Base Fuel Calculations inside the Distributor Pickup Interrupt routine:

In all generations of the Chrysler ECU (LM, SMEC, SBEC at least), the fuel pulsewidth is calculated every Distributor Interrupt. The base pulsewidth is looked up in 1 of 3 tables depending on the throttle condition. There is a base fuel table (no-throttle), a table for part throttle, and a table for full throttle. Then, the computer decides if it should be using starting fuel calculation or running fuel calculation. The resulting PW is multiplied by a modifier based on many factors; Coolant Temp, Air Intake Temp, O2 sensor, and Pumping Efficiency mainly. After the modifier, PW is added for accelerator pump function. The starting fuel PW, the PW modifier, and the Accelerator Pump adder are calculated during normal ECU running, not inside the Distributor Interrupt Routine.

The Base PW in the tables is calculated based on the Speed/Density fuel control theory. Basically, this is a calculation that estimates the Mass Airflow through the intake manifold based on the manifold pressure and air density. Here's how the table data is calculated:

$$PW = \frac{(MAP \times (6894.8/(287.05 \times (273.15 + TEMP))) \times DISPL/1000) \times 3600}{4 \times AFR \times INJFLOWRATE \times 2.2}$$

*Where MAP is in PSI, TEMP in Deg-C, DISPL in L, INJFLOWRATE in lb/hr

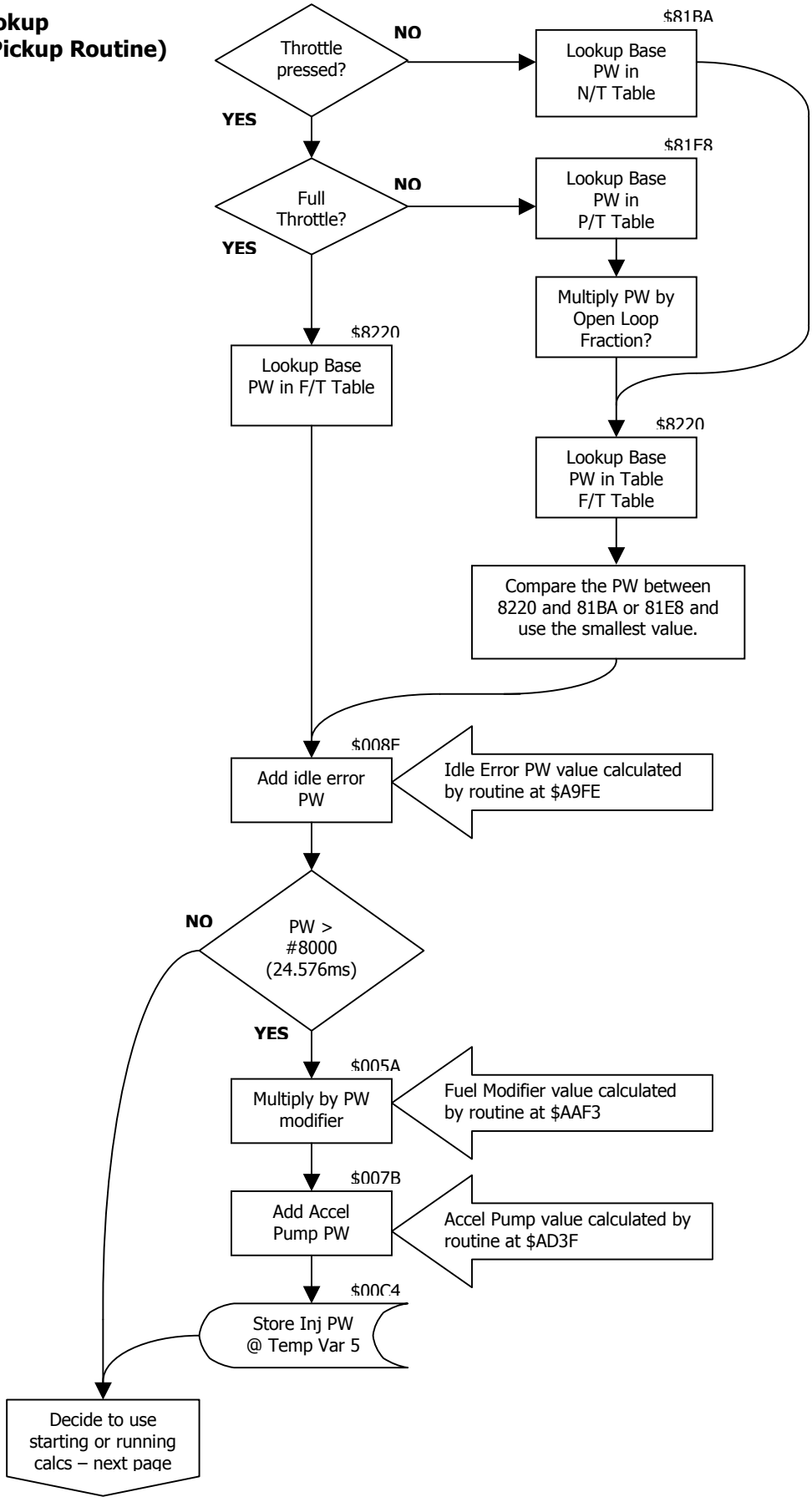
In most speed density calculations, the Volumetric Efficiency is included in this calculation (and, since VolEff is RPM based, the engine speed as well – hence the name Speed-Density). But, Chrysler chose not to include VolEff in this calculation and instead include it as a modifier to the PW. I'll show the PW modifier calculations on another doc.

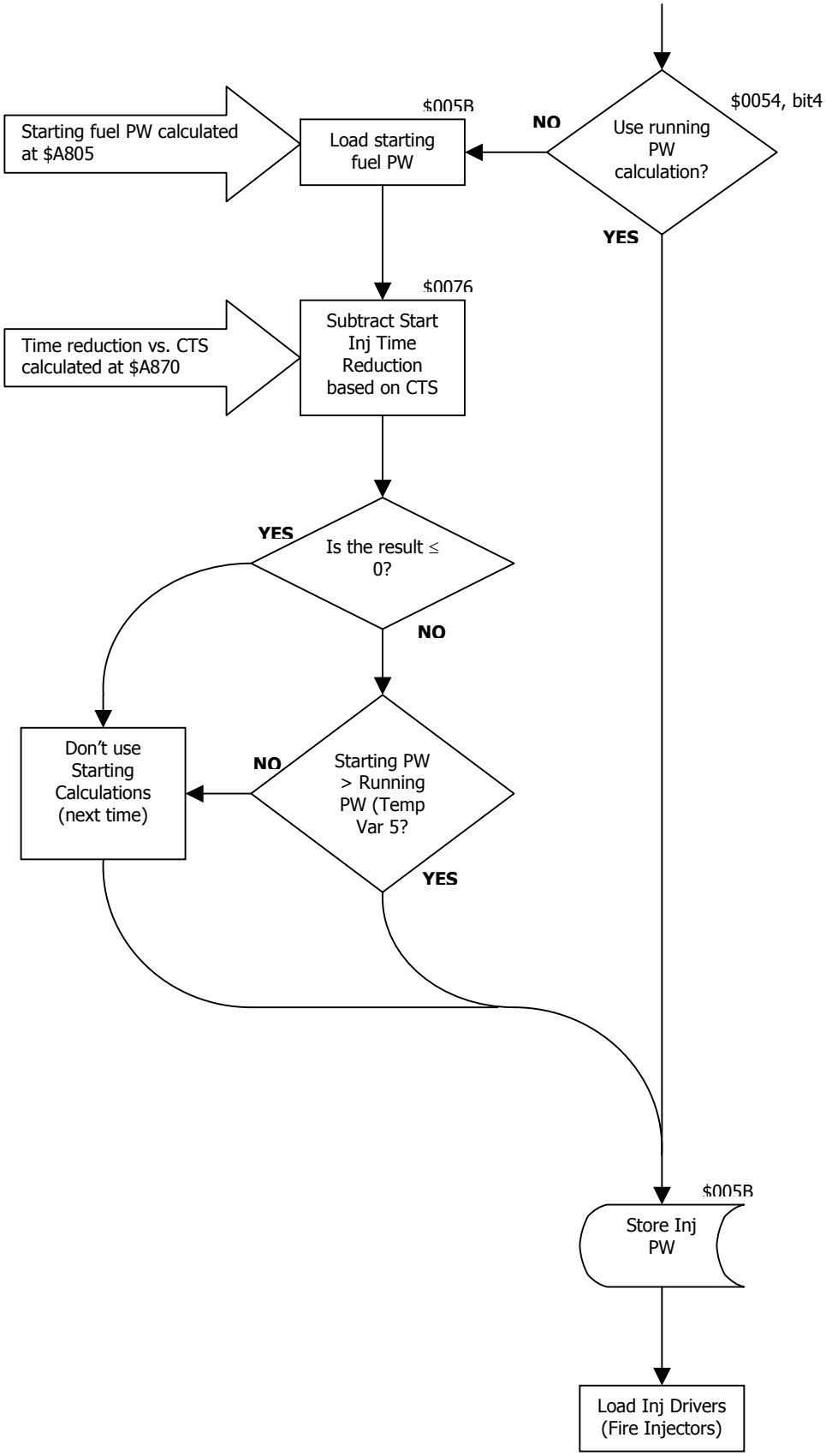
Basically, you can use this to adjust the fuel curves based on your own assumptions. For example - a different injector flow rate. Or you can simply change the theoretical AFR. But, you could also use this to compensate for a rising rate fuel pressure regulator. You could use a RRR to get lower flow rates at idle conditions, and still flow enough at full boost.

I created an Excel spreadsheet using this calculation. It allows the user to change the above parameters and includes compensation for a RRR.

Also, it should be noted that the AFR in this calculation is purely theoretical. It is not measured in anyway by the ECU. It is only used in the PW calculation. The actual resulting AFR will depend on other factors. Specifically the PW Modifier and Accel Pump.

Base Fuel PW Lookup
(Inside Dist Int Pickup Routine)
Rev 3




$0054, bit4
Use running PW calculation?
NO
YES
$005B
Load starting fuel PW
Starting fuel PW calculated at $A805
$0076
Subtract Start Inj Time Reduction based on CTS
Time reduction vs. CTS calculated at $A870
YES
Is the result ≤ 0?
NO
NO
Starting PW > Running PW (Temp Var 5?
YES
Don't use Starting Calculations (next time)
$005B
Store Inj PW
Load Inj Drivers (Fire Injectors)