Black Diamond Tuner PC software guide

This document will give some instructions how to use the pc software and some setup guidelines.
For latest revision and releases please visit
www.advanced-electronics.se
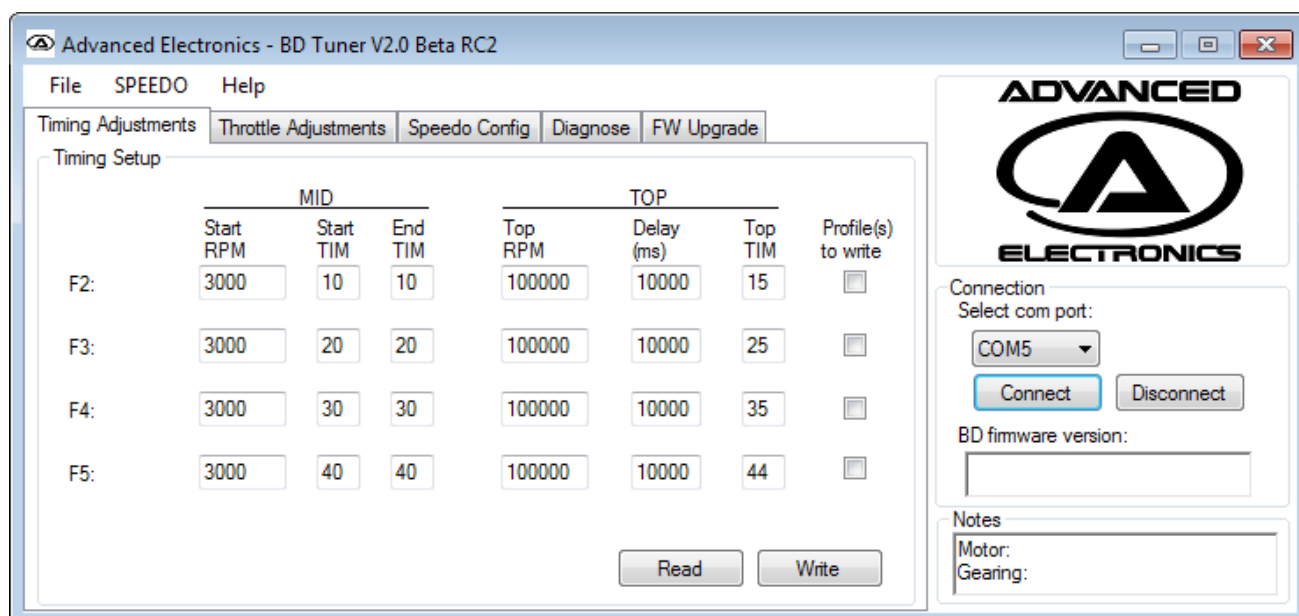
Connection & start up

Fig 1. Overview of program

1. Disconnect sensor cable between speedo and motor.
2. Connect USB cable between PC and sensor connector at speedo.
3. Connect battery to speedo to power it up (if rx pack or booster is used turn this on). Speedo shall blink slowly red (indicating no receiver signal, see speedo manual for more info).
4. Start PC Software.
5. Make sure Transmitter is turned off (or disconnect RX cable from receiver) or this might interfere communication with PC (some receivers send signal even when transmitter is turned off if you have problem connecting disconnect rx cable to receiver).

The Speedo has 5 selectable forward profiles and on 4 of these profiles (F2 - F5) you can tune the timing with this software. F1 is still 0 degree profile to be compliant with Roar Sportsman so for this profile it's not possible to adjust the timing.
Other settings as initial throttle can be adjusted for all 5 forward profiles

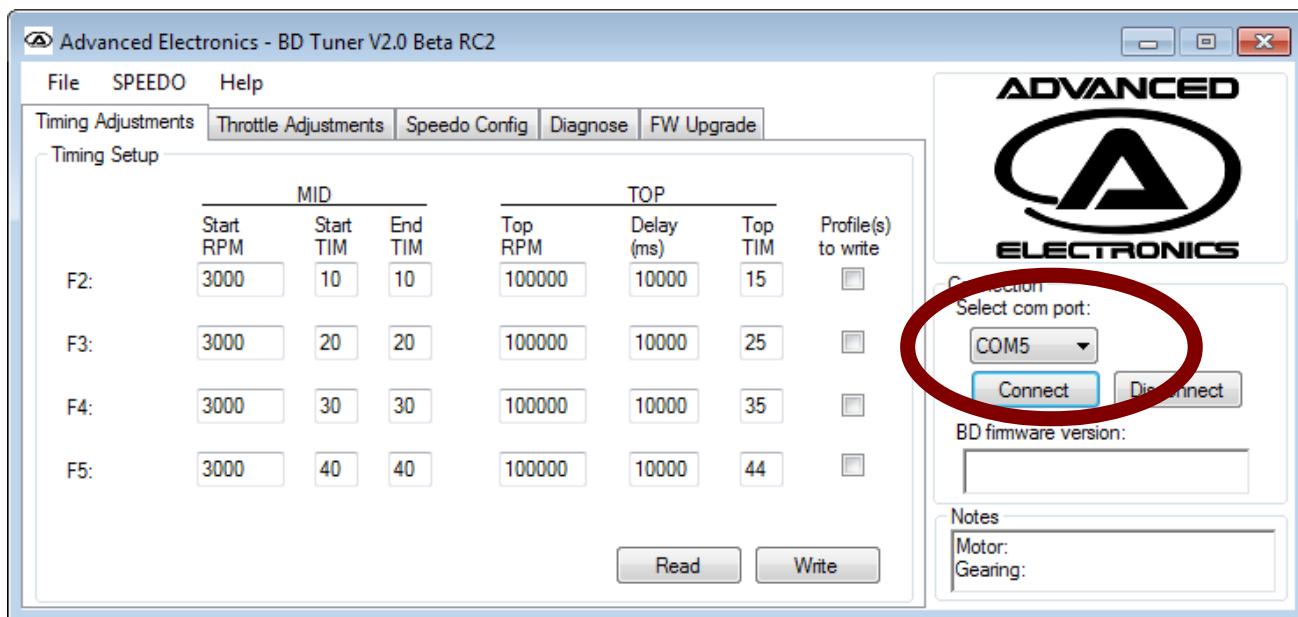# Black Diamond Tuner
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Usage of program.

Fig 2. Setup of comport

1. Select com port in drop down menu.
If you don't know your com port you can find it by disconnecting the usb cable from pc and then click on the drop down menu. Remember the com ports and close the drop down again by pressing or releasing the button. Now connect the usb cable to PC and check again the drop down menu you should now have a new com port number in the list this is your com port number (if you don't see a new number please consult the trouble shooting of pc cable manual).
Press Connect.

2. If all worked ok all three leds on the speedo shall now be turned on and the "BD software version:" textbox will show the connected speedos sw version.
If it didn't work, try to unplug the USB cable from you PC and connect it again.
Wait approx 5sec after USB cable is plugged in before you try connect.

3. When connected and leds are turned one then program and speedo is ready for tuning.

4. When changing values program will check if they are valid. If not the text will turn red when the text box is left. For some values the program will round them to correct values therefor sometimes values will no be the same as you typed them.

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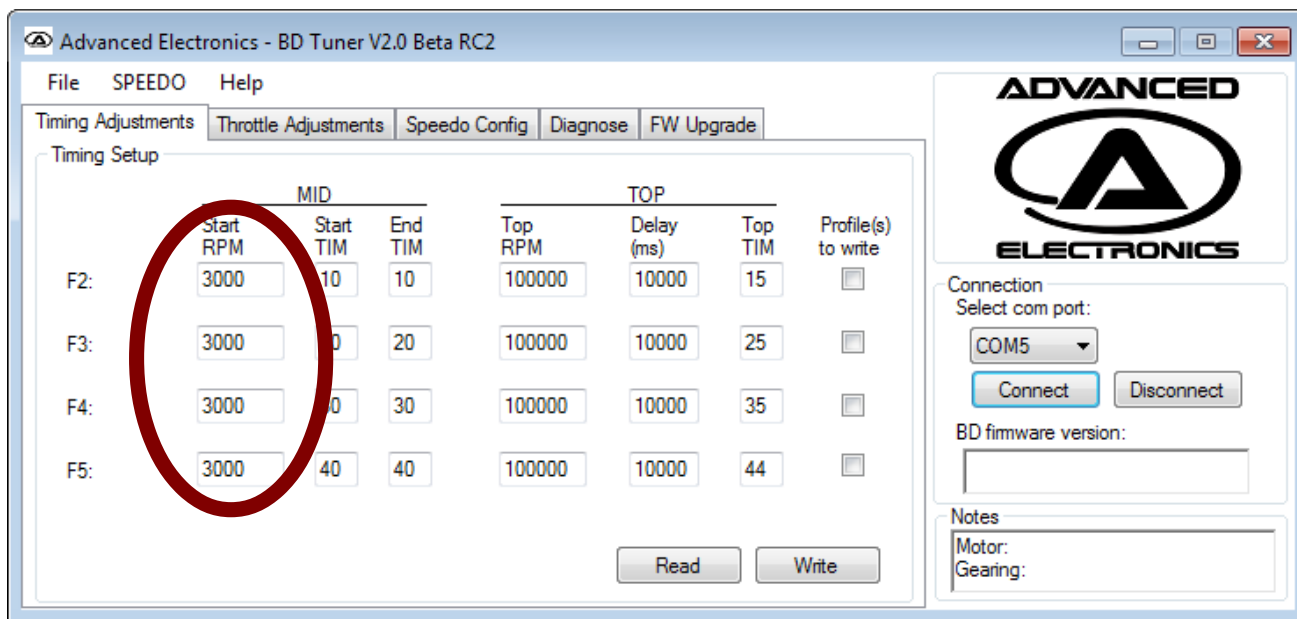
Mid Timing
Start RPM setting

Fig 3. Start RPM setup

The start RPM is adjustable from 500 up to 100000 in 100 steps and this setting controls when Timing is started to be applied.

Recommended values to test.
Stock: 1500-3000
Mod: >4000
V2.1 setup: 2000 on all profiles

Each profile (F2 to F5) has it's own start RPM value to set.

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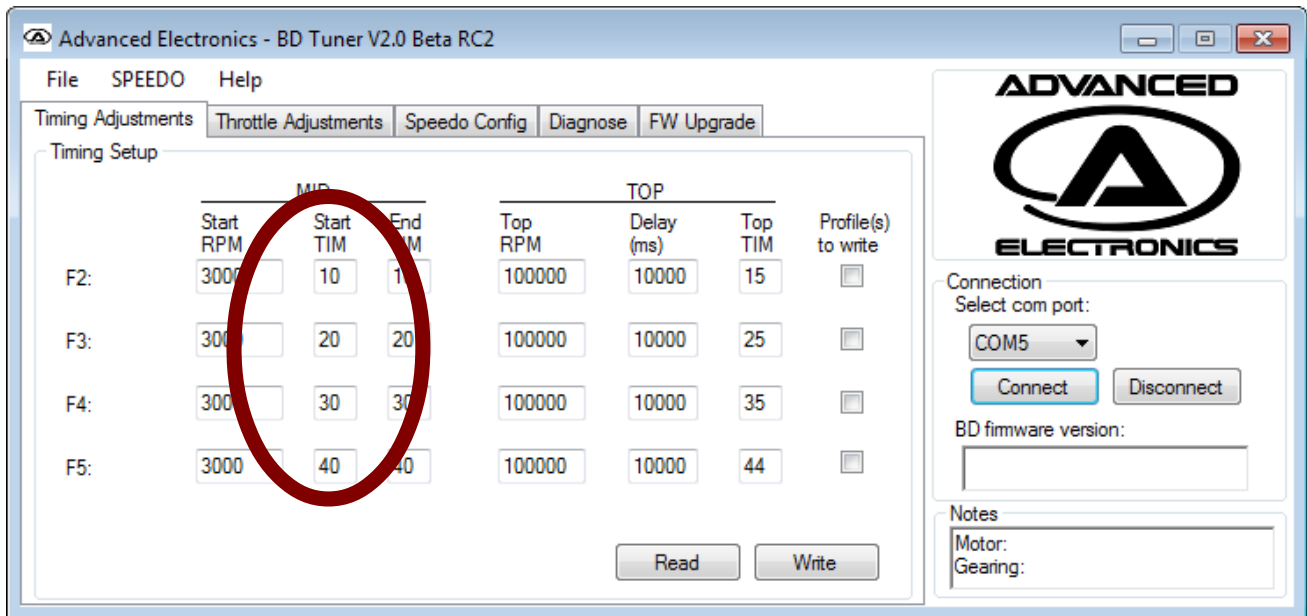
Mid Timing
Start Timing setting

Fig 4. MID Start TIM setup

The start TIM is adjustable from 0 up to 60 in 1 degree step and this setting controls how much Timing to be applied when timing starts (when motor rpm is above set value) .

Recommended values to test.
Stock: 15-20
Mod: 0-5

Each profile (F2 to F5) has it's own start TIM value to set.

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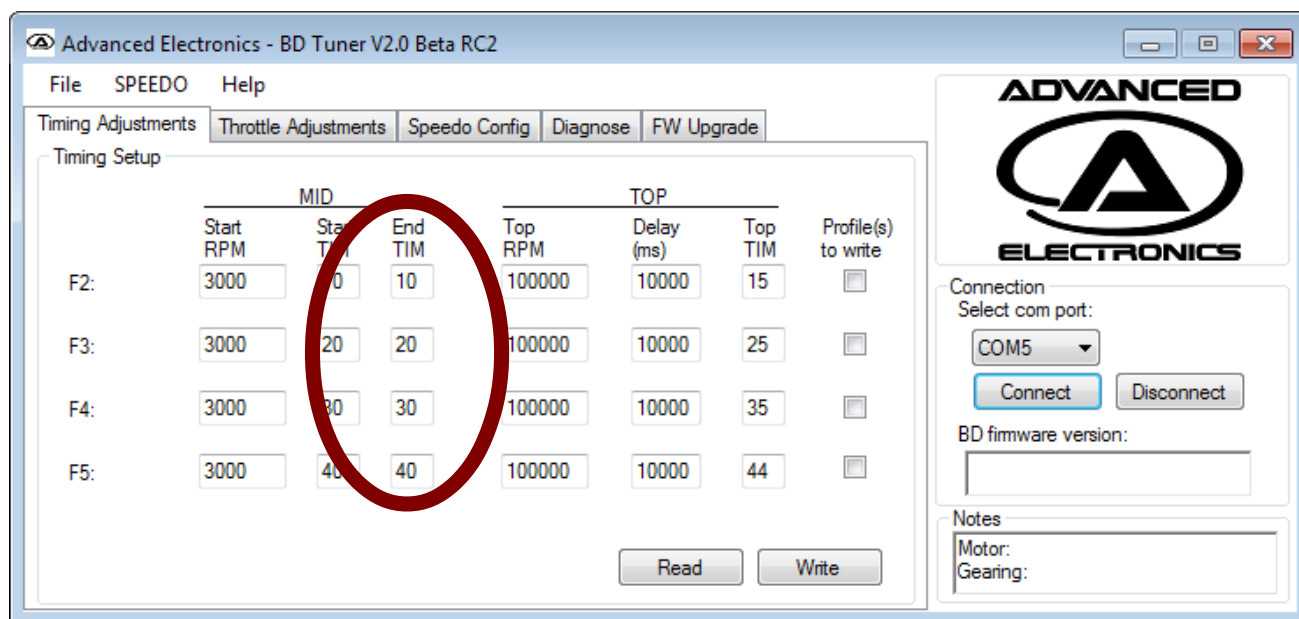
Mid timing
Mid Tim setting

Fig 5. Mid End Timing setup

The End Mid timing is adjustable from 0 up to 60 degrees in 1 degree step but must be same or higher than the Mid Start timing.

Be carefully with the timing settings and always check motor and Speedo temperatures during usage.

We recommend keeping the mid timing below 40 degrees and if extra speed is needed play with top timing settings.

When setting up the speedo for stock use 30 or 40 degrees mid timing and disable the top timing. Then play with the gearing and motor timing until you have a good working motor temperature and speed.

Recommended values to test.
Stock: 30-40
Mod: 10 – 25
V2.1 setup: 10, 20, 30 & 40

Each profile (F2 to F5) has it's own timing value to set. So you can set 4 different settings and the at track you can alter between the settings with the forward profile menu by push the button on the speedo (see speedo manual for instructions how to change profile).

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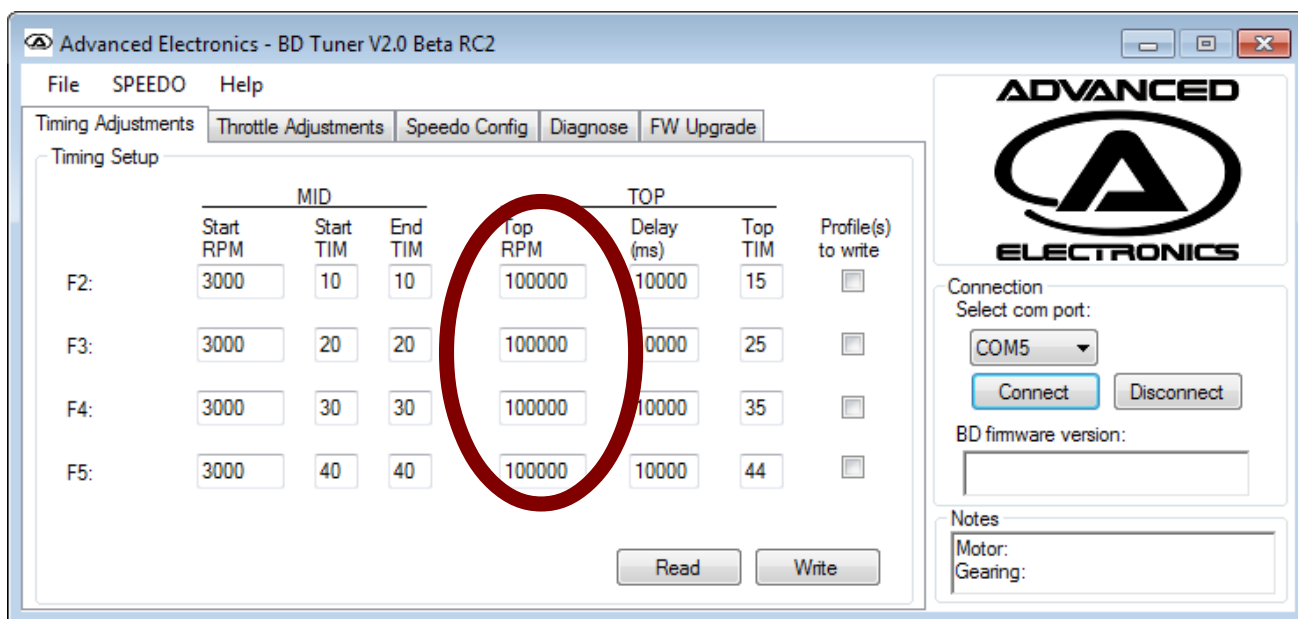
Top Timing
Top RPM setting

Fig 6. Top RPM setup

The Top RPM is adjustable from 500 up to 100000 in 100 steps and this setting together with Delay controls when Top Timing is started to be applied.
Top timing is started when Top RPM is reached and full throttle is pushed.
The delay controls the ramp time between mid end timing and Top timing.
The delay is counted from when full throttle is applied.
Top RPM is most used for fine tuning and when Top timing is used normally set Top RPM to a low value (same as Mid Start RPM) and use Delay instead.

To disable Top timing set RPM to 100000

Recommended values to test.
Stock: 8000-12000
Mod: 100000 (Normally disabled, rarely used in Mod).

Each profile (F2 to F5) has it's own Top RPM value to set.

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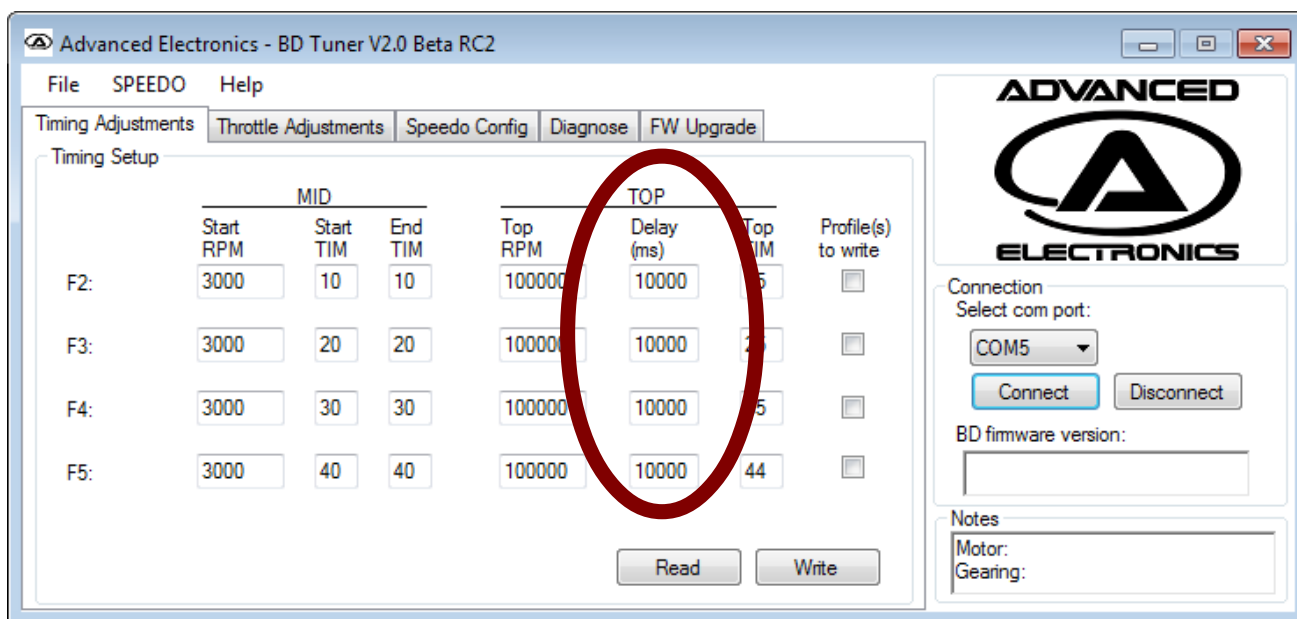PC software guide**

Top Timing
Delay setting

Fig 7. Top delay setup

Delay value is adjustable from 5ms up to 10000ms in 5ms steps
If 10000 (10sec) is set then top timing is disabled.
This setting together with Top RPM controls how top timing kicks in.
The delay timer start when full throttle is applied, so with a setting of 300 the top timing will be reached after 0.3sec after full throttle is pushed. The top timing is set in next box (next page). The timing is ramped from Mid End timing to Top timing.

This setting is intended for adjusting so that top timing kicks in on the straight for extra top speed.

Recommended setup:
Try to time how long it takes to travel the straight and set the delay value to 1/3 or half this value. For example Straight takes 2.4sec to pass, set delay to 1200

Each profile has it's own Top Delay value to set.

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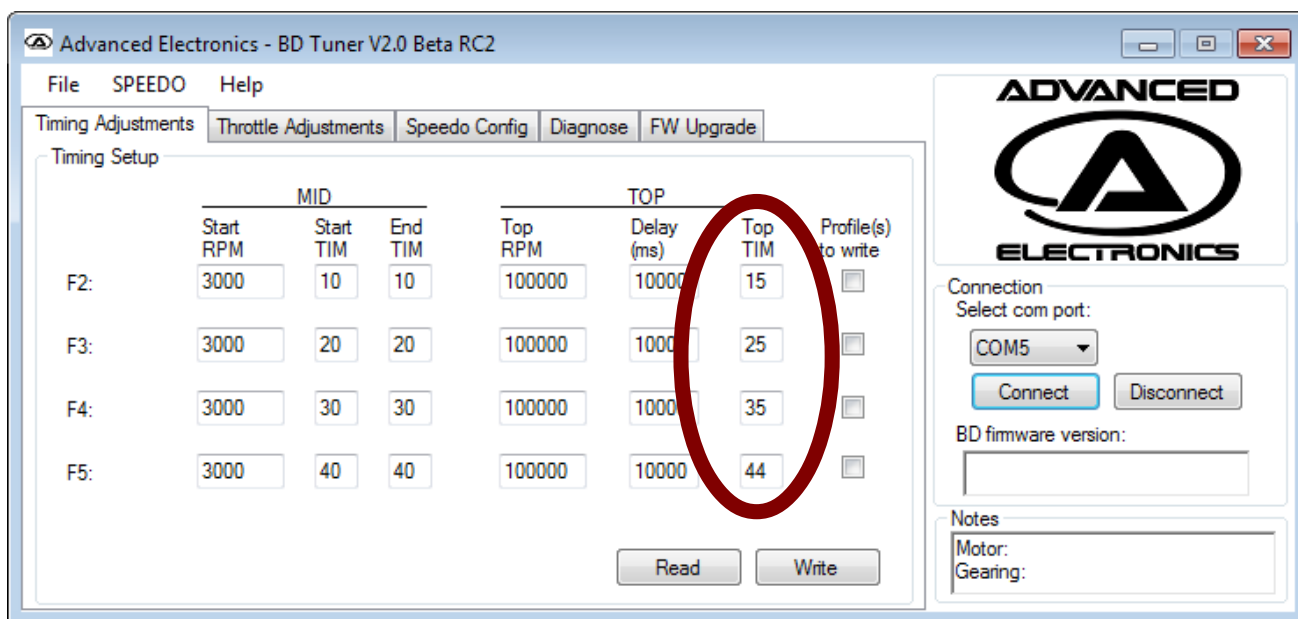## Top Timing
Top TIM setting

Fig 8. Top Timing setup

Top Timing value is adjustable from 0degrees up to 60 degrees in 1 degree step but must be same or higher than the Mid End timing.
This setting controls how much top timing that is applied when Top RPM and top delay value (previous pages) is fulfilled.
The Top timing is ramped from Mid End timing to the Top timing set.

This setting is used to adjust for extra top speed and power.
Just be careful to apply too much timing, since this build up heat in motor and speedo.
Use this feature to achieve a little extra speedo on the straight.
Recommended is to set Top TIM to a value that is around 5degrees higher than Mid TIM.
Example:
Mid End TIM = 40
Top RPM = 10000, Top Delay = 500, Top TIM = 45

These values will give a timing ramp from 40 degrees to 45 degrees and time will be 500ms. So when full throttle is pushed it will take 0.5sec to increase the timing 5degrees if motor rpm is above 10000.

Each profile has it's own Top TIM value to set.

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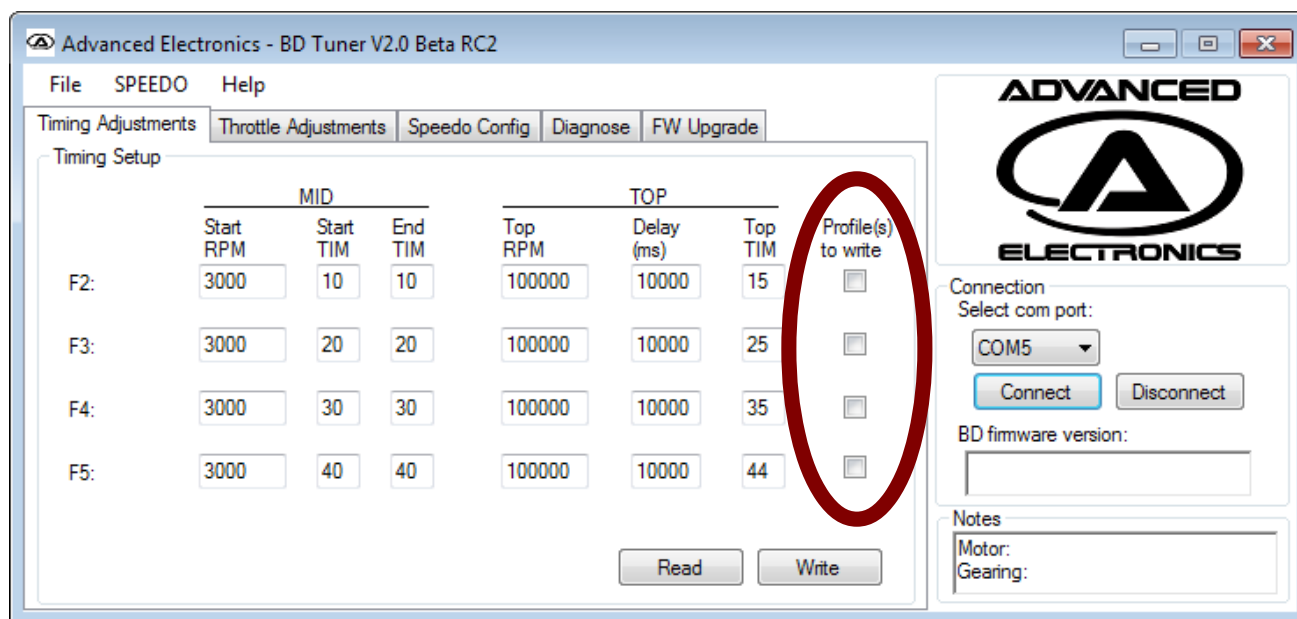# PC software guide

Write profiles

Fig 9. checkbox for selecting profile(s) to write

1. To write the profiles to speedo, tick the checkbox for each profile to write. It's possible to check only one check box or several.

2. Press "Write" button, when the selected profile(s) is written an info box will pop up to inform you that write is finished, just choose OK.

3. To check the profiles in speedo do a read (press "Read" button) the stored values will be shown in the boxes. If you like to read all configuration from the speedo go to SPEEDO manu and select "Read all from speedo" (or press CTRL + R). This will read all settings. Please note that any changes (not written to speedo) you have made in the program will be over written when you do a read all.

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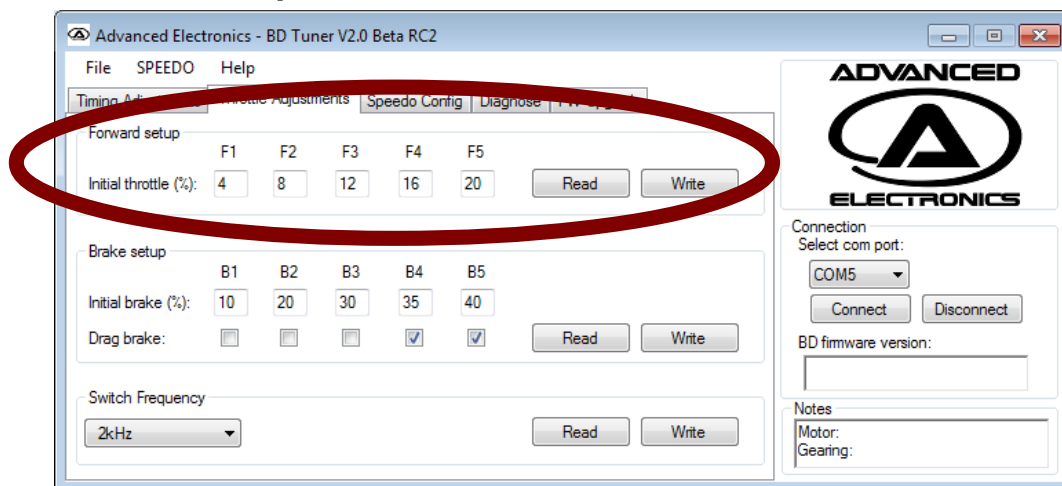## Throttle Adjustments
Forward Setup

Fig 10. Initial Throttle

Initial throttle can be set on all 5 profiles including the No timing profile (F1).
This setting shall be adjusted according to your preference and motor. For high turn motors try a higher initial throttle and for low turn you can try a lower setting.
Press Write button to write the set values to speedo.
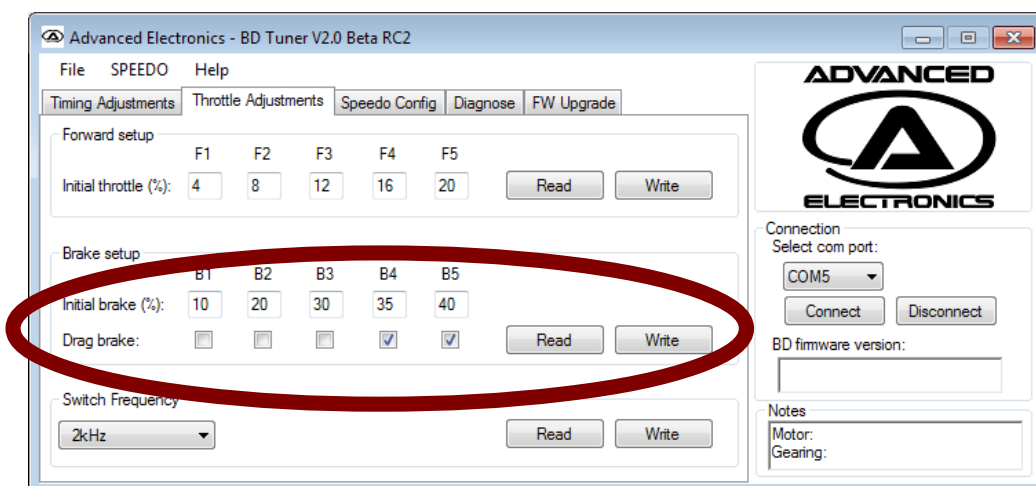Read Button will read the current settings from the Speedo.

Brake Setup

Fig 11. Initial Brake & Drag Brake

All 5 profiles has a different brake character with profile 1 as the softest and profile 5 the strongest most aggressive brake. Please try all to find the one that suits you best. Suitable value to test is 20-45%
To enable Drag Brake just tick the check box for each of the profiles you like to activate Drag Brake on. Brake profiles are individually set speed and are not same as the Forward profile. Please see speedo Manual for info how to select profiles. Press Write button to write the set values to speedo. Read Button will read the current settings from the speedo.

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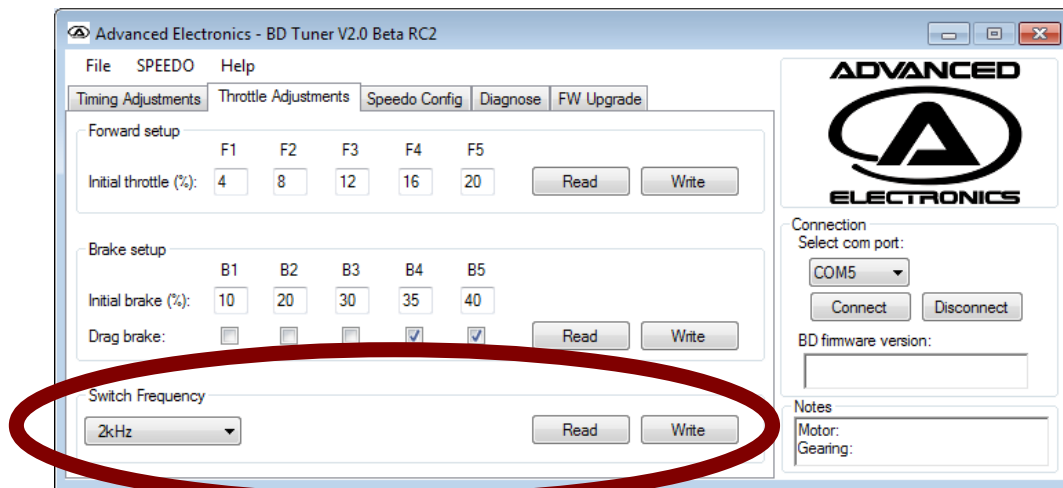
Switch Frequency

Fig 12. Switch Frequency

The set Switch Frequency is valid for all profiles (throttle and brake).
A lower frequency gives a little more bottom end power and a higher frequency gives a smoother power.
For blinky mode try 2-4kHz
For Stock try 4-8kHz
For mod 4-8kHz

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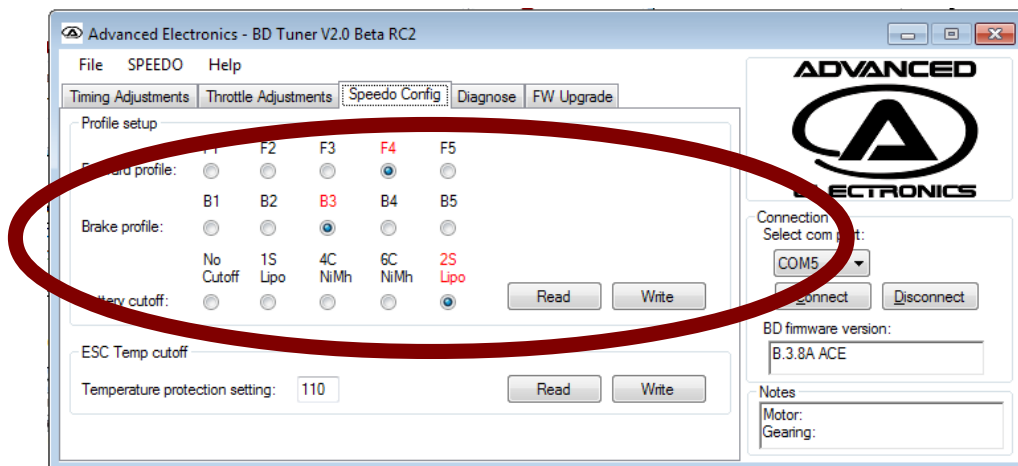
Speedo Config
Profile Setup

Fig 13. Profile Setup

Here are the same settings that you can set with the push button on the speedo. Forward profile, brake profile and battery cutoff profile. You can read the current setting from the speedo and you can set and change setup with the radio buttons and write button. For more info about these see the speedo manual. The current profile set in speedo is shown in red.
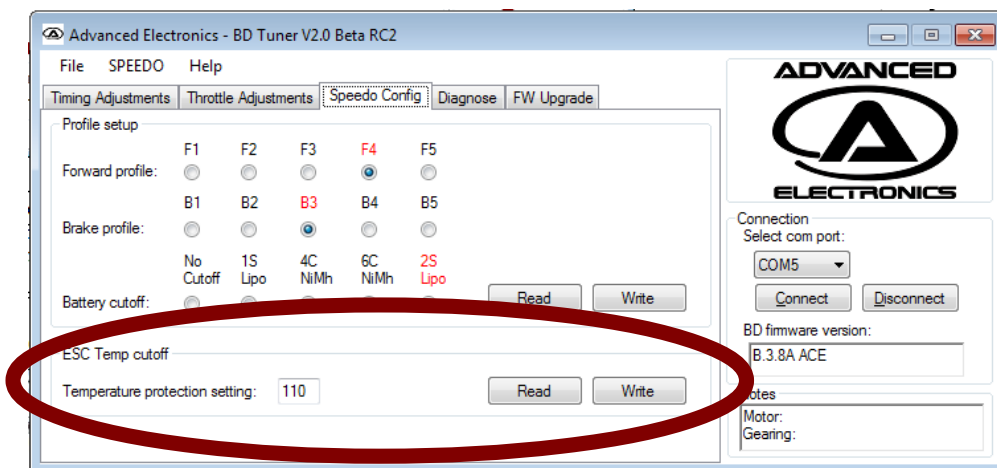
ESC Temp cutoff

Fig 14. Temperature cutoff

Here you can adjust the speedos temperature cutoff. Use with care! A value above 115 makes your speedo more sensitive and it might get permanent damage. **Use at own risk!**
Range that can be set is 50 – 125 degrees Celsius. If you reach temp cutoff first check that everything rotates freely and you are using correct gearing and not too much timing.

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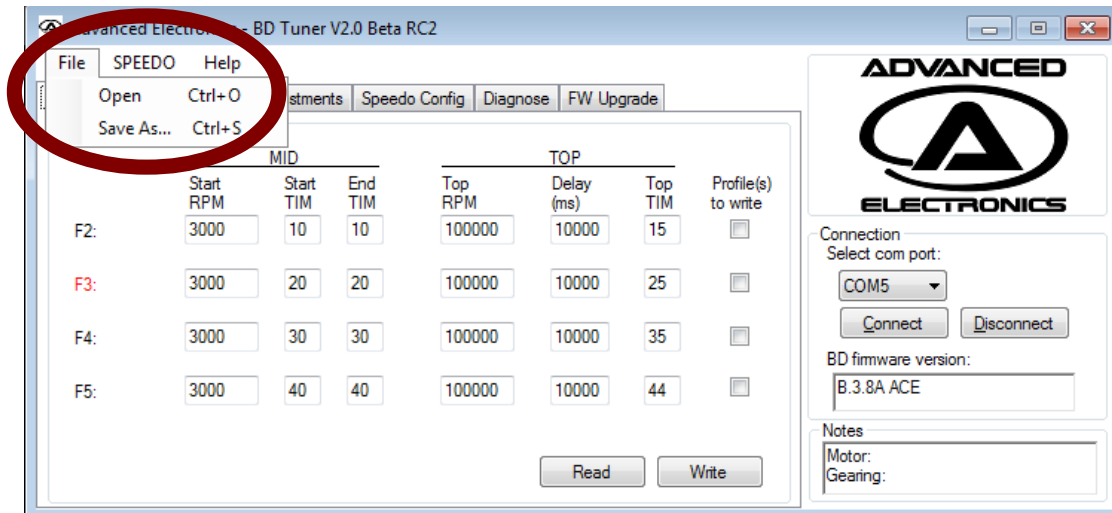
File Menu
Open/Save

Fig 15. File menu

You can save settings made in the program so you can prepare different setups at home and quickly open these at track for quick testing.

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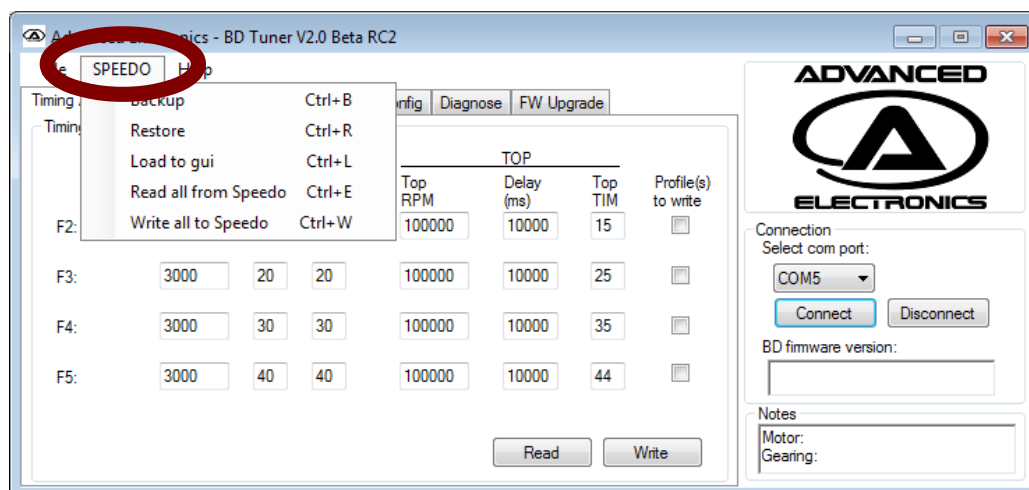PC software guide**

SPEEDO Menu
Backup/Restore

Fig 16. SPEEDO menu

This menu is used to backup and restore settings from/to your Speedo.

Backup (short cut: CTRL+B)
Backup stores all settings from speedo (including radio calibration) so you later on can restore your settings. It's handy to do a backup the first time after you have calibrated the radio then you have a "default" setup to return to.
Backup can also be used to quickly load settings to the speedo at the track. Prepare setups at home and load into the Speedo then do a backup. Change settings and load into speedo and do another backup with different name. At track you can then just do a restore with selected file to quickly load all settings into the speedo.
In the Notes text box blow BD firmware version box, you can type some notes about your setup, these will be stored when you do a backup.

Restore (short cut: CTRL+R)
Restore loads a backup file into the speedo and Notes (if any) into the Notes text box.

Load to gui (short cut: CTRL+L)
Loads a backup file to the program so you can review the settings and notes quickly.

Read all from Speedo (short cut: CTRL+E)
Reads all settings from speedo to program so you can see them.

Write all to Speedo (short cut: CTRL+W)
Writes all settings from program to Speedo.

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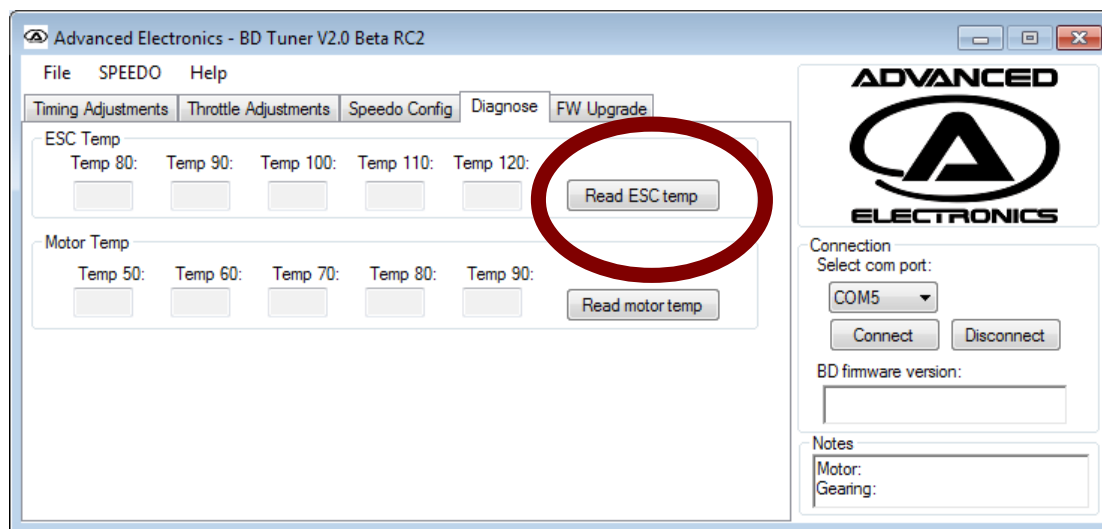PC software guide**

Diagnose -Temperature logger

Fig 17. Diagnose tab -Read temperatures

Under the Diagnose tab you find the temperature logger.
ESC Temp
When Read ESC Temp button is pressed the temperatures stored in speedo will be read. The values shown are the time in seconds the speedo has monitored temperature for each temperature interval. The first box (Temp 80) show the time for temperatures between 80 and 89 degrees Celsius. Next box (Temp 90) shows the time for temperature interval 90 to 99 degrees Celsius. This logger can be used to aid in the setup of gearing and timing.

To use the temperature logger you need to hold full brake for approx 5sec after a run (can be done any time during the race to store the temp at that time) **before you unplug power**.
Now the temperature is stored and can be read from program.

Motor Temp
This works in similar way as ESC Temp but does only work with Advanced Electronics Motors configured with temp sensor.

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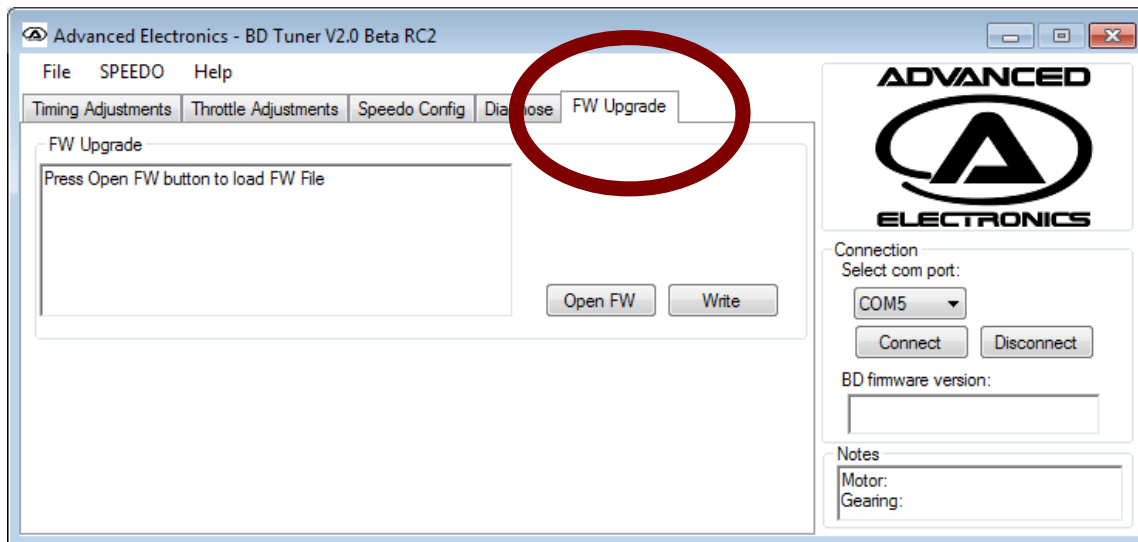PC software guide**

FW Upgrade

Fig 18. Diagnose tab -Read temperatures

Under the FW Upgrade tab you can load new FW into your speedo.

1. Press Open FW and select the fw file to upgrade your speedo.
2. Check Com port (if your not connected already) that it's correct.
3. Press Write. Upgrade will take 20-25sec
DON'T POWER OFF OR PRESS ANYTHING UNTIL READY.
4. When upgrade is finished the speedo will be connected and the BD firmware version text box will show the new fw version.

When we develop new Firmware for the speedo we release it on our web page:
www.advanced-electronics.se

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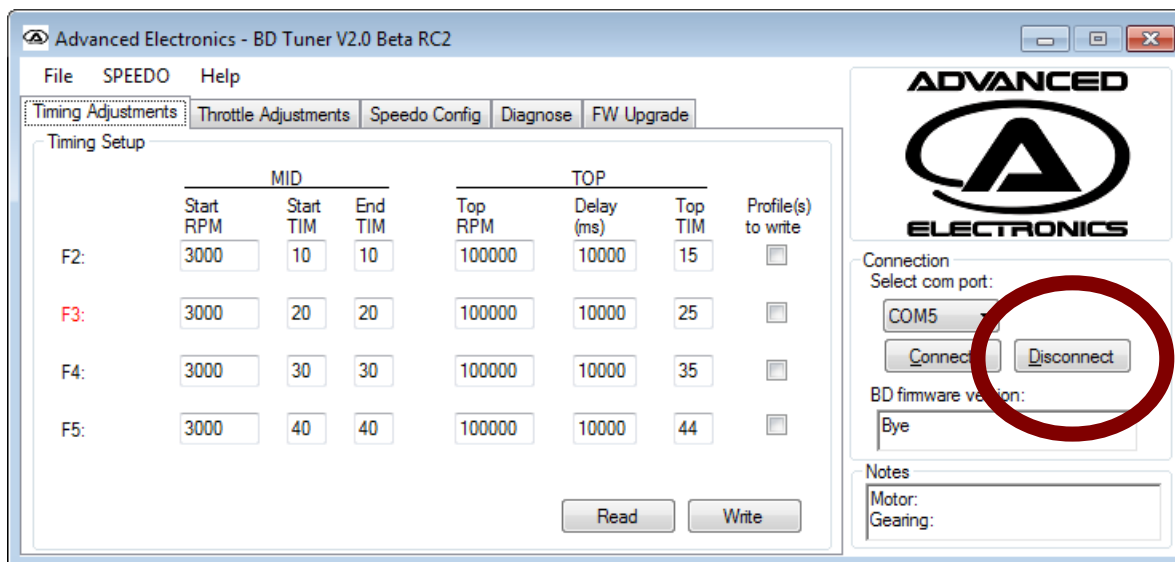## Disconnect and prepare for race!

Fig 19. Disconnect

Press disconnect and close program.
Remove power from speedo.
Speedo needs to be turned off before used in car after tuning with PC!

Disconnect cable from sensor connector and reconnect sensor cable from motor.
You are now ready to try the new settings.