CB Performance Black Box Parts List

1 – Black Box

1 – Wiring Harness

1 – Serial Cable

1 – Instructional CD

1 – Small Eyelet Terminal

3 – Large Eyelet Terminal

4 – Female Disconnect Terminal

3 – Male Disconnect Terminal

1 – Bosch Lock Out Washer

Step-1 Installing Black Box

1) Bring engine up to TDC for #1 Cylinder. Align rotor with #1 spark plug wire on cap. Rotate the engine to 70 Degrees BTDC. Rotate the distributor counter clockwise until the rotor lines back up with #1 on the distributor cap. V8 and V6 will set their distributor at 0 degrees.
2) Note position of rotor and remove distributor from engine. **Lock out all advance from Distributor.** If you have a Bosch style distributor see bottom of this manual for installation instructions of the lock washer. If distributor has any advance, engine damage will occur. If using a vacuum advance distributor, leave vacuum line disconnected. Re-install distributor making sure to keep rotor is same position as removed.
3) Find location for mounting Black Box. Try to keep away from heat sources and places that will see repeated exposure to the elements.
4) Locate vacuum source from below the throttle plates or below the turbo or Supercharger in those applications.
5) Refer to wiring diagram which matches your application.

Step-2 Installing Black Box Dashboard

Insert the CD provided with your Black Box 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. After setup loads, go through the proper steps to load the software. When you are done left click finish and your software will be ready to run.

Step-3 Establishing Communication

Attach your USB/Serial converter (not included) to the black serial cable. Plug the cable into the Black Box and the other end into your laptop computer. Turn your ignition switch on. Double left click the Black Box Dashboard Icon on your desktop. The Black Box dashboard will open and attempt to establish a connection with the unit. When the dashboard establishes a connection with the unit, 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 Black Box. Once the key is turned on or the communication cable is re-attached the dashboard will re-connect to the unit. In some situations, you may need to left click on the connect button to re-establish communication with the unit. The connect button is located on the bottom right corner of the dashboard.

Step-4 Loading Spark Profile

The Black Box is shipped pre-loaded with a naturally aspirated 4 cylinder timing map. If you are running a forced induction application we have included 2 pre done maps on the CD included with your kit. They are a 10 PSI and 18 PSI timing maps.

1) To load a file into the Black Box, go to "file" on the top left corner of the dashboard. Left click on "Open user timing maps from file and load to The Black Box.
2) Left click on "open" Select the file you want to load and click "open"
3) After opening the file you want to load into the Black Box, click "Send" The Black Box software will tell you when the file is loaded into the Black Box

4) Check under main setup that the proper cylinder count is selected.

Step-5 Setting Initial Timing

1) After you have verified you have the right timing MAP loaded into the Black Box. It is time to start the engine and set the timing.
2) With the laptop connected and the Black box dashboard started, start the engine and let it idle.
3) Take note in the Black Box dashboard software timing table of the lowest timing value. This is where the timing should be at an idle.
4) Using a timing light, rotate the distributor to match the engine timing to the Black Box dashboard software.
5) Tighten distributor clamp and re check timing, if it hasn't moved. This step is completed.

Step-6 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 Black Box dashboard folder for future use.

Step-7 Selecting load and RPM boundaries

An important step for creating a timing map is understanding how load affects 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 Black Box software are KPA values converted into inches of vacuum. The Black Box 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

KPA-101.32 x .295=inches of vacuum

Example: 58kpa - 101.32 = 43.32 43.32 x .295 = **12.77 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

KPA-101.32 / 6.89 = Boost/PSI

Example: 204.67-101.32 / 6.89 = 15psi Boost pressure

Step-8 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.

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.

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

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 400 RPM. 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 9- Rev Limit and Two Step Rev Limit

The Black Box 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 Black Box

Fixed timing while Two Step is engaged

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-10 Setting up your spark table

After you have finished selecting your Load/RPM boundaries, 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. 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 curser will move from left to right. Under deceleration, vacuum increases and the green curser will move from right to left.

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

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 curser “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 curser 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 Black Box.

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 curser 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. **Note: You must click on the "send" key after making any changes in the spark table. This will send the information to the Black Box.**

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 1lb 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 Black Box houses a 5 bar map sensor. This will allow you to have full control of ignition timing up to 43psi of boost pressure. After 43psi of boost the timing map will work off its maximum KPA zone.

Locking out a Bosch style distributor using the lockout washer

Remove distributor cap and note position of the rotor.

Remove the rotor. Remove the felt that covers the shaft screw.

Remove the shaft screw. Be careful not to turn the shaft with the screw out. Orient the lockout washer with the step face down. Tighten down the shaft screw as tight as possible. You do not want this coming loose. Blue locktite can be used, but do not use red locktite. Check to make sure distributor has no advance.

NOTE: Washer may not work on all reproduction Bosch style distributors. If this is the case, another lock out way must be used.

LIMITED WARRANTY

THIS IS A LIMITED WARRANTY - CB Performance Products offers a 90 day limited warranty from date of purchase on all products in The Black Box™ and all associated line. 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 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.

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How to Initiate the Warranty Process

Do not return any The Black Box™ 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.

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