You may adjust these on the fly until you get the Idle RPM you want.

"RPM is not stable"
Either the Error sensitivity or the Rate-of-Change sensitivity is too high. Another (more likely) possibility is the idle mixture is wrong. The mixture at idle should be what produces a stable idle, not what you think your AFR gauge should read.

"Engine will not idle and making changes to idle parameters either has no effect or makes it worse"
Most often this is because the IAC is either not working or working backwards. Verify that the IAC is working properly. Only 4-wire IACs can work backwards, this is fixed by swapping the two green OR the two blue wires. If the IAC is not working and the wiring is correct you will need to verify that the IAC is good before having the unit sent in for repair. I have yet to see a two-wire IAC driver fail.

"My 4-wire IAC never seems to hold Idle at the same position each time"
This is most likely due to the min and max duty values being too far apart. The IAC is running all the way closed before hitting the 0% position and getting out of synch. Bring the min and max closer together.