# Custom Chip for the GMC Syclone and Typhoon
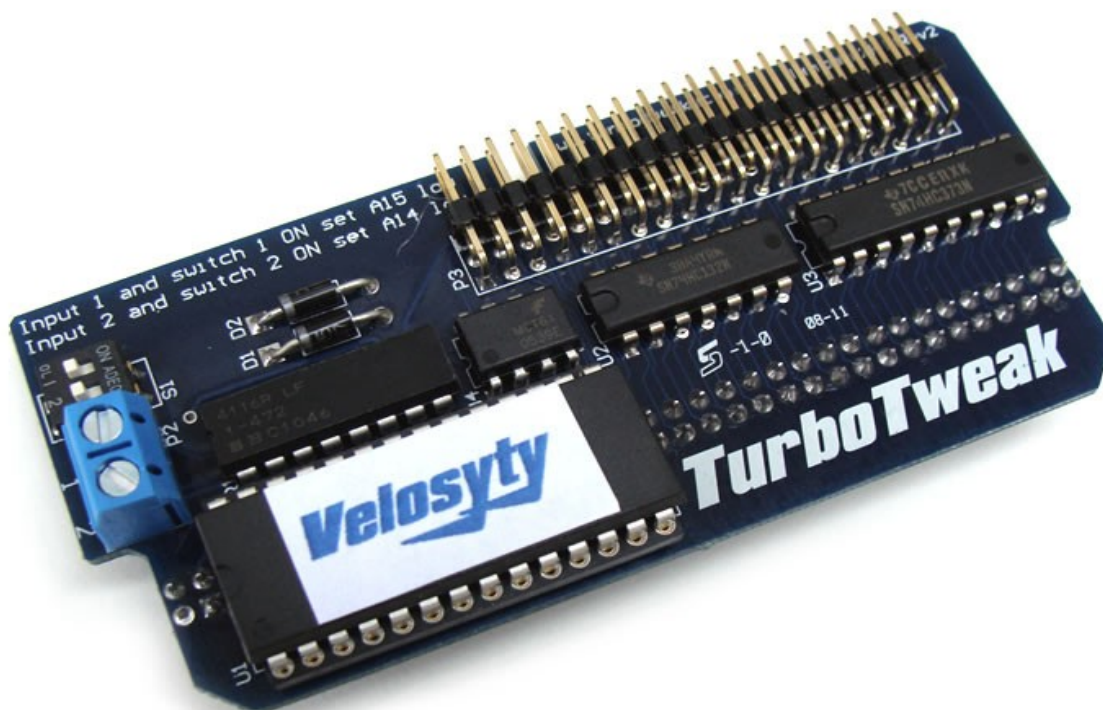
**Chip Version 1.0**



**This product is intended for off-road use. TurboTweak cannot be held responsible for any damages resulting from the use of this product.**

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## Please read before installing!

1. Before installing the chip, disconnect the power to the ECM by either disconnecting the battery, pulling ECM-B fuse, or disconnecting the 3 ECM harness plugs. This resets the ECM's memory so it can re-learn with the new chip. The power MUST be disconnected for at least 30 seconds for the new chip to work properly.

2. After gaining access to the ECM and removing the cover, remove the old memcal by opening the locking tabs on both ends, and pulling the memcal out.
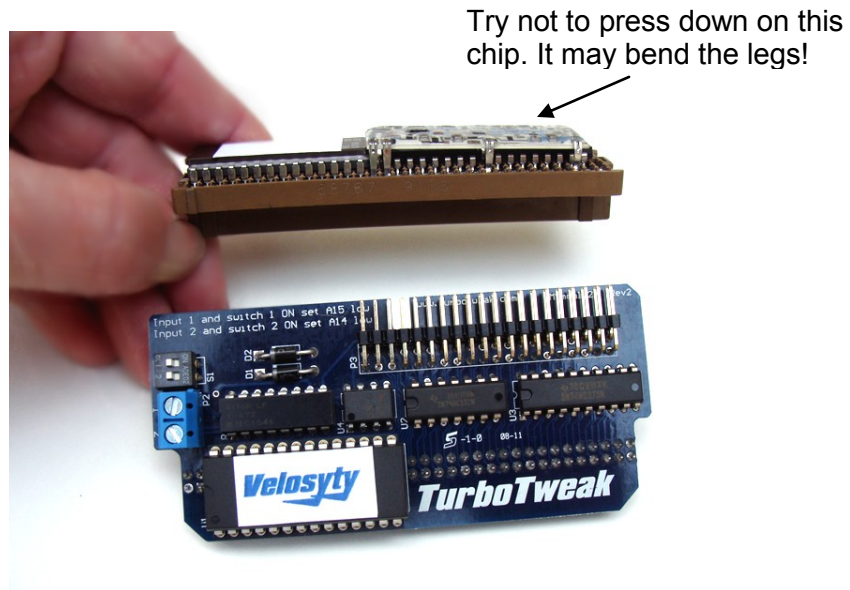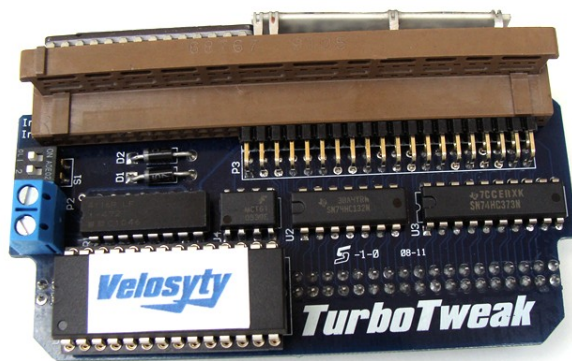


Original Memcal

3. Remove the original blue memcal cover. You will not be reinstalling the cover since the memcal will not usually fit back into the computer with the cover on. You can use a small flat screwdriver to pry the ends. Keep the cover somewhere safe in case you want to go back to the stock chip someday.

Cover removal

Try not to press down on this
chip. It may bend the legs!

4. Install the original memcal onto the new Velosyty memcal adapter. Note the proper
   alignment in the picture above. When installed, it should look like the picture below.

Proper installation

5.  To install the new memcal assembly, start vertically, and "roll" it into position so that it will plug into the original socket.



6.  Carefully push the new memcal assembly into the socket. The locking tabs on the ends should rise up as you push it in. Then pull the tabs closed. They will not lock tightly. It should look like the picture above when done.

7.  You can now reconnect the battery or ECM harness connectors.

8.  Turn the key on. The "Check Engine" light should come on, blink once and stay on. If the Check Engine light flashes on and off repeatedly, do not start the car. Recheck your installation of the memcal adapter. If the CE light still flashes, then the chip may be defective, or damaged during shipment, and will need to be replaced. You should not have any Check Engine light when the engine is running.

9.  To start with, set the fuel pressure to 43psi, vacuum line off. This may need tuning later.

10. You can now start the truck. The very first time you start the truck with a new chip, the idle may flare up, or it may stall. This is common, as the ECM has lost track of the idle air control motor's position. Simply turn the ignition off and wait about 5 seconds, then restart. The idle should return to normal.

11. The car may need to be warmed up and driven around for the ECM to re-learn, in order for it to run its best. Once the car is warmed up (160°F), most of the learning can be done in about 15 minutes of city driving.

12. This chip includes a "knock alert" feature.  It is set up to flash the check engine light if knock retard exceeds 5 degrees. If you are seeing the flashing at WOT, it's best to let off and figure out what's causing the knock.

13. It is critical for all your sensors to read correctly for the chip to calculate fuel properly, especially at idle. The IAC reading should be around 20-30, with the truck warmed up, in Park. You might need to adjust the throttle blade to achieve this. The TPS is typically about .60 to .90 volts with the throttle closed. The MAP reading is normally around 30-40 kPa at idle. These readings may not have been as critical with your previous chip, but they are critical for the Velosyty chip.

14. The rest of this document covers the adjustable features of this chip. These features need some type of scantool to operate. If you are not comfortable using the adjustable features, that's ok too. In that case, you can skip the rest of the instructions.

## Programmable Features

There are 7 areas of this chip that can be adjusted by the user. These adjustments offer you a way of fine-tuning the chip for your car or conditions. You will need a scan tool that can display INT and BLM to make adjustments. A scantool that can log, and a wideband O2 sensor are highly recommended.

**Use Caution!** The adjustments available to you with this chip have the capability to do serious harm to your engine if you do not monitor your air/fuel mixture and knock retard with some type of scanning device.

### Parameter 1 – High Boost Fuel Adjustment (around 15psi)

   This feature will add or subtract from the default wide open throttle (WOT) fuel in order to make the fuel mixture richer or leaner at WOT. The adjustment range is +/-18%. The default number shown on your scantool is 128 which means no change, the minimum is 105, which is –18%, and the maximum is 151, which is +18%. This adjustment has maximum effect when boost is about 15psi. With smaller injectors, you may have already have max fuel, or close to it, so this adjustment might not add anymore fuel in that case.

### Parameter 2 – Mid Boost Fuel Adjustment (around 7psi)

   Same as High Boost fuel adjustment except it has maximum effect at about 7psi boost.

### Parameter 3 - WOT Spark Timing, 1$^{st}$/2$^{nd}$ Gear Adjustment

   This feature will add or subtract from the default timing in 1$^{st}$ and 2$^{nd}$ gear at WOT. The default number shown on your scantool is 128 which means no change. When the number is raised, each number equals .35 degrees. So if you raise the number to 131, you have added about 1 degree of timing. The max is 151, which is an additional 8.1 degrees. The min is 105, which subtracts 8.1 degrees.

   Be very careful when running pump gas (91-94 octane), as it generally cannot tolerate much more than 14-16° total timing at full throttle. 1$^{st}$/2$^{nd}$ gear can sometimes tolerate a little more.

### Parameter 4 - WOT Spark Timing, 3$^{rd}$/4$^{th}$ Gear Adjustment

   Same as 1$^{st}$/2$^{nd}$ gear except applies to 3$^{rd}$/4$^{th}$ gear (over 55mph). If you have no MPH signal to the ECM, this adjustment will have no effect.

### Parameter 5 – Initial Boost Duty Cycle

   <u>Be careful with this adjustment!</u> If you increase it too much, you may see a damaging boost spike!
   This will adjust the initial duty cycle for the wastegate solenoid when you first get into boost. This can change how fast the turbo spools. If you have a boost spike, this may need to be lowered. If it is spooling too slowly, then try raising this adjustment. The default number will show 100. Higher is faster spool, lower is slower spool. One number represents about .4%. So, for example, to increase initial boost duty cycle by 5%, you would increase the number by 13. (5% ÷ .4% = 12.5, round to 13) See quick reference chart to avoid the math.

**Parameter 6 – Max Target Boost**

  This sets the target boost in closed loop boost mode. See quick reference chart for adjustment units.

**Parameter 7 –Target A/F for Closed Loop Wideband Mode at WOT**

  This sets the target A/F for closed loop wideband mode, if a wideband O2 system is installed and connected to the ECM. Divide by 10 to get the A/F. For example, to set the target A/F to 11.0, set it to 110. To turn off wideband control, set it to an A/F of 9.9 (99). If you have no wideband installed, leave this setting at 99.

  You can see where any parameter is currently set by turning the key on (engine off), set your selected parameter to the one you want to see (see next page on how to select a parameter), then look at BLM on your scan tool. By default, parameters 1-4 should be at 128 if the ECM was reset correctly during the chip install.

## Adjustment Procedure

To adjust the programmable features, you will need a scantool that can display INT and BLM (Some scantools display these as Lterm(BLM) and STerm(INT).

### Select a parameter:

1. With key on/engine off, look at INT (STerm) on your scantool. It will display the parameter you will be adjusting. It should display "0" to begin with.
2. Press the gas pedal fully and release 3 times, *except* on the 3$^{rd}$ press, hold it to the floor. Like this:
    1. Press/Release
    2. Press/Release
    3. Press/Hold -- don't let go!
    You must complete this sequence in less than 3 seconds! If not, you'll have to turn the key off, then back on to start over.
3. Keep holding the gas pedal. After about 2 seconds, INT will start to cycle from 1 to 7, over and over again. This is how you select which parameter you want to adjust.
    - 1 = High Boost Fuel – fuel around 15psi boost and higher
    - 2 = Mid Boost Fuel – fuel around 7psi boost
    - 3 = WOT Timing, 1$^{st}$/2$^{nd}$ gear
    - 4 = WOT Timing, 3$^{rd}$/4$^{th}$ gear
    - 5 = Initial Boost Duty Cycle
    - 6 = Max Target Boost
    - 7 = Target A/F for closed loop full throttle wideband mode
3. When you get to the parameter you want to adjust, release the gas pedal. Wait a couple seconds to make sure the number stopped on the parameter you wanted.

### Adjust the parameter you just selected:

4. Look at BLM (LTerm) on your scantool. This will show you the current setting of the parameter you selected.
5. If you want to change the setting, press the gas pedal a little bit (under half) and the number will decrease slowly. Press a little more (over half) and the number will increase slowly. Mash the pedal to the floor and the number will increase rapidly. When the number gets to its max or min, it will wrap around and keep going. When you get to the number you want, release the gas pedal.
6. Key off and the process is complete. If you want to adjust another parameter, key off for 5 seconds and key back on, and start the process over.

**Notes:**

If the battery or ECM is disconnected, the memory will be erased and your settings will be lost (they will return to the default). I recommend periodically looking at the saved values to make sure they have been retained. Sometimes bad battery cables, a bad starter, bad ignition switch, etc. can cause the ECM to lose its memory when starting the car.

### Troubleshooting

If you can't get the adjustable parameters to work, then the TPS sensor may not be working correctly.

## Using Closed Loop Wideband Mode

If you have a wideband O2 system, you can connect it to the ECM for data logging and closed loop control at full throttle. The chip needs be programmed for your specific wideband type (PLX, AEM, etc). The analog output wire from your wideband needs to be connected to pin F14 at the ECM. That location is not used from the factory and a special wire terminal is required to install into the connector. The wideband A/F will display in the "Cranking A/F" or "Desired A/F" box on Datamaster (they both will read the same thing) and Tunerpro.

This chip will attempt to maintain the target WOT Air/Fuel ratio that you set in chip parameter #7, as long as you have it enabled, and a wideband is connected to the ECM. However, the program can only add or subtract a certain amount of fuel. This is the "correction factor". The correction factor is currently displayed in the "CC" location on a scantool, also called "XCNTS" or cross-counts. It is allowed to reduce fuel by up to 10%, and add fuel up to 33% if your injectors are big enough. We'll call this the "correction window".  Therefore, the correction window is -10% to +33%. We need to keep the correction factor within this window, preferably around 0%, in order for the closed loop operation to work correctly. It's ok if it's not exactly at 0%, just somewhere in that area, maybe +/-10. Note that the scantool doesn't display percentage. For 0%, it will show 128. It will show 170 when at +33%, and 115 when at -10%. It's best to monitor closed loop correction after the boost has stabilized. As long as the correction factor has not hit the lower or upper limit (115 and 170), then it should hold your air/fuel ratio pretty close to the target, typically +/- .3 once at full boost. You might see more variance during spoolup, or on shifts.

When at full boost (WOT), monitor closed loop correction and see where it ends up. If the correction is too far away from 0%, then you can change the High Boost Fuel (parameter #1), to get the correction closer to 0%. For example, if the correction ends up around +10%, then increase the Base WOT Fuel by 10%. If the correction is too low, say -10%, then decrease the Base WOT Fuel by 10%. If the correction is stuck at the upper or lower limit no matter what, then you'll need to stop and figure out what's going on.

Once you go through this process, you should not have to adjust the High Boost Fuel much more, unless you make some type of radical change to the setup of the car.

Regarding target air/fuel ratios, I find that around 10.8-11.0 is a good place to start for WOT A/F in most situations whether it's street, race, or with alcohol injection. Start there and monitor for knock and performance. If the car is knocking at 10.8, then you may have to go richer, however you may want to evaluate your octane level or alcohol spray volume. Typically the idea is to go as lean as you can without knocking, but I wouldn't go much leaner than 11.5. Some cars can go leaner if running low boost, say 15-16psi, or on some race cars with very high octane.

If you are seeing a rich spike or lean spike when the boost first comes up and peaks, then you may need to adjust the High Boost Fuel or Mid Boost Fuel (parameters #1 and #2). Especially with alcohol injection, you might see a rich spike as the boost first comes up. You should consider experimenting with the settings on your alcohol system in that case.

## Secondary Chip Program Option

The Velosyty chip has enough memory to fit two chip programs on it. For example, a street chip and a race chip.

If there is a secondary program installed on the chip, it can be accessed by switching on Dip Switch #1 on the memcal adapter. Another way to access the second program is applying 8v-13v to Terminal #1 on the memcal adapter. You could wire an external switch that supplies 12v to the terminal to quickly switch to a different tune. Also, some alcohol injection kits have outputs that you could connect to the terminal to automatically switch to an alcohol tune when the kit is operating.

The tune can be switched on the fly (with the engine running). Be aware that any changes you made with the user adjustments will also apply to the secondary tune. For example, if you added 2 degrees of timing on tune 1, that same 2 degrees will be added to tune 2.

If you have one program that is <u>very</u> different than the other, for example, one for gasoline and one for E85, then you'll have to disconnect power from the ECM when changing programs.

**Warning: Do not ever turn on Dip Switch #2, or connect anything to Terminal #2.**
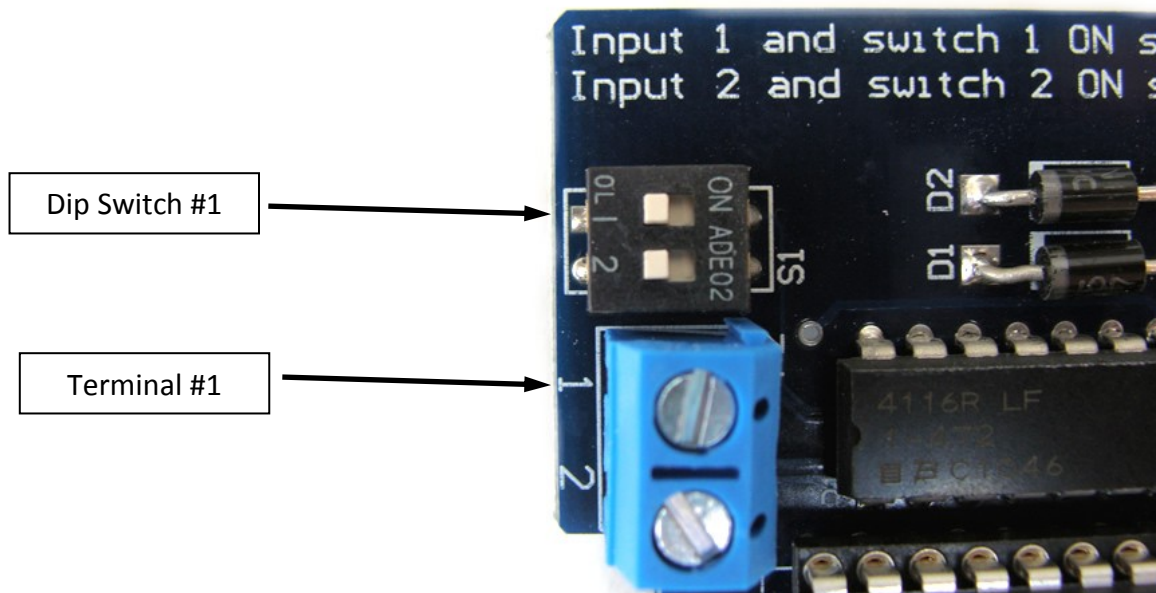
# Quick Reference for User Adjustments

| Mid/High Boost Fuel | |
|---|---|
| Change to WOT fuel | Number on scantool |
| +18.0% | 151 |
| +17.2% | 150 |
| +16.4% | 149 |
| +15.6% | 148 |
| +14.8% | 147 |
| +14.1% | 146 |
| +13.3% | 145 |
| +12.5% | 144 |
| +11.7% | 143 |
| +10.9% | 142 |
| +10.2% | 141 |
| +9.4% | 140 |
| +8.6% | 139 |
| +7.8% | 138 |
| +7.0% | 137 |
| +6.3% | 136 |
| +5.5% | 135 |
| +4.7% | 134 |
| +3.9% | 133 |
| +3.1% | 132 |
| +2.3% | 131 |
| +1.6% | 130 |
| +0.8% | 129 |
| 0.0% | 128 |
| -0.8% | 127 |
| -1.6% | 126 |
| -2.3% | 125 |
| -3.1% | 124 |
| -3.9% | 123 |
| -4.7% | 122 |
| -5.5% | 121 |
| -6.3% | 120 |
| -7.0% | 119 |
| -7.8% | 118 |
| -8.6% | 117 |
| -9.4% | 116 |
| -10.2% | 115 |
| -10.9% | 114 |
| -11.7% | 113 |
| -12.5% | 112 |
| -13.3% | 111 |
| -14.1% | 110 |
| -14.8% | 109 |
| -15.6% | 108 |
| -16.4% | 107 |
| -17.2% | 106 |
| -18.0% | 105 |

| Spark timing | |
|---|---|
| Change to timing | Number on scantool |
| +8.1° | 151 |
| +7.7° | 150 |
| +7.4° | 149 |
| +7.0° | 148 |
| +6.7° | 147 |
| +6.3° | 146 |
| +6.0° | 145 |
| +5.6° | 144 |
| +5.3° | 143 |
| +4.9° | 142 |
| +4.6° | 141 |
| +4.2° | 140 |
| +3.9° | 139 |
| +3.5° | 138 |
| +3.2° | 137 |
| +2.8° | 136 |
| +2.5° | 135 |
| +2.1° | 134 |
| +1.8° | 133 |
| +1.4° | 132 |
| +1.1° | 131 |
| +0.7° | 130 |
| +0.4° | 129 |
| 0.0° | 128 |
| -0.4° | 127 |
| -0.7° | 126 |
| -1.1° | 125 |
| -1.4° | 124 |
| -1.8° | 123 |
| -2.1° | 122 |
| -2.5° | 121 |
| -2.8° | 120 |
| -3.2° | 119 |
| -3.5° | 118 |
| -3.9° | 117 |
| -4.2° | 116 |
| -4.6° | 115 |
| -4.9° | 114 |
| -5.3° | 113 |
| -5.6° | 112 |
| -6.0° | 111 |
| -6.3° | 110 |
| -6.7° | 109 |
| -7.0° | 108 |
| -7.4° | 107 |
| -7.7° | 106 |
| -8.1° | 105 |

| Initial Boost Duty Cycle | |
|---|---|
| Change to DC | Number on scantool |
| +20% | 151 |
| +15% | 138 |
| +10% | 126 |
| +5% | 113 |
| 0% | 100 |
| -5% | 87 |
| -10% | 74 |
| -15% | 62 |
| -20% | 49 |

| Target Boost (3 Bar MAP) Varies with barometric pressure | |
|---|---|
| Target PSI | Number on scantool |
| 29 | 245 |
| 28 | 239 |
| 27 | 233 |
| 26 | 228 |
| 25 | 222 |
| 24 | 216 |
| 23 | 211 |
| 22 | 205 |
| 21 | 199 |
| 20 | 194 |
| 19 | 188 |
| 18 | 182 |
| 17 | 176 |
| 16 | 171 |
| 15 | 165 |
| 14 | 159 |
| 13 | 154 |
| 12 | 148 |
| 11 | 142 |
| 10 | 137 |

| Target Boost (2 Bar MAP) Varies with barometric pressure | |
|---|---|
| Target PSI | Number on scantool |
| 14 | 125 |
| 13 | 115 |
| 12 | 106 |
| 11 | 97 |
| 10 | 88 |