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ignition systems for classic cars



HI-SPEED
CERTIFIED **USB**



INSTALLING THE SOFTWARE

Important : Do not connect the I23\TUNE, until you have installed the software !

Go to the site www.I23ignition.nl and download the latest version of the I23\TUNE-software. This software-package is designed for Windows XP and onwards.

Run the software, and you will see an electronic dashboard. In the top-center you will see two grey tabs, with 'DASHBOARD' and 'SETTINGS'.

By clicking 'SETTINGS' you will see the page, where you can edit your centrifugal and vacuum advance-curves, and where you can 'STORE' them into your I23\TUNE.

Click 'DASHBOARD' again, and you will see the electronic dashboard again. Note the red dot in the bottom-left corner. This indicates that there is presently no connection.

Now connect your I23\TUNE (use a **shielded** USB-cable **ONLY** ; Belkin is a good brand), and you will see this dot become green, accompanied by an audible signal.

For programming the I23\TUNE will be powered from the USB-port in your computer.

Important keys to memorize :

alt-F4 → closes the program

F8 → switches the RPM-stopwatch on and off.

F11 → switches to and from "Full-Screen" (which is nice for the dashboard-feature)

With the I23\TUNE connected, go to the 'SETTINGS'-tab and press the "curve1"-button. The curve that is presently stored in the I23\TUNE will appear in the screen. (Off course,you can select the "curve2"-button too,and see which curve is stored in your I23)

Each curve consists of a maximum of 10 so called "points" : for the upper curve, each point consists of two numbers : "crankshaft-revolutions-per-minute" and "crankshaft-degrees-advance". For the lower curve this is : "absolute manifold pressure in kP" and "crankshaft-degrees-advance".

Go to the "Centrifugal Advance" curve, and left-click on one of the points in the curve. Note that you can drag this point up- and down- whilst doing this. (at the same time, the points-list will be up-dated, as you will see)

By right-clicking on one of the points in the curve, you can "delete-a-point" from the curve. If you want to add a point, simply move your mouse to the required position, right-click, and select "insert point".

If you only want to change the horizontal position of a point, you can go to the points-list, and fill in a different number. (respectively for "revolutions-per-minute" or "abs.manifold-pressure") Note that after entering the number, the curve will be updated immediately.

WIRING THE I23\TUNE

The I23/TUNE-4-R-V and the I23/TUNE-6-R-V can be used on cars with 'battery-minus' connected to the body of the car ("NEG-EARTH"), **but also** on cars with 'battery-plus' connected to the body of the car ("POS-EARTH") .

The 8-cyl. version however (I23/TUNE-8-R-V) can **only** be used on cars, with the 'battery-minus' connected to the body of the car. (this is also called 'NEG-EARTH')

Check the diagrams, at the last pages of this manual, for proper wiring.

The I23/TUNE-8-R-V is layed out for 12Volt cars **only** ; the I23/TUNE-4-R-V and the I23/TUNE-6-R-V can be used on cars with 6 **and** 12 Volt batteries.

MOUNTING THE I23\TUNE IN YOUR CAR

Check, before removing the old distributor from the car, in which direction the rotor is moving. (you can do this, by first removing the wire from the distributor to the coil. Then remove the cap, and ask some-one to look at the rotor, whilst you activate the start-motor)

Now you know if the rotor rotates clockwise (CW) or counterclockwise (CCW) seen from the top, that is. (put that on a little note, together with the proper ignition sequence)

The next thing : bring the engine to the static timing point, at the end of the compression-stroke, for cylinder number 1. (the rotor on the old distributor should point to the cable that connects to the sparkplug of cylinder number 1)

After having done all this, you can now put your I23\TUNE in the car and find a position where the cables, the USB-plug and the vacuum-nipple come out conveniently. Connect the wires according to the proper diagram, and for now, do not yet connect the black wire.

Turn on the ignition.

If your rotor rotates CW : rotate the unit CCW until the green LED **just** lights up. (also press the rotor in a CCW direction, to remove any free play in the drive)

If your rotor rotates CCW : rotate the unit CW until the green LED **just** lights up. (also press the rotor in a CW direction, to remove any free play in the drive)

(The LED shines through one of the holes in the aluminium disc below the rotor)

For 8-cyl. models : if you expect a bad ground connection : use the M5-threaded hole in the bottom-face of the housing, for a direct wire to ground.

Turn off the ignition.

Now, connect the black wire to the coil according to the schematic.

Connect the spark plug leads in the proper sequence to the cap, starting with the wire for the number one cylinder at the position pointed to by the rotor of the 'I23'.

Also connect the high voltage wire from the coil to the center position of the cap. Attach the cap to the distributor. Route all wires, inclusive USB (!) , well away from the high voltage leads and away from moving

parts, using tie-wraps or other suitable means.

Connect the vacuum-tube (if there is one) from the carburetter to the nipple on the '123'. Older engines may have a screw-connection for the vacuum-advance diaphragm. In this case you can use a short length of rubber hose to connect to the 123, or remove the hard line to the carburetter and replace it completely with thick-walled rubber vacuum-hose.

If you loaded the proper advance-curve before , you can now start your engine !

LOADING CURVES INTO THE 123\TUNE

Connect the 123\TUNE to your computer, and start the 123\TUNE-software.

Example 1

Go to : 'File' → 'Import from file' → select "example1.xml" and "Import"

This example demonstrates the (quite unpractical) use of maximum 10 points for each curve. The rev. limiter for this curve is set to 6000 rpm. The MAP-start (the speed above which the vacuum-curve will be active) is set to 1500 rpm.

The vertical grey line in the manifold advance curve, indicates atmospheric pressure. (1 bar equals 100 kPascal) The more you go to the left, the lower the abs. pressure gets, or the higher the vacuum, hence the vacuum-advance sits in the left, upper part of this curve.

Boost-retard is a term, that stems from supercharged / boosted engines. When the pressure in the manifold becomes greater then atmospheric, you will have to retard the spark. For this reason, the boost retard sits in the right, lower part of the curve.

Example 2

This demonstrates how to set the unit in a real-life situation, using the original data from the 'one-fits-all' Bosch-distributor 0.231.170.034 for Volkswagen. (see the picture at the last pages of this manual)

As the original data is VERY often based on distributor speed, and distributor advance, you have to be aware, that both numbers have to be multiplied by a factor 2, in order to get to speed crankshaft, and advance crankshaft. If we now look at the 0.231.170.034, we see that the advance starts at 500 rpm distributor. In the list, you will find this as point no. 2 (1000; 0,0) Then it advances to say 4,5 degrees at 750 rpm, and you will find this in the list as point no. 3 (1500;9,0). After that, the slope gets less steep, and the advance ends at 10,5 degree at 1750 rpm. after which it remains constant. Hence you will find point no.4 (3500;21,0) and point no.5 (8000;21,0)

The vacuum-curve is a little more complicated. The horizontal axis indicates the vacuum, but it does that **relative** to the atmospheric pressure, **and** millimeters-Hg. (this is not a standardized value ; 123ignition uses the **kP** (kiloPascal) and **absolute** manifold pressure)

Here is the conversion table :

0 mmHg = 100 kPascal	-100 mmHg = 87 kPascal
-200 mmHg = 73 kPascal	-300 mmHg = 60 kPascal
-400 mmHg = 47 kPascal	-500 mmHg = 33 kPascal
-600 mmHg = 20 kPascal	-700 mmHg = 7 kPascal

Back to the 0.231.170.034 : the vacuum-advance starts at 100 mmHg **below** atmospheric. In the list you will find this as point no.3 (87;0,0). It then advances to a maximum of 5,0 degrees at 200 mmHg, which translates to point no.2 (73;10,0) and point no.1 (0;10,0) !

The MAP-start is set to 1500 rpm : the vacuum-part of the advance **thus** only comes into play, above 1500 rpm. The RPM-limit is set to 8000 rpm, indicating that no rev.limiting is active.

Example 3

This demonstrates how to set the unit in a real-life situation, using the original data from a Bosch-distributor 0.231.116.051 (see the picture at the last pages of this manual)

This distributor was kind of special, because it had 'negative vacuum', e.g. the more vacuum the less advance. This 'trick' was used in two situations :

- European car-manufacturers were faced with more stringent emission-rules in the USA and Canada. Retarding the advance around idle was a popular solution to improve emissions.
- cars with automatic gearboxes ; once set in "neutral" the advance was retarded, thereby keeping the engine-speed acceptably low.

Back to the 0.231.116.051 : the vacuum-**retard** starts at say 100 mmHg **below** atmospheric.

But how can we retard ? Simple as '123' ! In the list you see point no.5 as (99;11,0) ; it is **important** to use **only 99 kP** to achieve this!

The 123\TUNE will now produce 11,0 degrees advance, **immediately** after starting the engine. That is why **off-course** the MAP-start is set here to zero !

The advance then begins to drop around 100 mmHg , point no.4 (85;11,0) to eventually 400 mmHg at point no.2 (50;0,0)

Example 4

This demonstrates how to use the centrifugal advance to get idle-control ; the engine will tend to stay in the dip around 1100 rpm. In the vacuum-curve you can see an example of how to achieve so-called "gear-shift-retard"....if the absolute pressure in the manifold gets below 37 kP, the advance will fall to zero. The result is, that if you release the throttle (and the engine begins to produce vacuum) you either want

to engine-brake or to shift gears. In both situations you don't want to create thrust anymore....hence the removal of the (in this example) 10,0 degrees advance does exactly that !

Example 5

This demonstrates how to set the unit in a real-life situation, using the original data from the Bosch-distributor 0.231.129.009 / 0.231.173.009 ; also referred to as the '009' !

As this distributor did not offer vacuum-advance, the manifold-pressure curve shows a straight line at zero degrees. (see the picture at the last pages of this manual)

For the aircooled **VW** engine and '009' distributor, the maximum advance **MUST** be between 28 and 32 degrees at 3000+ rpm ; so if you use this example curve, you should start by setting it statically to 7 degrees. This way it would reach exactly 28 degrees at 2600 rpm. ; at idle it would show 5 plus 7 degrees is 12 degrees.

This is a safe way to start the tuning process : the advance at idle is not really important. (an engine will never be damaged at idle) Too much advance at high revs. will eventually ruin an engine.... always be aware of this ! This example also indicates that it is possible, to integrate (part of) the static-advance into the 123\TUNE.

TUNING WITH THE 123\TUNE

- Switch from curve #1 to curve #2

A very nice and easy way, to interactively check, is to switch over from curve no. 1 to curve no. 2 with the yellow wire. (see the drawings at the end of this manual ; please note the difference for NEG. & POS. EARTH-ed cars.)

- Enable Tuning

When the engine is running, you could press the 'T' to enable real-time 'TUNING' mode. (the curve-indicator-light on the dashboard will blink 'TUNE', to indicate that the tuning-mode is active.

By pressing 'A' (advance) you can increase the total amount of advance with a maximum of 5,0 degrees crankshaft, in steps of 0,1 degrees.

By pressing 'R' (retard) you can decrease the total amount of advance with a maximum of 5,0 degrees crankshaft, in steps of 0,1 degrees.

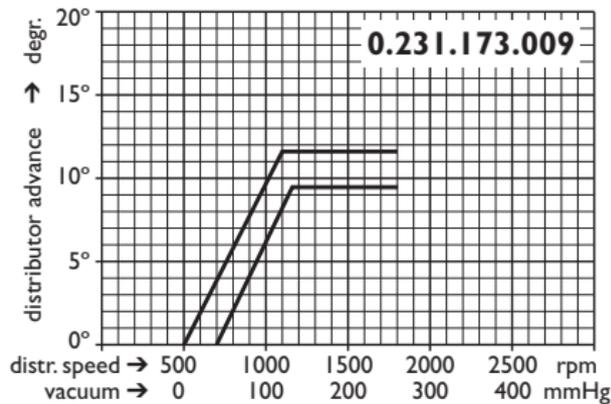
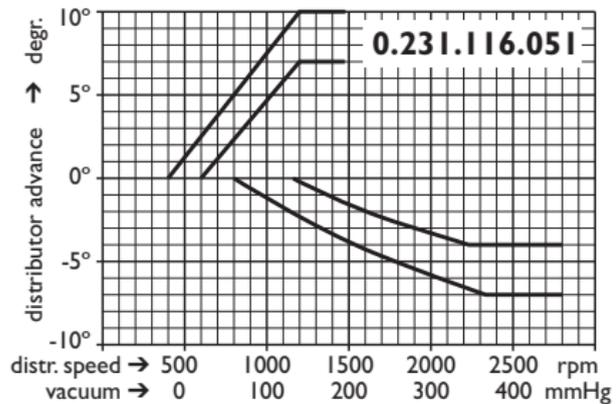
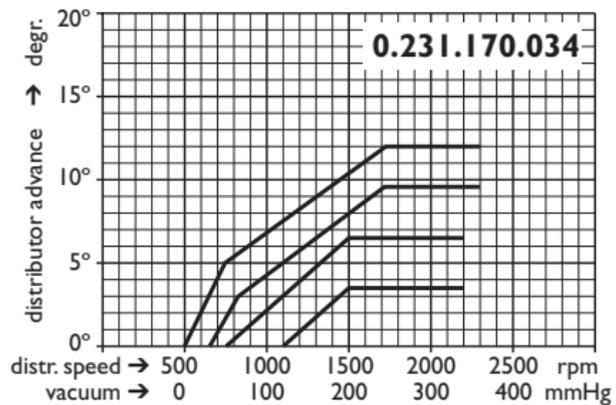
This feature will come in handy, if you have your car on a rolling road, and want to optimize the engine-power. The advance or retard found is not stored in any way, so you will have to remind your findings, and adapt the active advance-curve accordingly.

- RPM-stopwatch

If you don't have a rolling road available, it is also possible to use a flat piece of road. Here is what you should do : drive until the engine is warmed up, remove the vacuum-hose, and activate the 'RPM-stopwatch'. Enter the two engine-speeds to the area of your interest.

Drive the car at maximum-power (and in one gear) through that area, and measure the time needed. (this time will be displayed in steps of 0,1 seconds)

After having changed the centrifugal advance-curve, you can work your way towards a minimum time, indicating you have found the optimum power in this specific area.



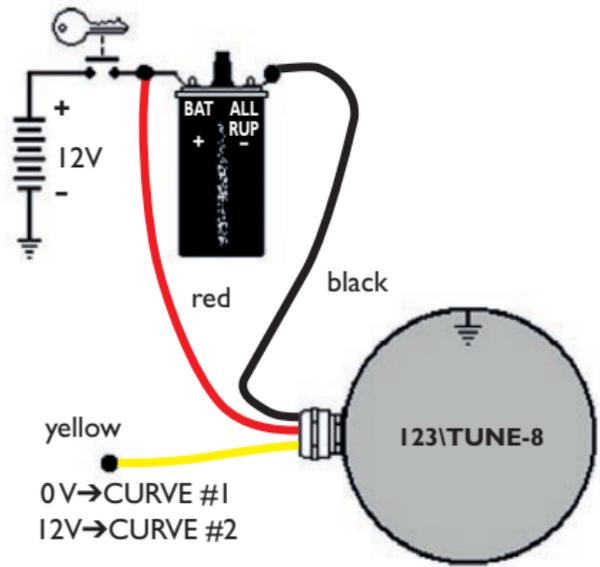
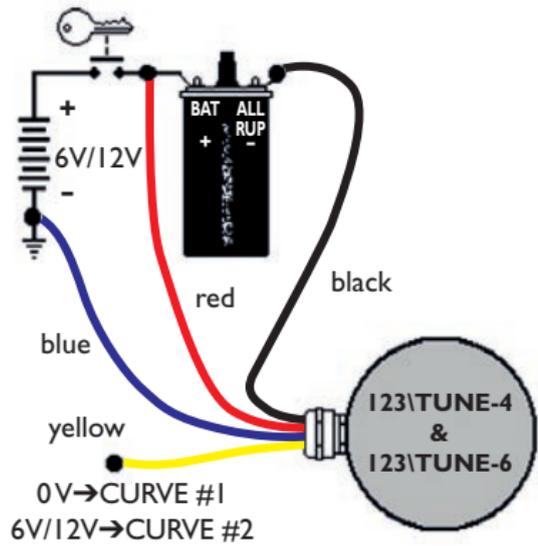
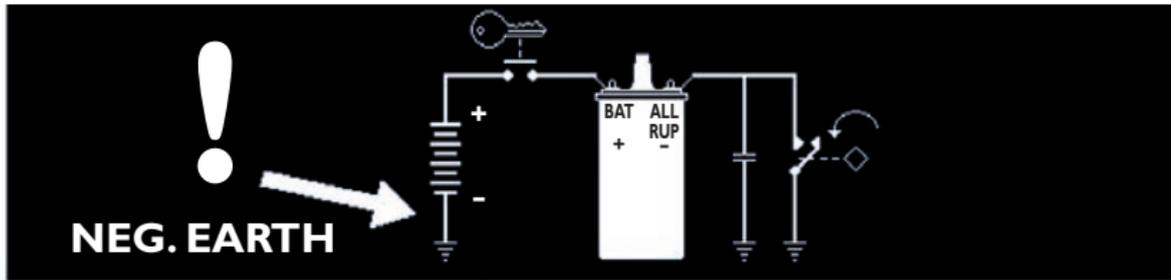


Diagram for cars with NEG. EARTH

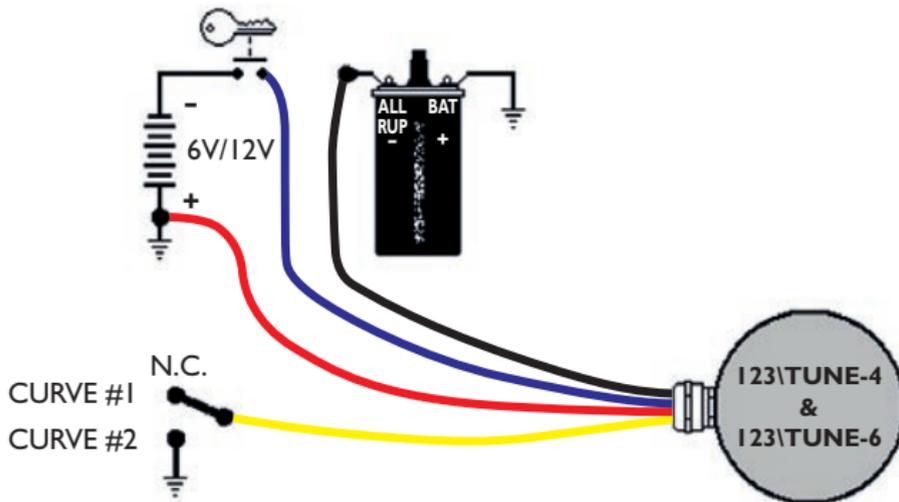
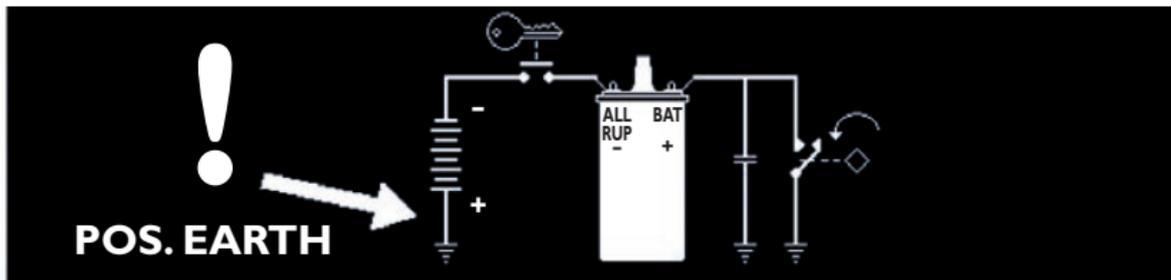


Diagram for cars with POS. EARTH

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