Overview of Features

Convenient 2 5/8” round gauge package for easy Dash or Gauge Pod mounting
No Laptop, PC or Palm Pilot necessary for programming (except for super user features)
Programming via rotary knob with push button detent for ‘enter’ function
Programmable base timing curve in 100RPM and 1DEGREE increments (via PC)
Programmable base timing curve in 200RPM and 1DEGREE increments (via Knob)
Constant RPM and Ignition Timing display
Programmable Vacuum Advance (Knob and PC) global base curve advance only
Programmable Boost Retard (Knob and PC) global base curve retard only
Internal 2BAR MAP sensor (Knob and PC)
Rev Limiter for engine safety with programmable threshold (Knob and PC)
Built in Shift Light with programmable threshold (Knob and PC)
Brightness control (via Knob only when engine is running)

SUPER USER Features (PC only):
Number of cylinders (defaults to product ordered).
Base Timing (defaults to 10DEG).
Maximum allowable timing advance (defaults to 50DEG).
Closed Loop Rpm Threshold (timing defaults to base timing until 400rpm).
Mounting

For best results mount in a visible location. Use standard gauge mounting methods (in your dashboard, or a gauge pod, or a gauge bracket) inside the passenger compartment. Although the Timing Computer is treated to be weather resistant it CANNOT tolerate under-hood or on-hood environments.

If you must bend the wires that come out of the back please observe the following guidelines.
Connect the MAP sensor port shown in the photo below
Vehicle already equipped with 7 Pin (Large Diameter Cap)

**Wiring**

Disconnect the Negative Battery Terminal.
Connect the power wire to a 12v source that is fused and switched.
Drill a ½” hole in the firewall.
Feed the grey cable through the hole.
Feed the vacuum hose through the hole.
Install the pins into the weather-pack connector, wired as follows A=EST  B=Reference  C=Bypass  D=Ground see photo below
Plug the weather-pack connector into the distributor’s weather-pack connector.
Reconnect the Negative Battery Terminal
**Power Up**

Turn on your ignition **without** cranking the engine.  
The display should read 5 then 4 then 3 then 2 then 1  
Then the display will go blank until you start programming or start cranking  

*Programming*  
See the ‘Programming via Knob’ or ‘Programming via Serial Port’ sections.  

**Prepare to Start your Engine!**  
Note to simplify the next steps you may want to program a flat timing curve then disconnect and plug the map sensor hose.  
Connect a timing light to the engine and battery  
Start your engine. If the engine doesn’t start verify the wiring.  
Verify that the timing you see on the Timing Computer matches the timing light  
If it doesn’t match then your base timing is probably wrong. It should be corrected by either;  
rotating the distributor or changing the ‘Base Timing’ super user setting. Note you can unplug the Timing Computer from the distributor and run the engine, then use the timing light to note the timing at idle. This timing should match the base timing setting (usually 10 degrees).
Vehicle NOT equipped with 7 Pin (Large Diameter Cap)

Distributor Installation
Locate a new or used (in good condition) large diameter HEI distributor with cap, coil and module. IT MUST BE A 7 PIN MODULE WITH THE ADDITIONAL WEATHER PACK CONNECTOR HANGING OUT OF IT AND NO VACUUM ADVANCE CANISTER. The older 4 pin module with a vacuum advance canister, weights and springs, will NOT work. NOTE some GMC trucks came with the 7 pin module AND a vacuum canister. No testing has been done at this time.

With the engine off rotate the crankshaft and set Cylinder One to 10 degrees before top dead center.
Install the distributor and align the magnetic pickup (you can feel a slight detent)
Whichever post the rotor is pointing should get spark plug wire for cylinder 1
The remaining firing order should be wired clockwise around the distributor cap
Wire Switched +12volt power to the BAT terminal
Follow the instructions listed in the previous section.
8pin GM HEI Timing Computer Instructions

Wiring
Disconnect the Negative Battery Terminal.
Connect the power wire to a 12v source that is fused and switched.
Drill a 1” hole in the firewall.
Feed the metri-pack connector and cable through the hole.
Feed the vacuum hose through the hole.
Plug the metri-pack connector into the distributor’s metri-pack connector.
Reconnect the Negative Battery Terminal

Power Up
Turn on your ignition without cranking the engine.
The display should read 5 then 4 then 3 then 2 then 1
Then the display will go blank until you start programming or start cranking

Programming
See the ‘Programming Via Knob’ or ‘Programming Via Serial Port’ sections.

Prepare to Start your Engine!
Note to simplify the next steps you may want to program a flat timing curve then disconnect and plug the map sensor hose.
Connect a timing light to the engine and battery
Start your engine. If the engine doesn’t start verify the wiring.
Verify that the timing you see on the Timing Computer matches the timing light.
If it doesn’t match then your base timing is probably wrong. It should be corrected by either; rotating the distributor or changing the ‘Base Timing’ super user setting. Note you can unplug the Timing Computer from the distributor and run the engine, then use the timing light to note the timing at idle. This timing should match the base timing setting (usually 10 degrees).
**Distributor Installation**

Locate a new or used (in good condition) small diameter HEI distributor with cap, coil and module. IT MUST BE AN 8 PIN MODULE WITH THE TWO METRI PACK CONNECTORS PROTRUDING OUT OF THE SIDE AND NO VACUUM ADVANCE CANISTER. If it is not like this, it will NOT work.

With the engine off rotate the crankshaft and set Cylinder One to 10 degrees before top dead center.

Install the distributor and align the magnetic pickup (you can feel a slight detent)

Whichever post the rotor is pointing should get spark plug wire for cylinder 1

The remaining firing order should be wired clockwise around the distributor cap

Wire the module as shown in the picture above

Follow the instructions listed in the previous section.
**Feature Descriptions**

**TIMING:** the base timing curve for your engine, programmable in 100 rpm (200 via knob) and 1 degree increments. This timing is your Wide Open Throttle (WOT) timing with no vacuum advance or boost retard factored in. WARNING if you skip over an rpm range the timing for that range cannot be guaranteed and can ruin your engine.

**VACUUM ADVANCE:** For normal part throttle driving you can gain fuel economy and throttle response by advancing the timing based on manifold vacuum. It is a simplified algorithm that advances the entire base curve by a percentage of your programmed amount. For example if you program 10 degrees of vacuum advance, then at ‘full’ vacuum (throttle closed) your base curve will be advanced by 10 degrees. At partial throttle your base curve will be advanced a portion of the 10 degrees. NOTE some engines especially ones with big cams and rough idle will never achieve ‘full’ vacuum.

**BOOST RETARD:** If your engine is turbocharged or supercharged you can retard the timing based on boost. It is a simplified algorithm that retards the entire base curve by a percentage of your programmed amount. For example if you program 10 degrees of boost retard, then at 2bar your base curve will be retarded by 10 degrees. At 1.5bar then your base curve will be retarded by 5 degrees.

**REV LIMIT:** To protect your engine set the rev limit to the maximum RPM that you want the engine to turn. Once this RPM is exceeded then sparks are sequentially cut. NOTE if you downshift to the wrong gear, no rev limiter is going to protect the engine.
**SHIFT LIGHT:** If you like to hold gears right up to redline but do not like to lose speed by bouncing off the rev limiter set the shift light RPM slightly below the rev limit. When the shift light RPM is exceeded ALL of the feature LEDs come on to warn you to shift! (shown below)

**SAVE:** To have the desired settings available upon every power-up you can permanently save your settings to EEPROM.

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**Feature Utilization**

**Programming via knob**

Programming can only be done while the engine is not running.  
Power up the Timing computer.  
To select a feature gently press on knob and rotate  
The LED will light up the feature you want to modify  
When you have selected the feature let go of the knob.  
Rotate the knob to change the value of the feature.  
Move onto the next feature by again, gently pressing on knob and rotating  
For Timing Map editing briefly press the knob in to toggle between RPM and Timing  
The highlighted parameter is the one that will change when the knob is rotated  
To Save your new settings permanently select SAVE and press the knob for 5 seconds  
Once saved, the display will flash random segments and turn off.  
If you do not SAVE then your settings will be lost if you cycle power.

**Programming via Serial Port**

For easier control and quicker programming you may want to use a PC.

Run the software. You should get a screen like seen in Appendix C.

Connect the Timing Computer serial port to the PC’s Comm1

Note PC communication is not functional above idle (closed loop RPM)

Press the read button to get the present settings

Edit the settings according to your preference (Danger: you can damage your engine)

All RPMs are in hundreds (for example 55 = 5500RPM)

All timings are in degrees before top dead center (10 = 10° BTDC)

All Map Sensor settings are in 8bit ADC counts (1BAR approx = 128)

Once editing is completed press the Write button (this is not permanent)

To permanently save the new settings press Save

SUPER USER Features (PC only):

Max RPM: 99 stands for 9900. Please do not change this. It hard limits all engine calculations.
Operation above this or especially above 10000rpm will yield very erratic results

Dwell: Percentage of off time versus on time for coil energy build up. Even though the HEI module limits to 6amps you can still ruin your coil by changing this.

Base Timing: Like GM the base timing should be 10 degrees. Changing this is a simple way to advance or retard the whole curve but that should not change more than 5 degrees either way because rotor phasing will be affected. Also note negative values wont work. Also note this affects limp home mode.

Max Timing: Hard caps the vacuum advance from advancing too far.

cLoopRpm: is the RPM where the timing computer takes over ignition timing. Increasing it is useful with cams that prohibit low idle RPMs.

maxVac is the 8bit ADC value at which the MAP sensor no longer advances.

minVac is the 8bit ADC value at which the MAP sensor will not start affecting advance mainly for hysteresis purposes when pegging is not successful.

minBoost is the 8bit ADC value at which the MAP sensor will not start affecting retard, mainly for hysteresis purposes when pegging is not successful.

vBattHigh is 8bit ADC representation of battery voltage used in hysteresis of compensating dwell for less energy..

vBattLow is 8bit ADC representation of battery voltage used in hysteresis of compensating dwell for more energy.

nbOfCyls is used if the timing computer is moved to an engine with more or less cylinders. This feature is not supported yet and default to the product ordered.

bankSpace is the number of degrees between firings which is useful in odd fire engines but it is also not supported yet.
**Upgrading Firmware via Serial Port (Bootloader)**

The Timing Computer has a small kernel of software dedicated to upgrading to future releases in firmware. This kernel is known as a ‘Bootloader’. To upgrade firmware do the following….

Download the upgrade from [www.rabidgator.com](http://www.rabidgator.com)

Run your favorite Terminal Emulator on your PC… or Download and install ‘Tera Term Pro’ from [http://hp.vector.co.jp/authors/VA002416/teraterm.html](http://hp.vector.co.jp/authors/VA002416/teraterm.html) Note you can use ‘Hyper Terminal’ (supplied with Windows) but it is much more confusing than Tera Term Pro.

Run Tera Term Pro and configure the opening screen as follows, with your comport.

![Tera Term: New connection](Image)

and press OK

Connect the PC COMport to the Timing Computer via the serial cable

Ground the Green pigtail hanging out of the serial port connector.

Power down the Timing Computer

Power up the Timing Computer.

The Terminal Emulator will show the following prompt.

![Tera Term - COM1 VT](Image)

Rabid Gator Bootloader

a) Erase Flash
b) Program Flash
c) Set Baud Rate


Press ‘a’ to ‘Erase Flash’ Five seconds later you will get the prompt back like this:

![Tera Term - COM1 VT](image1)

If you get an error message, cycle power and start over.
If error message persists contact Rabid Gator.

Then Press ‘b’ to ‘Program Flash’ it will prompt you for the file like this

![Tera Term - COM1 VT](image2)
Then select File / Send File… select the .s19 file you downloaded from rabidgator.

While downloading it will look like this

When done it will look like this

You have Successfully downloaded new firmware!

Remove the ground from the pigtail and cycle power.
APPENDIX A: Troubleshooting and Error Codes

If you are experiencing technical difficulty you may simply unplug the Timing Computer from the distributor. The HEI module will default to a limp-home timing curve between 10 and 20 degrees BTDC.

If you see an error code displayed here is the following meaning:

Err1 is an incomplete serial message was received by the serial port and it timed out.

Err 2 is a write/save to the EEPROM timed out.

Err 3 is an error occurred writing to the EEPROM
APPENDIX B: Knob Editing Example photos

*Programming the Base Timing Curve via knob*

Press the knob in and rotate until the LED is lit. In the photo below notice the 400 RPM is brighter than the 10 degrees. This means the RPM can be changed and the timing for the associated RPM will be displayed.

To edit the timing press the knob in briefly (just tap it) and timing will be brighter than RPM and it will look like the photo below. Now you can change timing.
Programming the Vacuum Advance via knob

Press the knob in and rotate until the LED is lit. Notice the 10 degree timing is bright and changeable. This means the whole base curve will be advanced by 10 degrees at full vacuum. The RPM displayed is irrelevant.
**Programming the Boost Retard via knob**

Press the knob in and rotate until the LED is lit. Notice the 10 degree timing is bright and change-able. This means the whole base curve will be retarded by 10 degrees at full boost (2BAR). The RPM displayed is irrelevant.
Programming the Rev-Limiter via knob

Press the knob in and rotate until the LED is lit. Notice the 8700 RPM is bright and change-able. This means the engine will be rev-limited at 8700 RPM. The timing displayed is irrelevant.
Programming the Shift Light RPM Activation via knob

Press the knob in and rotate until the LED is lit. Notice the 6000 RPM is bright and change-able. This means the shift light will be activated at 6000 RPM. The timing displayed is irrelevant.
Saving your values via knob

Press the knob in and rotate until the LED is lit. Notice both RPM and Timing are dim. This means nothing is change-able. If you then hold the knob in for 5 seconds you will permanently save all your Timing and RPM settings to EEPROM.
all communications will take place at 38.4k baud, No Parity, 1 Start and Stop bits.

Write = send parameters to RAM, the first step of applying new values.

Save = copy parameters from RAM to EEPROM for permanent use.
APPENDIX D: Legal and Glossary of Terms

GM and HEI are trademarks of General Motors Corporation

ADC = Analog to Digital Converter, converts real world signals into digital representation.

1BAR = one atmosphere approximately the pressure at sea level

BTDC = piston position Before Top Dead Center

EEPROM = storage memory that will be remembered if power is removed

HEI = High Energy Ignition

Hysteresis = the middle point of no change in activity.

LED = Light Emitting Diode, in this case red or green lights.

MAP = Manifold Air Pressure Sensor, an expensive device that converts engine vacuum or boost to an analog signal.

RAM = memory that will be lost if power is removed.

Rotor Phasing = where the rotor is pointing at the time of spark creation, relative to where the high voltage wire terminal is located. Optimally the rotor is pointing directly at the terminal but with EST it is always a compromise.

RPM = revolutions per minute

All the information here in is believed to be true.