

## **VAC-DIAG-II**

### **Hints for synching your engine**

#### **VAC-DIAG-II, measuring vaccum (synching)**

Function:

- View synchronicity of the throttle bodies
- Synch throttle bodies
- Adjust idle
- Graphical display the vacuum course for each TB separately to show irregularities like vacuum leaks or defective intake valves (specific knowledge of combustion engines are required for analysis)
- Show number of revolutions
- Adjust number of revolutions
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#### **Basic procedure of synching**

- Engine should have its working temperature.
- No vacuum leaks, valve play is correct
- Choke bowden cable is correctly adjusted

#### **What VAC-DIAG-II can do for you**

- Assists you when performing adjustment procedures
- Avoids wrong adjustments, if used according to specifications
- Guides you through the more complex adjustment and analysis procedures

#### **What VAC-DIAG-II cannot do for you**

- solve basic problems with your engine
- avoid not meeting the prerequisites

**Working on engines may require specific knowledge, tools and diligent course of action. If in doubt, you better ask and make sure, that you know, what you are doing, or you might end up making things worse!**

Your VAC-DIAG-II cannot do miracles for you.

But it can give you a valuable assistance when servicing your engine.  
VAC-DIAG\_II was developed and built with much knowledge and care to serve this purpose, and that is, what you can expect and what you will get from it.

### **Synching procedure**

- close all air bypass screws
- rev your engine up to approx. 1200 /min by opening the throttle. DO NOT use the choke to achieve this!
- Now adjust the throttle bodies after selecting the fixed throttle body (the one with the bowden cable attached)

### **Adjust idle speed**

- Do not touch the stop screw!  
If the stop screw was misaligned, the gap (opening in idle) of the fixed TB must be adjusted to 0.8 mm before continuing.
- close all air bypass screws
- set VAC-DIAG-II ton o fixed throttle body
- now open all air bypass screws for 1 to 1 ½ turns
- now adjust the idle speed by turning all bypass screws. Keep an eye on that the pressure difference is as close to zero as possible
- **increase idle speed:** open (turn out) all bypass screws evenly
- **decrease idle speed:** close (turn in)all bypass screws evenly
- readjust throttle position sensor

### **caveats**

there are some potential sources of errors:

- bowden cable oft he choke has no or no sufficient free play
- TPS can not move freely and inhibits free rotation oft he TB axle
- Vaccum leaks or misadjusted valves (O-rings, tubes, cankcase ventilation tube...)

### **Important notes/prerequisites:**

**Before adjusting or synching the throttle bodies, make sure the the following prerequisites are met:**

- valveplay is checked/adjusted
- you have performed an inspection of all vaccum tubes and collars related to the intake system. An intense examination can be done by spraying brake cleaner on those parts while the engine is running. If the idle speed changes during the spraying, there is a vaccum leak, that needs to be fixed first.
- make sure, that there is no free play in the throttle body shaft
- wear parts like spark plugs and air filter are in fair condition

**Notice: failing to meet the prerequisites mentioned above will lead to a supoptimal result and you will only compensate the basic errors.**

defective collar



defective O-ring



On your BMW K Bike you can find three possibilities to manipulate:

- stop screw leverage (do not touch)
- adjustment screws between the throttle bodies (paint sealed)
- air bypass screws

Picture of a BMW throttle body assembly (4-valve model)



BMW M model air intake system

Air bypass screws for adjusting the idle speed



Screws on the connection rod between the throttle bodies.

Here the single TBs can be adjusted relative to each other. Used for synching.

Vacuum cap on the measuring connection (often cracked and (vacuum)leaking)

Haftungsausschluß: Für die Richtigkeit obiger Informationen übernehmen wir keine Haftung!

## Adjustment procedure

In the main menu choose and click „Vaccum“. Now, the number of cyls. and the number of the fixed cylinder have to be entered

You have the choice between 2, 3 or 4 throttle bodies, according to the engine.

Fixed Throttle body is the TB which is directly actuated by the bowden cable. On a BMW K 4 cyl. this is the third TB on a K75 the second TB.

**before synching** you have to choose the correct fixed TB, because you cannot adjust this TB relative to the other but only the other relative to the fixed TB.

VAC-DIAG-II will compute and display the pressure difference of all other TBs relative to the fixed TB and take the fixed TB as the zero reference.

Choosing fixed TB → none is recommended for idle speed adjustment only

**The idle increase by the choke lever must not be active!**

Remove the rubber caps from the measuring connectors and connect the 4 vacuum tubes according to the numbers marked on the tubes. For BMW K models the first cyl. is the one next to the cooler. At the VAC-DIAG-II tube Nr. 1 is the top left one.

Remove the tube connected to the gasoline pressure regulator. Make sure, this tube is not leaky, as this will not influence the measurement and adjustment.

Then start the engine.

**In the upper part of the display** you will see the number of revolutions and the pressure for each throttle body.

**In the lower part of the display** you will see the pressure difference relative to the reference cylinder.

## **Synching:**

VAC-DIAG-II, Menu „Vaccum“ set to fixed throttle body.

Close all bypass screws. Should the engine stall, open throttle a bit and keep the engine at about 1200/min.

Do not let the engine turn faster, because the wider the throttle is open, the lower the pressure differences will be, and the more difficult the adjustment will be.

Now the display will show you the pressure difference between the throttle bodies will be shown, the reference cyl. will be shown as the zero line.

A cylinder with a bar below the zero line has a lower pressure than the reference cylinder, so its throttle valve will be less open than the reference cylinder.

A bar above the zero line indicates a wider open throttle valve.

Bar above the reference line: not enough vacuum: close throttle valve!

Bar below the reference line: too much vacuum: open throttle valve!

On the 75 models the first cyl. and the last cyl. must be adjusted relative to the fixed throttle body (middle)

On the 4 cyl. model the third throttle body is operated by the bowden cable, so this is the fixed one. Here, you will have to adjust Nr.2 and 4 first, and Nr.1 after that, because adjusting Nr.2 influences Nr.1 by the connection rod.

To perform the adjustment, open the counter nut and turn the set screw. After finishing the adjustment, fasten the counter screw again carefully, or a new misalignment could be caused. You can precompensate that when adjusting the set screw.

The VAC-DIAG-II is a very sensitive device and you might not be able to set all cylinders to a zero divergence. The goal is a minimum divergence. Differences below 5mbar are in the green area and can be regarded as ok.

**Adjust idle speed:**

before setting the idle speed, a synch should be completed. Set VAC-DIAG-II to „Vacuum“ and „compute average“

Open the air bypasses about 1 to 1 ½ turns. Engine should now be running smoothly. Adjust the idle speed by carefully turning the bypass screws to about 950 rpm and keep an eye on the evenly pressures for all TBs in the display.

We recommend to set the pressure even on all cyl. first and then adjusting the speed by evenly turning all bypasses in the desired direction (slower or faster)

**After completing this task, in any case the TPS needs readjustment!**