

MS-Digital Software Instructions

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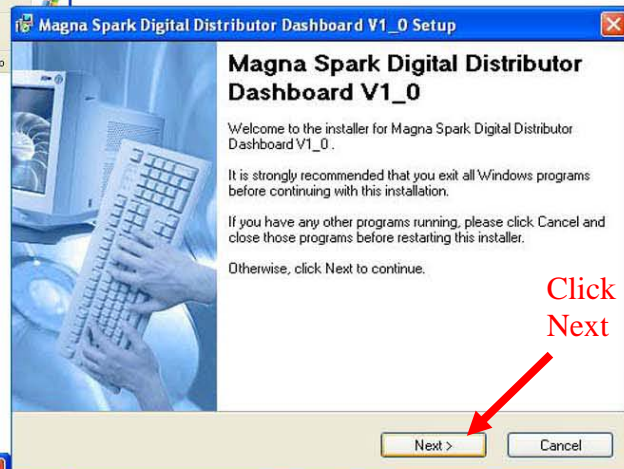
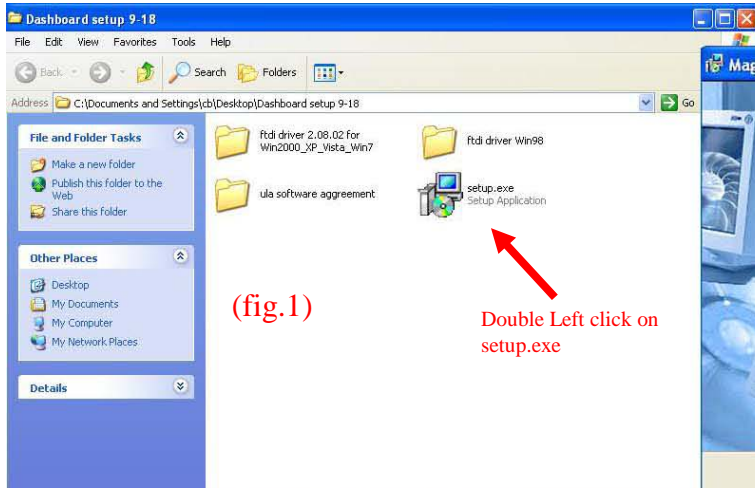
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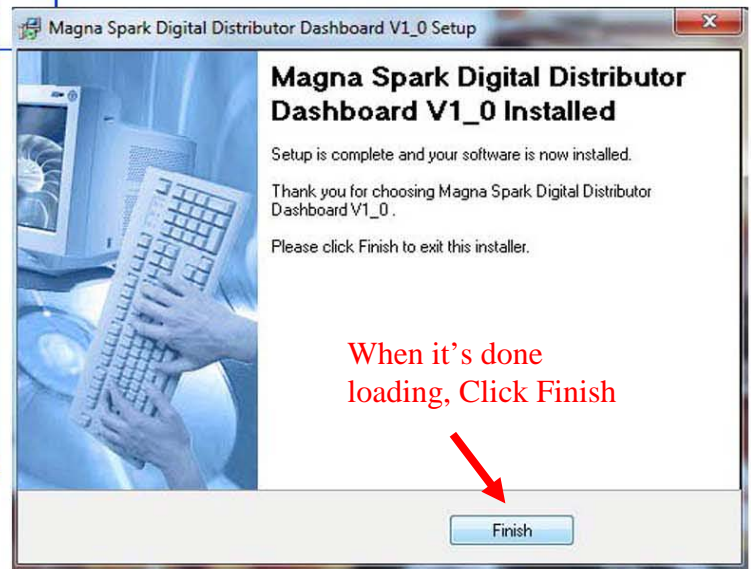
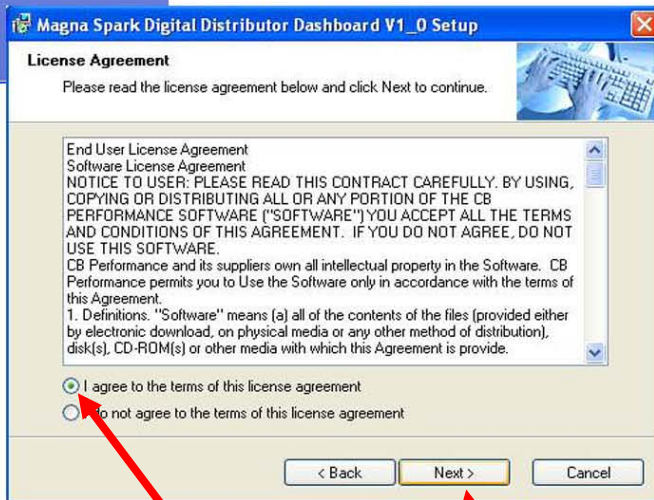
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Step-1 Installing MagnaSpark Digital Dashboard.

Insert the CD provided with your MS-Digital kit. The CD should auto load, if it doesn't then double left click on My Computer and find your CD/DVD drive and double left click to open it. Find setup.exe and double left click on it. (fig.1). After setup loads, go through the proper steps to load the software. (fig.2) When you are done left click finish and your software will be ready to run. (fig.3)



(fig.2)



(fig.3)

Step-2 Establishing communication

Attach your USB/Serial converter to the black MS-digital serial cable. Plug the cable into the MS-Digital distributor and the other end into your laptop computer. Turn your ignition switch on. Double left click the MS-Digital Icon on your desktop. The MS-Digital dashboard will open and attempt to establish a connection with the distributor. When the dashboard establishes a connection with the distributor, it will show “connected” on the bottom right corner. If you turn off your ignition switch or unplug your communication cable, the dashboard will continue to search for the distributor. Once the key is turned on or the communication cable is re-attached the dashboard will re-connect to the distributor. In some situations, you may need to left click on the connect button to re-establish communication with the distributor. The connect button is located on the bottom right corner of the dashboard.(fig.4)



Step-3 Selecting proper dipswitch location

Your MS-Digital distributor is shipped with four pre loaded timing maps. Two of these timing maps are for forced induction applications and two are for normally aspirated applications. These four timing maps are fixed and cannot be removed. You also have the option of loading up to four of your own timing maps into the MS-Digital distributor.

There are four dipswitches located under the distributor cap. These dipswitches can be selected in different configurations allowing you to choose what timing map you would like to use. Below is a table showing dipswitch/timing map locations.

User set position #1- Dipswitch position 3on, 1-2-4 off

User set position #2- Dipswitch position 1-3 on, 2-4 off

User set position #3- Dipswitch position 2-3 on, 1-4 off

User set position #4- Dipswitch position 1-2-3 on, 4 off

Fixed normally aspirated position#5- Dipswitch position 1-2-3-4 off

Fixed normally aspirated position#6- Dipswitch position 1 on, 2-3-4 off

Fixed Turbo/Blown position#7- Dipswitch position 2 on, 1-3-4 off

Fixed Turbo/Blown position#8- Dipswitch position 1-2 on, 3-4 off

After you select a timing map, the dipswitch position will appear on the top left corner of your dashboard. This will allow you to know what file you have loaded into your distributor.

Using the Dipswitches to select a timing map

It is VERY important to turn off your ignition before selecting a dipswitch position.

After you select a dipswitch position, turn on the ignition switch. Your MS-Digital dashboard will re-establish a connection with the distributor. The dipswitch position you chose will appear on the top left corner of your dashboard. This will allow you to know what file you have loaded into your distributor.

Step-4 Creating and loading your own timing map.

When you order your MS-digital distributor, CB performance will set the dipswitch location that fits your engine configuration. You can choose to run the selected timing map, choose one of the other three fixed timing maps or create one of your own timing maps using one of the “fixed” timing maps as a template.

How to create your own timing map

- 1) Once the MS-Digital software is opened, it automatically reads and downloads all information from the distributor to the dashboard. If you want to create your own timing map, you can use the current map on your dashboard or you can select one of the other three “fixed” maps in the distributor.
- 2) To select a different “fixed” map, remove the distributor cap and locate the 4 dipswitches. Select the proper dipswitch sequence for the file you want to use. If you are unsure about the dipswitch locations, go to “view” on the top of the dashboard. (fig.5) Left click on “Dip-Switch Chart” for the proper Dipswitch location. (fig.6)

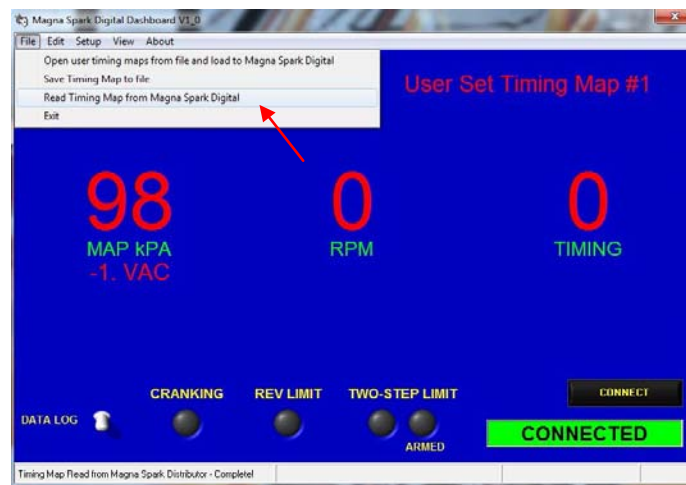


(fig.5)

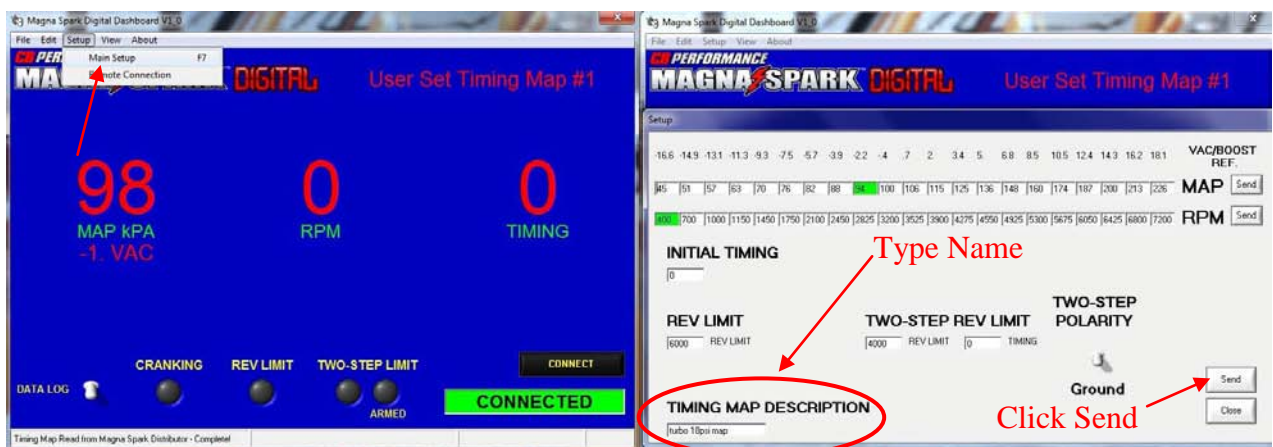


(fig.6)

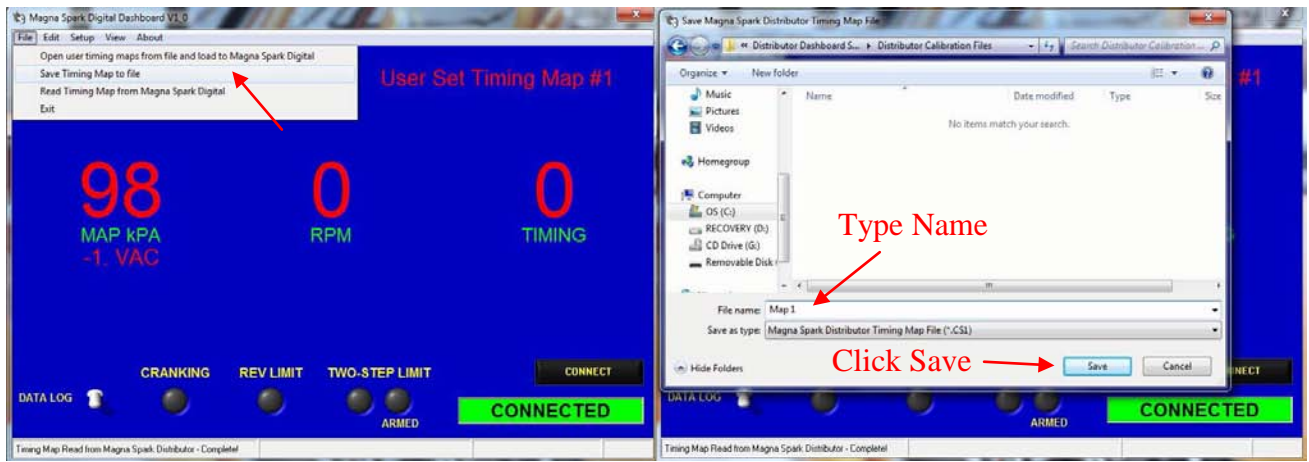
- 3) Go to “file” on the top left corner of the dashboard and left click “read file from Magna Spark digital” The software will download the file. (fig.7) You can now create your own timing map using the “fixed” map you chose as a template. After you have finished creating your map, go to “set up” and click on “main set up” At the bottom of the main set up page there is a window for the name of your new timing map. Once you name your new map, click send. (fig.8) After clicking “send” you can save the map to file if you like. To do this, go to “file on the top of the dashboard and left click on “save timing map from Magna Spark Digital.” Give your new file the same name you used in the main set up screen. After naming the file, click save. Your file is now saved for future use. (fig.9)



(fig.7)



(fig.8)



(fig.9)

Loading Timing Map to MS-Digital distributor

After creating and saving a file you can load that file into the MS-Digital distributor.

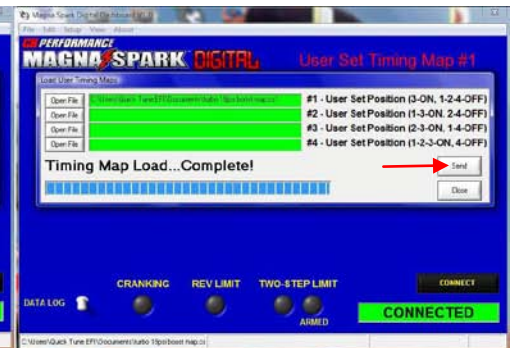
- 1) To load a file into the MS-digital distributor, go to “file” on the top left corner of the dashboard. Left click on “Open user timing maps from file and load to Magna Spark digital. (fig.10)
- 2) Left click on “open” next to the dipswitch location you want the file loaded to. Select the file you created and click “open” (fig.11)
- 3) After opening the file you want to load into the MS-Digital distributor, click “Send” The MS-Digital software will tell you when the file is loaded into the Distributor completely. (fig.12)



(fig.10)



(fig.11)



(fig.12)

Step-5 Selecting load and RPM boundaries

An important step for creating a timing map is understanding how load effects an engine. All engines create vacuum. When an engine has a light load such as idling or cruising down a highway, it will create high vacuum. When you depress the throttle while taking off from a stop sign or driving up an incline your engine has a higher load and vacuum decreases. Engines will show no vacuum under wide-open throttle situations. Once you know the vacuum characteristics of your engine, you can design a timing map that optimizes your engines performance.

A) KPA and Vacuum

Kilopascals or “KPA” is a metric measurement of vacuum. To easily understand this think of millimeters compared to inches. ¼ inch is the equivalent to 9.84 millimeters. 10 inches of vacuum is equivalent to 67 KPA.

Most normally aspirated dual carbureted/throttle body engines create between 8-13 inches of vacuum or 74-57 KPA at idle. Normally aspirated single carbureted engines will create between 15-22 inches of vacuum at idle or 50-27KPA.

Camshafts with high degrees of duration will decrease an engine’s vacuum/KPA at idle. Engines with drag race camshafts can idle between 4-10 inches of vacuum or 88-67 KPA. Normally aspirated engines will have zero vacuum or 101.32 KPA while under extreme load or wide-open throttle situations.

You will notice above the load boundaries in the “main set up” page of the MS-Digital software are KPA values converted into inches of vacuum. The MS-Digital software will convert your KPA to vacuum once you enter a vacuum value and click send.

Below is a conversion formula for converting KPA to inches of vacuum.

KPA to Inches of vacuum conversion formula

$$\text{KPA} - 101.32 \times .295 = \text{inches of vacuum}$$

Example: $58\text{kpa} - 101.32 = 43.32$ $43.32 \times .295 = \mathbf{12.77 \text{ inches of vacuum.}}$

B) KPA/Boost pressure on Turbo/Blown engines

Boosted or blown engines also create vacuum while idling and cruising. When a turbo charged engine experiences load, the turbo will generate boost pressure. KPA is also a measurement of boost pressure. 15psi of boost pressure is equal to 204.67KPA.

KPA to Positive Pressure/Boost conversion formula

$$\text{KPA} - 101.32 / 6.89 = \text{Boost/PSI}$$

Example: $204.67 - 101.32 / 6.89 = 15\text{psi Boost pressure}$

Step-6 Selecting load boundaries

1- Left click on Set Up on the top of the dashboard. After clicking on setup, left click on Main Set Up. Once in main set up you will see the Vacuum/KPA load boundary zones and the RPM boundary zones. There are 21 vacuum/kpa boundary zones and 21 RPM boundary zones

- A) The load boundaries work from left to right. Left being the highest vacuum/KPA to right being the least vacuum/KPA. A easier way to visualize the load boundaries is idle on the left side to wide open throttle on the right side.
- B) Decide what KPA you think your engine will idle at. Starting in the first load zone, type in your idle KPA. On normally aspirated engines, type in 100KPA in the farthest right load zone. You will have 19 load zones left that need to be filled in. An easy way to do this is to subtract your idle KPA from your wide-open throttle KPA.

(fig.13)

Example: Idle KPA of 43

subtracted from wide-open throttle of 100 is 57KPA. 57KPA divided by your 19 load zones equals roughly 3KPA per zone. In your second load zone, type in 46KPA, followed by 49KPA in the third. Keep filling in load zones by 3KPA until you reach your wide-open throttle load zone of 100. (fig.13)

Selecting load Boundaries for Turbo/Blown engines

Since forced induction engines have vacuum and boost, your load boundaries will need to incorporate both. Following the same example as Normally aspirated engines, type in your idle KPA in the first load zone. In the last load/boost zone type in your max boosted KPA. This will leave you with 19 load/boost zones to fill in. A good starting point for setting up your vacuum/boost zones is to divide them in half. This will give you 10 vacuum zones and 9 boosted zones.

A) **Example:** Idle KPA of 60 subtracted from 100 is 40 KPA. A very important thing to remember on boosted timing maps is the point or “thresh hold” were your engine goes from vacuum to boost is 100 KPA. This leaves you with 40 KPA to divide by 10 vacuum zones. 40 KPA divided by 10 equals 4 KPA per zone. Starting in the second from the left zone, type in 64 KPA, followed by 68 KPA in the third until you reach 100 KPA.

B) You now have to fill in your boosted zones. Subtract you maximum boosted zone KPA from 100 KPA.



Example: Your maximum boosted zone is 181 KPA. Subtract your maximum boosted KPA of 181 from 100, this leaves you with 81 KPA to divide by your 9 boosted zones. 81 KPA divided by 9 equals roughly 9 KPA per zone. Starting after your 100 KPA zone, type in 109 KPA followed by 118 KPA until you reach your maximum boosted zone of 181 KPA.

(fig.14)

(fig.14)

Load boundaries do not necessarily have to be spaced evenly though out the boundary zones. You can have load boundaries closer at lower rpm's and spaced farther away at higher RPM's or vice versa, whatever works out best for your application.

IMPORTANT: After completing your Load boundary zones, click on “send” at the right end of the load boundary row.

Selecting RPM Boundaries

Note: the first RPM boundary is fixed at 550rpm. This zone is required for cranking rpm during start up. Do not attempt to change this boundary zone.

Selecting RPM boundaries is very simple. A good starting point for your first RPM boundary is 1000RPM. Engines that have long duration camshafts that need to idle at a higher RPM might need a higher RPM for the first boundary. Select what maximum RPM you think your engine will reach and type it in the last RPM zone. This leaves you with 18 RPM boundaries to fill in. **RPM boundaries do not necessarily have to be spaced evenly though out the boundary zones. You can have RPM boundaries closer at lower rpm's and spaced farther away at higher RPM's or vice versa, whatever works out best for your application.**

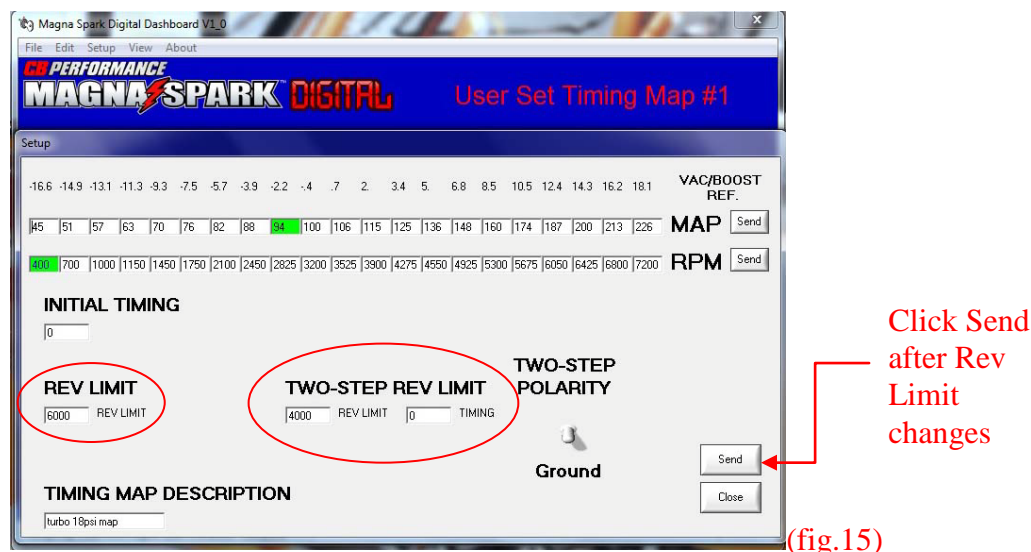
A) **Example:** Your first rpm boundary is set at 1000 RPM. Your last boundary is set at 6400 RPM. Subtract your idle rpm from your maximum rpm. This leaves you with 5400 rpm's. 5400 rpm's divided by 18 equal 300 rpm's per zone. Starting in the 2nd zone from the left, type in 1000rpm, in the third zone type in 1300rpm and so on until you reach your maximum rpm of 6400.

IMPORTANT: After completing your RPM boundary zones, click on “send” at the right end of the RPM boundary row.

Step 7- Rev Limit and Two Step rev limit

Your MS-Digital distributor has a built in Two-Step rev limiter and high rpm rev limiter.

- 1) To set your Two-Step rev limit and high rpm rev limit, go to “set up” on the top of the dashboard. Left click on “main set up”. Once in main set up you will be able to set your desired rpm for the Two-Step and high rpm rev limit, Simply type in what rpm you want and click “send” the information will be downloaded into the MS-Digital distributor (fig.15)



Fixed timing while Two Step is energized option

In the “main set up” of the dash board there is a fixed timing window for the two-step rev control. This feature allows you to have a lower degree of timing while on the two-step. Lowering the degrees of timing while on the two-step helps to generate boost on drag race starts. You can run as little as 0 degrees of timing in the fixed timing window. This feature is only useful in forced induction applications.

Two Step polarity

You can change the polarity for your two-step button located in your vehicle from a ground trigger or a 12volt trigger. To select a polarity left click on “set up” on the top of the dashboard. Left click on “main set up” You will see a toggle switch on the lower right side of the main set up page. By clicking on the toggle switch, you can change the polarity from a ground input trigger to a 12volt input trigger. When the Two-step rev limit is triggered, the two-step LED on the dashboard will illuminate red. Also, if you reach your high rpm rev limit, the high rpm rev limit LED will illuminate red.

IMPORTANT: You must click on “send” after selecting a two step and high rpm rev limit and two step polarity.

Step-8 Initial timing

You will need to decide what you want your initial or “base” timing to be. After deciding what base timing you want, go to the “set up” page on the top of the dash board. Left click on “main set up”. Here you will see the initial Timing window. Type in the degrees of initial timing you plan on running.

NOTE; When setting up your timing map, it is important to have your idle timing or “base” timing match the degrees of advance you selected for initial timing in the main set up page.

IMPORTANT: You must click on “send” in the lower right corner of the main set up page after selecting your base timing.

Step-9 Setting up your spark table

After you have finished selecting your Load/RPM boundaries and initial timing, it is time to set up your spark table. To set up your spark table, left click on “edit” on the top of the dashboard (fig.16) Here, You will be able to create your spark table. Notice that on the top of the spark table from left to right is your load and from top to bottom on the left side is rpm. As load increases, the green cursor will move from left to right. Under deceleration, vacuum increases and the green cursor will move from right to left.

As RPM increases, the green cursor will move from top to bottom and as RPM decreases, the green cursor will move from bottom to top.



(fig.16)

1) Getting started making your own timing map

A) The easiest way to make a timing map is to start with your initial or “base” timing. If your load and RPM boundaries are set up correctly, your engine will idle in the top left hand corner of the timing map. You will notice the green cursor “floating” in the load and rpm area your engine is idling at. This is the area were you want to fill in your initial timing or “base” timing. Notice the green cursor and were it “floats” try to keep your initial timing the same in this area. This will give you very stable timing at idle.

Cruising degrees of advance

A) After initial timing is selected in the timing map, you can start working on your cruising areas. Most normally aspirated engines like to cruise from 28-34 degrees of timing. You will have to experiment what works best for your engine. A good rule of thumb is to have your maximum cruising degrees of timing in by 2500-3000 rpm. Again, you will have to experiment for what works best for your engine. You want to blend your degrees of advance smoothly from idle to cruising. This will create very smooth acceleration from take off. You can “ramp” your timing from idle to cruising very quickly or slowly. Lower compression engines like more aggressive timing “ramps” from idle to cruising. This gives them smoother take off without the chance of detonation. High compression engines like a slow, gradual timing ramp from idle to higher RPM’s. This will decrease the chance of detonation caused by excessive degrees of advance at low RPM’s.

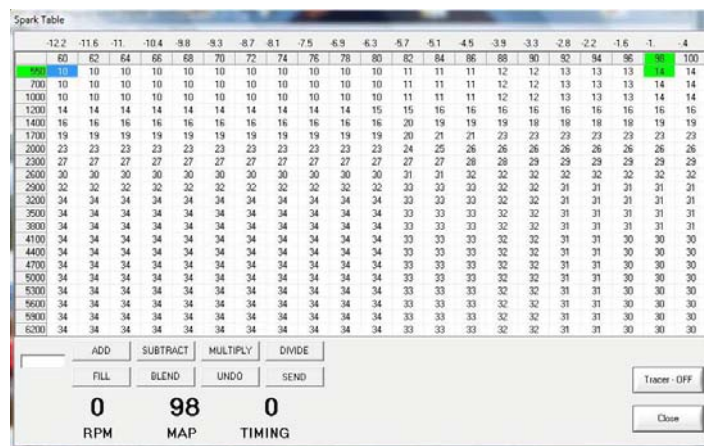
Note: You must click on the “send” key after making any changes in the spark table. This will send the information to the MS-Digital distributor.

Wide-Open Throttle/high load degrees of advance

A) When your engine goes to wide-open throttle or a high load condition, it will loose vacuum. You will notice that the green cursor in your timing map will move from left to right as load increases. In lower RPM/high load areas, it is important to **NOT** have too much degrees of advance. Too much timing at low rpm will create detonation with the chance of damaging your engine. At high rpm’s, it is much safer to have higher degrees of timing.

Normally aspirated engines respond in different ways to timing under high RPM/ wide-open throttle conditions. Some higher compression engines like to have less degrees of timing at high RPM/Wide-open throttle than at cruising. Some low compression engines like more degrees of timing under high RPM/wide-open throttle conditions. You will have to experiment on what works best for your application. Be very careful when designing your spark table. Too much degrees of timing can damage your engine. If you here detonation, adjust your spark table accordingly. (fig.17)**Note: You must click on the “send” key after making any changes in the spark table. This will send the information to the MS-Digital distributor.**

(fig.17)



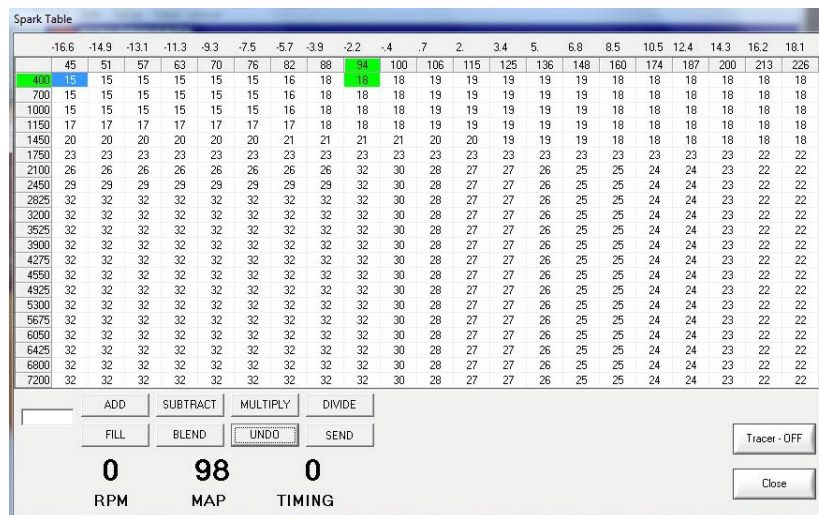
Forced induction Timing map

Forced induction timing maps resemble normally aspirated timing maps but only under atmospheric conditions. When a turbo charged engine generates boost, you must retard the degrees of timing because of the added cylinder pressure. Too much timing on forced induction engines will produce pre ignition/detonation. Pre ignition/detonation will damage your engine and must be avoided.

Setting up a forced induction timing map.

A) Follow the same principles for setting up a forced induction timing map as a normally aspirated timing map. In the load areas where boost starts to generate, you need to start lowering the degrees of timing. You should start blending the degrees of timing down as boost increases. Most turbo charged engines cruise from 28-32 degrees of timing and start retarding at 11lb of boost. A good starting point is to have from 18-20 degrees of ignition timing while at full boost. The degrees of timing relates to the amount of boost pressure your engine has. Higher boost levels usually require less degrees of timing where lower boost levels require slightly higher degrees of timing. In the spark table, you should blend the timing from cruising to maximum boost smoothly. This will help the turbo generate boost while creating a powerful and smooth horsepower curve. The MS-Digital distributor houses a 2.5 bar map sensor. This will allow you to have full control of ignition timing up to 25psi of boost pressure. After 25psi of boost the timing map will work off it's maximum KPA zone.

For Example; If you have a value of 20 degrees of timing in you 25lb/273.5 kpa area of the timing map, you can still run more boost pressure if you prefer without damaging the MS-Digital distributor. If boost levels go beyond 25psi your degrees of timing will be the value of the 25lb/273.5kpa area of the timing map. (fig.18)

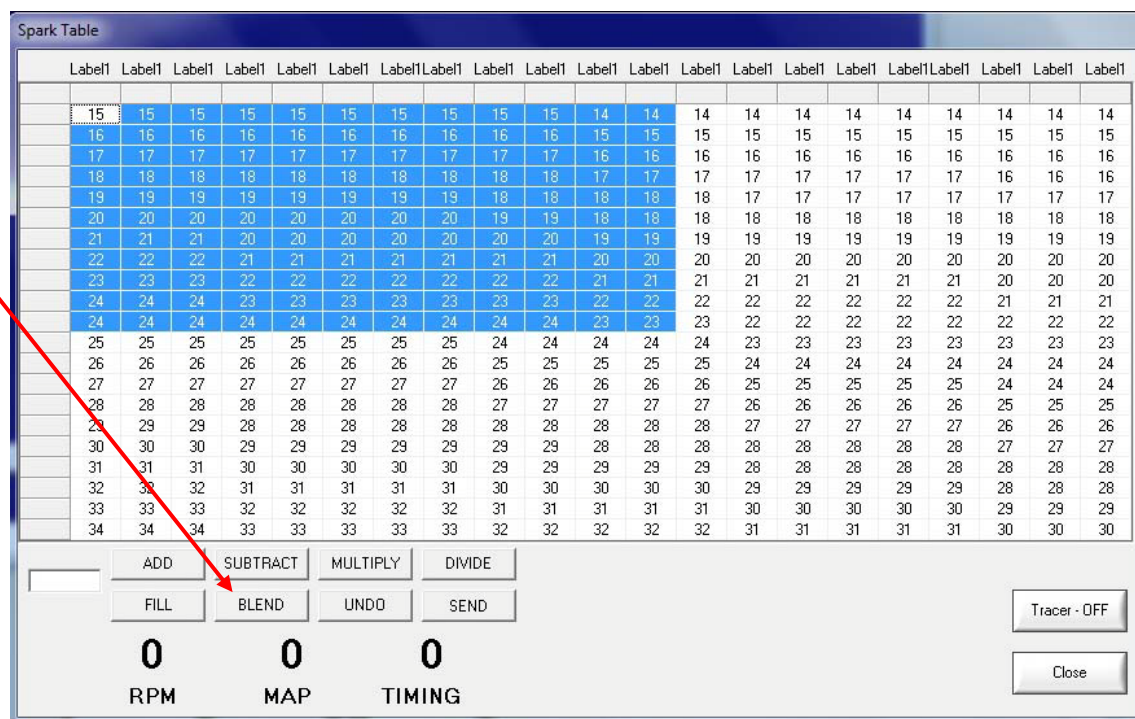


(fig.18)

Step-10 Using math functions in MS-Digital spark table

In the spark table, you will notice the math function keys. These keys help you create a spark table faster with smoother ramps. You can use these keys to “blend” your degrees of timing, multiply, divide, add and subtract. To use these keys, click and drag the area you want to change and click on the math function key you want to use. (fig.19)

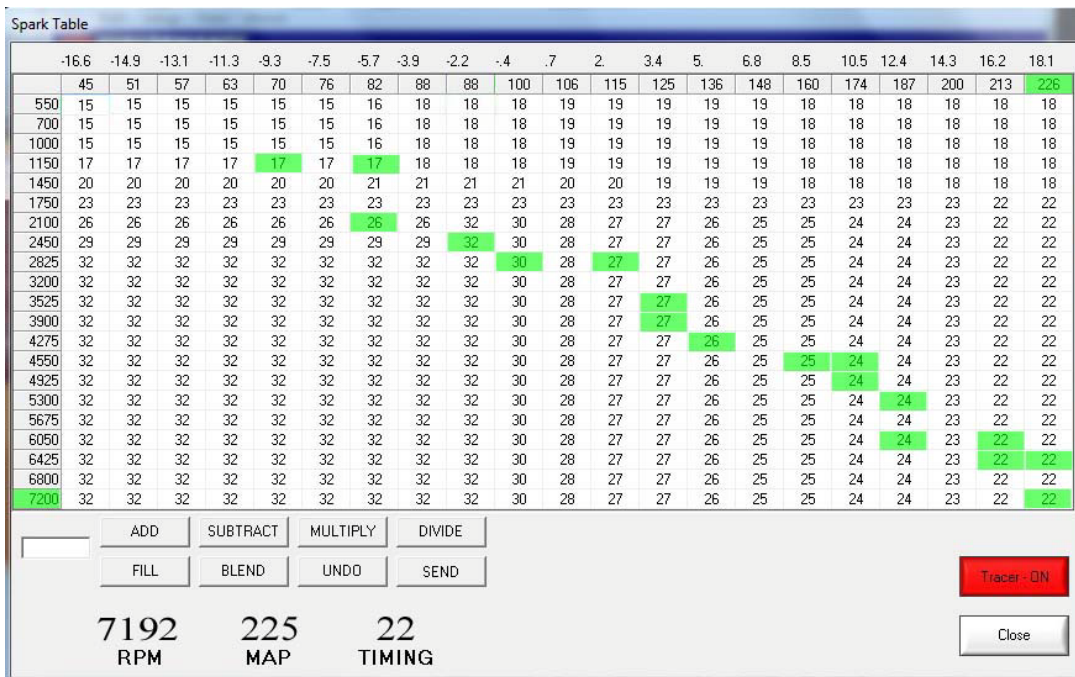
Example:
Highlight the areas you want to blend and click blend. The software will blend the values you have entered.



(fig.19)

Using the Tracer in the spark table

In the spark table there is the tracer key. The tracer highlights where the green cursor travels throughout your timing map. The tracer is a useful tool for knowing the RPM and load your engine travels through during acceleration. This will allow you to create a precise timing map for your engine. To use the tracer simply left click on the tracer button. To clear the trace on your spark table you will need to close and re open the spark table. (fig.20)



Tracer button will turn red when on, simply click again to turn tracer off.

(fig.20)

Step-11 Saving a timing map to file

You can save a timing map to file easily. First, left click on “file” on the top of the dashboard. Left click on “save timing map to file” You will need to enter a name for your timing map. Once you enter your file name, left click on ‘save’ Your timing map will be saved in the MS-Digital dashboard for future use.(fig.21)



(fig.21)

Step-12 Reading timing map from Magna spark digital

You can read the timing map that is loaded into the MS-digital distributor. To do this go to the top of the MS-Digital dash board and left click on “file”. Left click on “read timing map from magna spark digital. The dashboard software will download the information from the MS-digital distributor and populate the dashboard with the information. From here, you can modify the file and reload it into the MS-Digital distributor or save it to file. (fig.22)



(fig.22)

Remote Connection for user support

If you find yourself in need of customer support, you can use this feature of the MS-digital distributor. This feature allows you to go “online” through the Internet for live real time support. To use this feature, you need to have a working Internet connection with good to excellent signal strength. After you have verified a good Internet connection, call CB Performances MS-Digital technicians. A technician can give you a Port# and I.P address to go “online” for real time support. (fig.23)

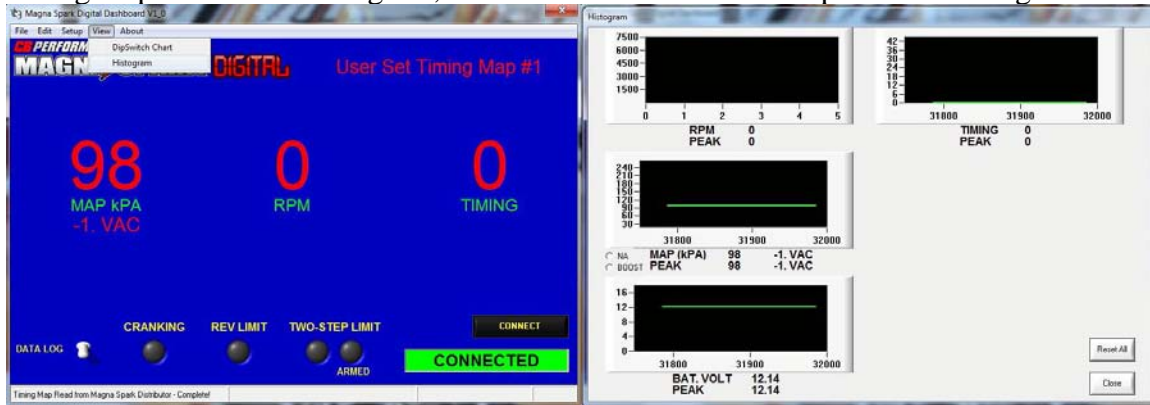
NOTE: THERE IS A \$20.00 CHARGE FOR 15 MINUTES OF ONLINE SUPPORT. YOU WILL BE CHARGED \$20.00 FOR EACH ADDITIONAL 15 MINUTES OF ONLINE SUPPORT.



(fig.23)

Step-13 Histogram, Live data viewing

A useful feature of the MS-Digital distributor is its real time histogram. You can view battery voltage, MAP/vacuum, RPM and timing. This is a helpful tuning tool for setting up or diagnosing your MS-Digital timing map. To view a histogram, left click on “view” on the top of the MS-Digital dashboard. (fig.24)



(fig.24)

Step-14 Data logging

Your MS-Digital distributor is capable of data logging all of it's functions. Data logging allows you to record real time information. This “logged” information is extremely useful for tuning and diagnosing problems. To do a data log file, simply left click on the data log toggle switch located on the lower left side of the dashboard software. (fig.25)

Click on toggle switch to activate data logging. It will turn red. Click again to turn off data logging. It will turn grey when off.



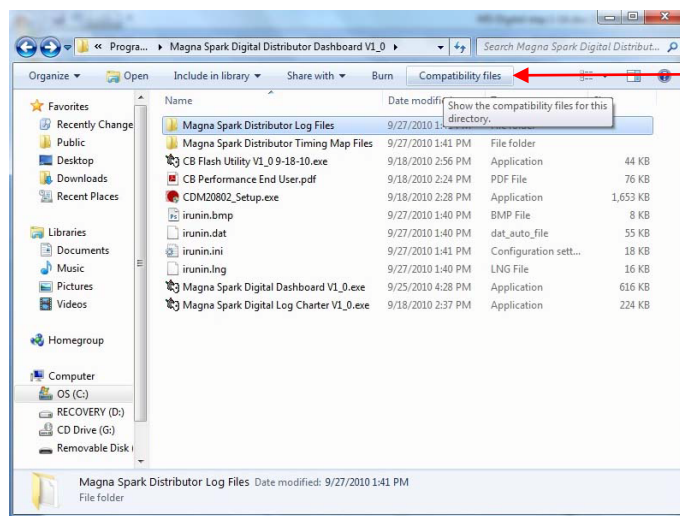
(fig.25)

A) How to retrieve a data log file using Windows XP and older software

Double left click on My Computer, located on the desktop or in the start menu. Double left click on Local Disk C: then double left click on Program Files. Locate the Magna Spark Digital Dashboard folder and double left click on it. Here you will have MS Digital log files folder, double left click on it, when it opens the log files that you have created will be separated in different folders depending on the date recorded.

B) How to retrieve a data log file using Windows Vista and Windows 7.

Double left click on Computer, located on the desktop or in the start menu. Double left click on Local Disk C: then double left click on Program Files. Locate the Magna Spark Digital Dashboard folder and double left click on it. Before going into the log files folder you will need to click on the compatibility files icon located at the top of the window. (See fig. #) When you click on the icon the windows below will show a log files folder, double left click on it and when it opens the log files that you have created will be separated in different folders depending on the date recorded. (fig.26)



Click on
compatibility files to
find logs in
Windows Vista and
Windows 7

(fig.26)

LIMITED WARRANTY

THIS IS A LIMITED WARRANTY - CB Performance Products offers a 12 month limited warranty from date of purchase on all products in the MAGNASPARK II Digital™ line. Certain component parts of the MAGNASPARK II Digital™ kits are limited to a 90 day warranty. Those parts are as follows: Ignition modules, controller boards and magnetic pick-ups. CB Performance Products warrants to the original purchaser of the product that the product and its component parts will be free of defects in material or workmanship for a period of 12 months or 90 days on listed components. This warranty does not apply to products that have been (a) modified or altered in any way; (b) subjected to adverse conditions such as misuse, neglect, accident, improper installation or adjustment, dirt or other contaminants, water, corrosion, or faulty repair; or (c) used in applications other than those recommended by CB Performance Products. CB Performance Products also does not warrant, and disclaims all liability, for products used in racing activities and/or applications other than those specifically recommended in the current CB Performance Products Catalog or website. This Limited Warranty is extended to the original purchaser only and is not assignable or otherwise transferable. There are no warranties which extend beyond those stated herein. CB Performance Products offers no warranties, either express or implied, beyond this Limited Warranty. In the event of an alleged defect in material or workmanship, CB Performance Products' responsibility is strictly limited to repair or replace the defective product.

CB Performance Products has no other obligation either express or implied. Final warranty determination will be at the sole discretion of CB Performance Products. CB Performance Products will not be responsible for: (a) actual or alleged labor, transportation or other incidental charges; or (b) actual or alleged consequential or other damages incurred by use of any product of CB Performance Products.

How to Initiate the Warranty Process

Do not return any MAGNASPARK II Digital™ product to the place of purchase. Contact the CB Performance Products Warranty Center at 559-733-8222. If it is determined that the product must be returned for inspection and evaluation, you will be given an RMA (returned merchandise authorization) number. This number must be visible on the outside of the return package.

Merchandise must be returned prepaid (with a copy of the original sales receipt) and insured. Also include your name, address, phone number, and a complete explanation of the problem. The product must be properly packaged so that no damage occurs in shipment. Ship product to:

CB Performance Products - 1715 N. Farmersville Blvd. - Farmersville, CA 93223

This warranty sets forth specific legal rights. The consumer may have other rights as a result of variations in state or provincial laws. This Limited Warranty supersedes all prior warranty statements.

MAGNASPARK II Digital™ is a product of CB Performance Products, 1715 N. Farmersville Blvd., Farmersville, CA 93223