

NEMESIS - TCS

Win-TC 4C Software manual v2.05 onwards

Nemesis-TCS / 4C Traction Control System

Revised for multi element files.

- BIKE
- TYRE
- CONFIG

This new release of WinTC-4C (4 cylinder only) provides a far easier interface for dealers and end users. No longer is it necessary to have a unique file for each bike and tyre configuration.

The user simply chooses the 'Bike' and then chooses a 'Tyre'. The software then assembles these elements for you.

IMPORTANT – To be read by ALL installers and owners

This software is only for use with Nemesis TCS – 4 cylinder systems.

Diagnostic light (certain Ducati models only)

The Nemesis TCS directly controls the ignition coils on your bike. The internal diagnostics will think there is a problem with the coils and activate the diagnostic light on your dashboard. There is no way to avoid this.

Terms of use

The presence of the Nemesis-TCS does not take away the responsibility of the rider to operate the bike correctly within their own abilities, the track conditions and the laws of physics.

The system is designed to achieve greater on-track performance by the use of power modulation during wheel slip events, but in no way should it be considered possible for the system to recover from every conceivable loss of grip. The onus for safety always rests with the rider to stay within his or her own abilities, and to ensure that the 'on-bike' equipment is programmed, setup correctly, and an appropriate TC level selected for the skill of the rider, the bike and the track conditions.

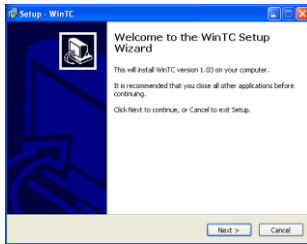
This equipment is intended for racing or track day performance use only and where exhaust emission controls are not applicable.

By installing and using the Nemesis-TCS you automatically indemnify Competition Systems Ltd, our suppliers and our authorised dealers from all first party or third party loss or damages. Normal components warranty is not affected.

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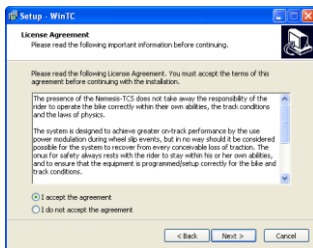
Author – Mick Boasman

3.00 Win-TC installation

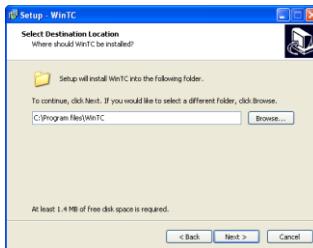


The Win-TC application software is provided in CD format and will Autorun when inserted into your PC. This software may be used on XP / XP-Pro / Vista / Windows 2007

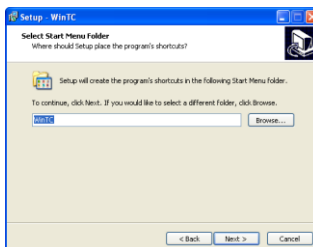
Press **Next** to continue



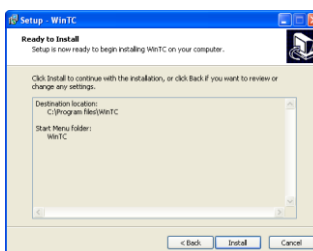
Press '**I accept the agreement**' only if you agree to abide by the terms of use and limitations of liability. Then press Next



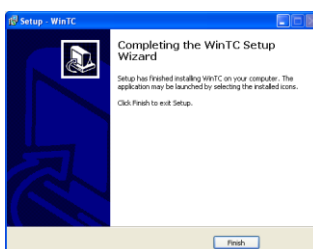
Choose to install in the default folder or any other folder of your choice. Then press **Next**



Use the default group name, or choose your own. Then press **Next**



Press **install** to begin the installation



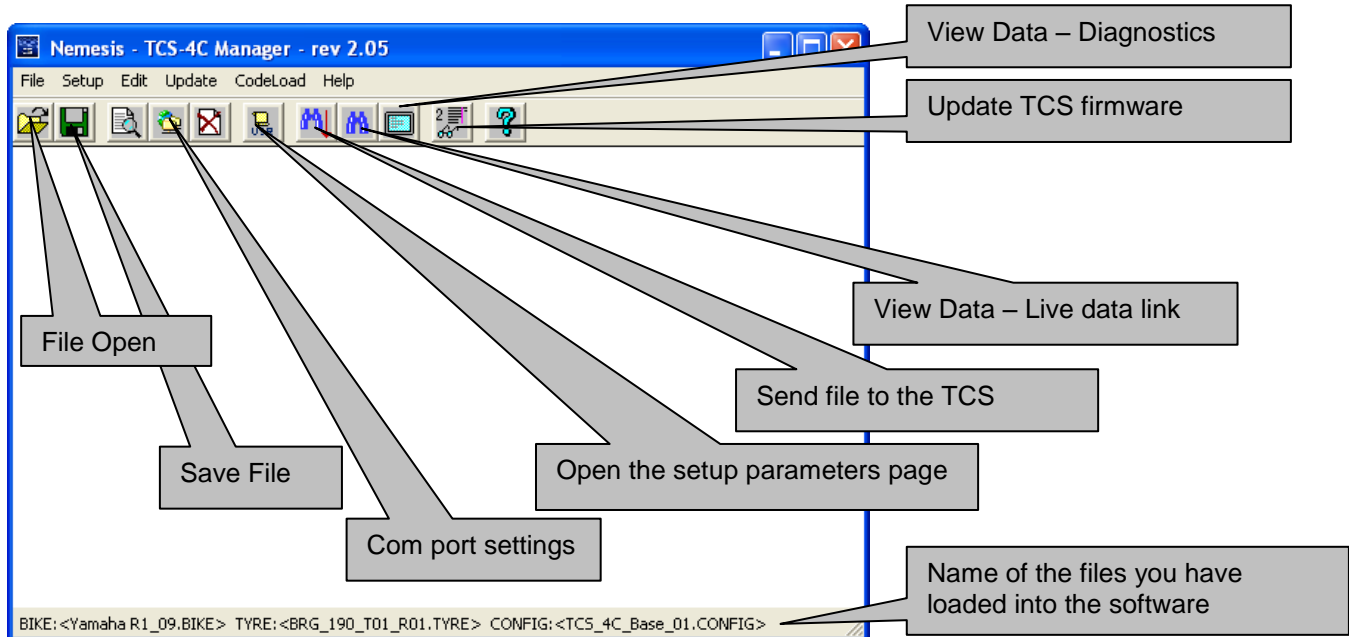
Installation completed.

Press Finish to complete the installation. You will now find a new program group called WinTC-4C and also a new desktop icon.

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Author – Mick Boasman

3.01 Win-TC (TCS Manger) overview



3.02 - Win-TC – System files

The latest version of WinTC (2.05 onwards for 4 cylinder application) splits the system files into 3 categories.

*.**BIKE** – These 'bike' files contain all information that is unique to the bike installation.

- Front teeth count
- Rear teeth count
- Sprocket teeth count (if applicable)
- TC strategy adjust (Weaker / Normal / Stronger)
- TPS position minimum (activation threshold for TC controls)
- Quick shift parameters
- All other hidden and non-editable TCS parameters)

*.**TYRE** – These 'tyre' files contain all information that is unique to the slip map and tyre size calibration

- Front tyre circumference
- Rear tyre circumference
- All other hidden and non-editable slip map controls

*.**CONFIG** – This file provides the TCS system with all other information that is not editable by the user. Any user who requires an adjustment to any of the following items must request a different CONFIG file from the base file that we supply.

- Diagnostic levels
- CAN bus controls
- Wheelie controls
- Activation level of TC Min speed
- TC strategies

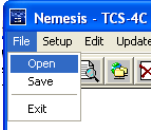
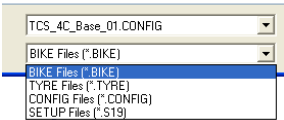
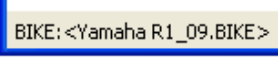
Before any work can be done with the WinTC system, the user must open each type of file.

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Author – Mick Boasman

3.03 Bike files

The bike file will look something like this **Yamaha R1_09.BIKE** , and can be loaded as follows:

	<p>From the upper menu, select File, then Open</p>
	<p>Use the 'pull down' menu and select the BIKE file option</p>
	<p>The file you have selected will be shown at the base of the page</p>

3.04 TYRE files

The tyre file will look something like this **BRG_200_T01_R01.TYRE**

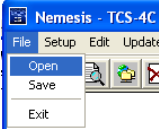
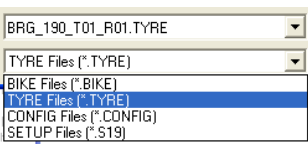
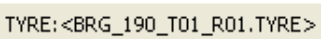
BRG BRIDGESTONE
 CON..... Continental
 DLP..... Dunlop
 MEZ..... Metzeler
 PIR..... Pirelli

The second number of the file is the tyre width 200(also covers 195), 190 and 180.

The third sequence Txx is the tyre model, which also covers other things such as tyre, profile, etc. The user should refer to the XL list for details of the different tyre model slip maps we have available. It looks like this example

map name	Front					Rear					Circ	Notes	
	dia	width	profile	rim	make	circ	dia	width	profile	rim			make
Bridgestone													
Bridgestone - 200 width													
BRG_200_T01_R01	17	120	70	3.5	Bridgestone Batlax	1752	16	200	55	6.25	Bridgestone Batlax	1835	desmo RR standard
Bridgestone - 190 width													
BRG_190_T01_R01	17	120	600	3.5	Bridgestone Slick	1752	17	190	645	6.0	Bridgestone Slick - 2010	1868	Slick race tyre
BRG_190_T02_R01	17	120	70	3.5	Bridgestone DOT R10 - Medium	1752	17	190	55	6.0	Bridgestone DOT R10 - Medium	1858	Treaded race tyre
Bridgestone - 180 width													
BRG_180_T01_R01	17	125	600	3.5	Bridgestone Slick	1752	17	180	645	5.5	Bridgestone Slick	1850	Slick race tyre
BRG_180_T02_R01	17	120	70	3.5	Bridgestone DOT race / med	1752	17	180	55	5.5	Bridgestone DOT race / med	1850	treaded race / road tyre
BRG_180_T03_R01	17	120	70	3.5	Bridgestone DOT race / soft	1752	17	180	55	5.5	Bridgestone DOT race / soft	1850	treaded race / road tyre
BRG_180_T04_R01	17	120	70	3.5	Bridgestone DOT R10 - Medium	1752	17	180	55	5.5	Bridgestone DOT R10 - Medium	1845	Treaded race tyre / low slip-thru
BRG_180_T05_R01	17	120	600	3.5	Bridgestone rain tyre	1752	17	180	640	5.5	Bridgestone rain tyre - 2010	1860	race wet
Continental													
Continental - 190 width													
CON_190_T01_R01	17	120	70	3.5	Continental RaceAttack 4206 - DOT	1752	17	190	55	6.0	Continental RaceAttack - Endurance 3610	1815	Treaded race tyre - DOT (same

To load a TYRE file

	<p>From the upper menu, select File, then Open</p>
	<p>Use the 'pull down' menu and select the TYRE file option</p>
	<p>The file you have selected will be shown at the base of the page</p>

The third set of characters Rxx, is the revision number of the TYRE slip map starting at R01 (revision 1)

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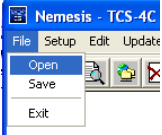
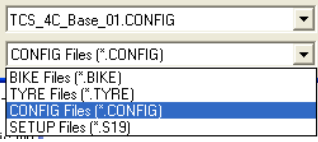
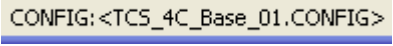
Author – Mick Boasman

3.05 CONFIG files

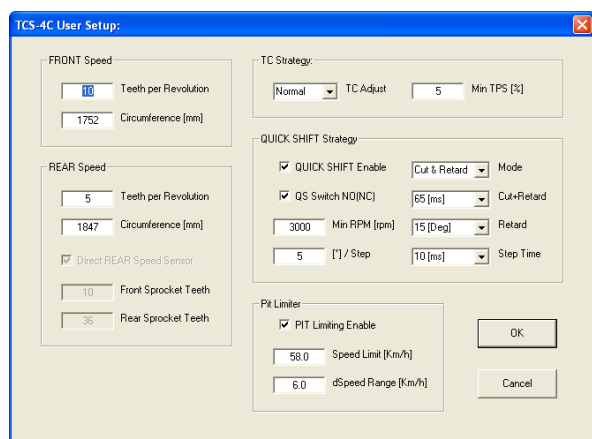
The Configuration file contains all other information and parameters that are required by the TCS system that are not considered as Bike or Tyre elements. It is however vital to have this file loaded for the system to function correctly.

All TCS installations use one common file called **TCS_4C_Base_01.CONFIG**.

This file should be loaded as follows:

	<p>From the upper menu, select File, then Open</p>
	<p>Use the 'pull down' menu and select the CONFIG file option</p>
	<p>The file you have selected will be shown at the base of the page</p>

Now that all three files have been selected the user is given the option to edit some parameters. The User setup window is automatically opened as seen here.



Note that editing or transmitting maps to the TCS module is not possible unless all three file types are loaded into WinTC.

To Save a file the user may Save either the Tyre elements or the Bike elements. To know which elements are stored in each file, refer to page 3 – Section 3.02

S19 files

An S19 file is an assembly of all three elements, tyre, bike, and configuration. The user may save these individual elements as a single entity assembly as an S19 file.

The user can also open and use previous S19 files from the first release of TCS-4C

Note that S19 files from TCS-2Cylinder which start with three numbers such as 111, or 117, or 118, or 120 must not be loaded or transmitted into TCS 4 cylinder version. Nor can S19 files generated within WinTC 2.05 be used in the 2-cylinder version.

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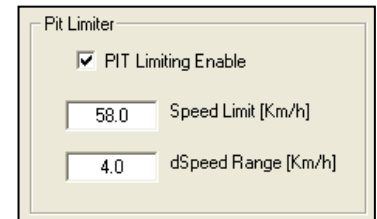
4.01 Win-TC / Pit speed limiter

The pit speed limiter can be activated by shorting together the 2 wires of the connector called PIT on the chassis-wiring loom supplied in your kit. Any type of 'normally open' switch can be used, or the dedicated switch CSP1041 shown below.

From the upper menu select **Edit**, followed by **TC Setup** to locate the Pit limiter settings.

The Pit lane speed limiter uses a the following parameters:

- Enable PIT Limiting. Tick the box to activate the pit limit system.
- Speed limit (km/h) – At this speed the TCS will start to cut cylinders which will be felt as a misfire.
- dSpeed range (km/h) – This value is added to the Speed Limit to create an upper boundary. If the bike reaches Speed limit + dSpeed range (eg: 60+6 = 66km/h) the majority of coil signals are cut. Between these 2 levels the cut becomes progressively more severe.
- To make the control softer, use a larger dSpeed range. 8 is the default setting.




The Pit limiter option is active whenever the bike front speed is between 30 and 100km/h.

The user must push and hold the Pit limiter switch for the system to remain active.

When the Pit limiter is active all blue LEDs are active on the TC-Pod for the duration that the button is held down.

If the button is held down for longer than 20 seconds it is presumed that the input or switch is damaged and a diagnostic message will appear on the Pod display. To save your changes, proceed as follows.

- Press **OK** to apply your changes.
- Press this button  to update the TCS module with your new map file.
- This process will take approx 6 seconds.
- During the transmission process and for 4 seconds afterwards the TC-Pod will flash an Error 5 and the bike cannot be started. This is perfectly normal.

The pit switch status (OFF or ON) can be viewed in real time within the **WinTC View Data** window, see section 10.01.

The pit limiter switch CSP1041 seen in this picture may be mounted to any convenient place accessible by the rider.



This item is an optional extra and not supplied as part of the kit.

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Author – Mick Boasman

5.01 Win-TC / Wheel speed

The Nemesis-TCS uses speed sensors for the front and rear wheels to determine slip. On some bike installations the rear speed is taken from a gearbox mounted sensor, in these cases the sprocket teeth count must be applied.

From the upper menu select **Edit**, followed by **TC Setup** to locate the wheel speed settings.

Rear Speed – The rear speed can be picked up in a number of ways, this is dependant on the specific bike installation.

- Existing sensor fitted to pick up from the rear wheel – we use this signal directly
- Existing sensor fitted top the gearbox or front sprocket cover plate – we use this signal and calculate from the final drive sprocket ratios
- No rear speed sensor - We provide a new sensor and mounting bracket**

**For these bikes we provide extra parameters for you to define the teeth count of the front and rear sprockets. It is VERY IMPORTANT that any changes to final drive gearing are entered into the TCS module or the rear speed will be calculated incorrectly. This of course has a significant affect on traction control. See also Note-2 below.

Front speed – The front speed can be picked up in a number of ways.

- Existing sensor fitted to pick up from the front wheel – we use this signal directly
- No front speed sensor - We provide a new sensor and mounting bracket

Front speed

- Teeth per revolution – Define the number of pick up teeth for one wheel revolution.
- Circumference – See Note-1 below.

Rear speed – Sensor of rear wheel (Direct)

- Teeth per revolution – Define the number of pick up teeth for one wheel revolution. See note 2 below
- Circumference – See Note-1 below.

Rear speed – Sensor on gearbox output

- Teeth per revolution – Define the number of pick up teeth for one revolution of the gearbox output shaft – See Note 2 below
- Circumference – See Note-1 below.
- Front sprocket teeth count
- Rear sprocket teeth count

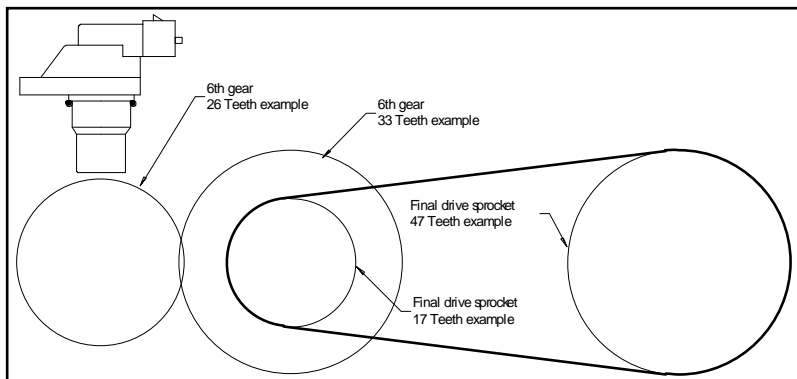
Note 1 - Circumference – These values are pre-defined by us in order to provide you with an accurately matched set of speed data when the bike is banked over. It should also be noted that we do not guarantee the speed to be correct, as we are more concerned with the relative speed of the front and rear wheels.

The tyre circumference you see here may not be exactly what you expect based on any static measurements you make. The value here is the rolling circumference when the bike is leaned over and under load.

The actual measured speed does not need to be very accurate; it only needs to be comparable with the rear wheel speed so that the front speed is 0.5% lower at the middle of the corner before the throttle is applied.

Tip – If using a BIKE setup designed for rear sprocket teeth count and you have moved the sensor to the rear wheel, set the sprocket teeth count to the same values eg: 10/10, and then apply the correct tooth count against 'teeth per revolution'

Note –2 Gearbox and final drive ratios. In this example the final drive sprockets are 17/47 with a 6th gear ratio of 26/33. The



sensor is mounted on the input shaft of the gearbox, which has 26 teeth. This practice is common on all Honda and Yamaha

To avoid the unnecessary complexity for the user of applying the 6th gear ratio, our software simply needs to know how many teeth will pass the sensor for one revolution of the output shaft. Which in this example is 33.

Any users who fit different 6th gear sets must take note of this and apply the correct value.

FRONT Speed	
<input type="text" value="10"/>	Teeth per Revolution
<input type="text" value="1752"/>	Circumference [mm]
REAR Speed	
<input type="text" value="5"/>	Teeth per Revolution
<input type="text" value="1815"/>	Circumference [mm]
<input checked="" type="checkbox"/>	Direct REAR Speed Sensor
<input type="text" value="10"/>	Front Sprocket Teeth
<input type="text" value="36"/>	Rear Sprocket Teeth

REAR Speed	
<input type="text" value="4"/>	Teeth per Revolution
<input type="text" value="1858"/>	Circumference [mm]
<input type="checkbox"/>	Direct REAR Speed Sensor
<input type="text" value="14"/>	Front Sprocket Teeth
<input type="text" value="44"/>	Rear Sprocket Teeth

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Wheel speed calibration - continued

Unless you use a data logger to measure this information using the 'CAN stream' we provide, your best solution for making adjustments yourself is to follow these rules, or use values provided by us and our dealers. Remember to try different map levels first.

Problem TCS activity is insufficient at the middle of the corner when throttle is applied.

Solution..... Increase the rear speed calibration in 0.5% steps until you achieve the results you want. This makes the TCS system think the rear wheel is faster, which is calculated as more slip, which gives greater levels of slip control.

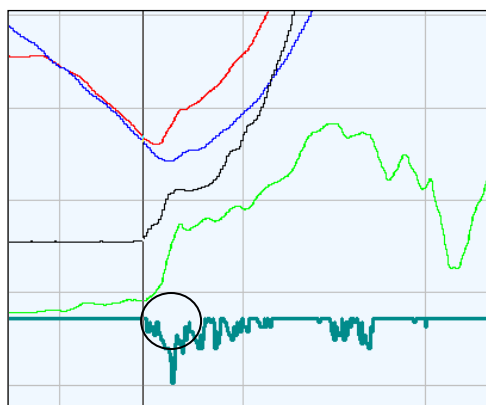
Problem TCS activity is excessive at the middle of the corner when throttle is applied.

Solution..... Decrease the rear speed calibration in 0.5% steps until you achieve the results you want. This makes the TCS system think the rear wheel is slower, which is calculated as less slip, which gives lower levels of slip control.

This race bike data shows the correct calibrated offset between front and rear on the approach to the apex of the corner.

At the point where the throttle is applied the system is already registering 0.5% slip and it reacts accordingly to this and the subsequent rise in slip as the throttle is applied.


The sudden rise in measured slip is correct and also necessary in order to achieve propulsion out of the corner. It can also be seen as a gradual increase as the bike accelerates and lifts up out of the corner.



This same piece of data is shown along with a bold graph showing the TCS system response (power reduction) as an example of correct operation.

This data is interesting because you can see a significant correction in the circled area, yet the wheel slip is far lower at this point than later on when the bike powers out of the corner.

This is the result of the sensors telling the TCS that the bike is in the middle of the corner and banked over, so a far greater response should be applied.

- Press **OK** to apply your changes.
- Press this button  to update the TCS module with your new map file.
- This process will take approx 6 seconds.
- During the transmission process and for 4 seconds afterwards the TC-

Pod will flash an Error 5 and the bike cannot be started. This is perfectly normal.

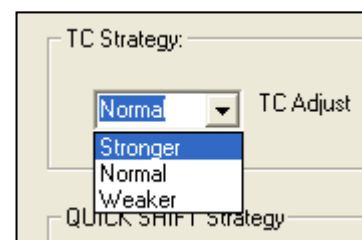
Note that in the majority of cases it is not necessary to adjust this yourself as we have already defined these parameters for a wide variety of tyre makes, models and sizes.

To achieve more of less control that the Normal slip maps provide during mid corner and accelerating out of corners the TCS-4c systems give the user a Stronger / Normal / Weaker option

Normal– Default on all maps (wet and dry)

Stronger - Should be applied by the user (or installer) when using WET tyre maps

Weaker – For dry use by professional racers only.



The wheel speed from front and rear can be viewed in real time within the **WinTC View Data** window, see section 10.01. But you may need to spin the wheels faster than 15kmh.

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6.01 Win-TC / Throttle

The throttle input is used along with Speed and RPM thresholds to define when the TCS system should, and should not be active.

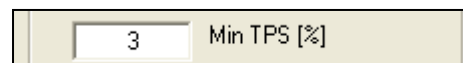
The RPM and Speed thresholds are fixed within your pre-loaded TCS map and are dependent on the type of bike. No adjustment is necessary.

TC Speed On = Above 34 kmh


TC RPM On = Above 3000 rpm

For the majority of users we apply a default value for throttle activation as part of the map for your bike and adjustment is not necessary. However, users of Win-TC are able to define this parameter to fix the threshold slightly above the closed throttle value.

Firstly the value of closed throttle should be viewed using the **View Data** window, See section 10.01. The Throttle activation point should then be adjusted to 3% above the closed throttle value.



To save your changes, proceed as follows.

- Press **OK** to apply your changes.
- Press this button  to update the TCS module with your new map file.
- This process will take approx 6 seconds.
- During the transmission process and for 4 seconds afterwards the TC-Pod will flash an Error 5 and the bike cannot be started. This is perfectly normal.

Analogue throttle information is picked up directly from the sensor and pre-defined within the TCS map. Typically the traction control activation point is preset at approx 3deg of throttle.

We apply default calibrations for the throttle based on average data from your model of bike. But it really does not matter if your base throttle value is at 6%, providing the activation point is set 3% above this.

If a TPS value below -5% and above 105% is seen by the system the rider will be shown a diagnostic message on the TC-Pod display.

7.01 Win-TC / Quick shifter

The TCS system is able to use any external quick shifter system that is able to provide a 'short to ground' output signal, or a signal that is normally closed with ground but goes open circuit when pressed.

From the upper menu select **Edit**, followed by **TC Setup** to locate the throttle setting.

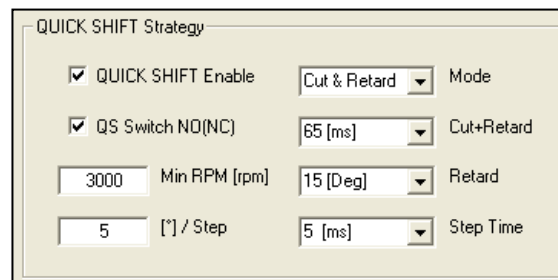
Within the Win-TC software you can choose to have

- Cut only
- Retard only
- Cut and retard

Cut / Retard time

If **Cut** mode is selected the ignition is cut for duration chosen by the user.

- 1) 40msec
- 2) 45msec
- 3) 50msec
- 4) 55msec
- 5) 60msec
- 6) 65msec - Default
- 7) 70msec
- 8) 75msec



QUICK SHIFT Strategy

<input checked="" type="checkbox"/> QUICK SHIFT Enable	Cut & Retard	Mode
<input checked="" type="checkbox"/> QS Switch NO(NC)	65 [ms]	Cut+Retard
3000 Min RPM [rpm]	15 [Deg]	Retard
5 [°] / Step	5 [ms]	Step Time

The cut starts as soon as the signal is seen from the shifter system. Further shifts are inhibited for 300msec after the end of the preceding shift.

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Shifter - continued

Ignition Retard

If **Retard** only mode is chosen the ignition continues to fire the coils but with a retard applied, as chosen by the user. The duration for the retard is defined by the Cut / Retard time above

- 1) No retard
- 2) 5deg retard
- 3) 10deg retard
- 4) 15deg retard - default
- 5) 20deg retard
- 6) 30deg retard
- 7) 40deg retard
- 8) 50deg retard

Retard return slope – Step time

The retard return slope defines how fast the ignition returns to normal timing after a 'Retard' event and is defined in this table. This ramp allows a gradual return to full power rather than a rapid return which is beneficial especially in the wet. The **Step time** is how long each return step is held for. And the Step value is how many degrees of ignition advance per step

- 1) No ramp return
- 2) 5msec
- 3) 10msec - default
- 4) 15msec
- 5) 20msec
- 6) 25msec

Notes


- The default setting is:
 - Ignition Cut – 65msec.
 - Retard – 15deg.
 - 5 degree every 10msec 'return to normal' slope.
- The use of a large retard can cause post combustion in the exhaust leading to banging.
- One 720 degree engine rotation at 11000rpm = 10.9msec.

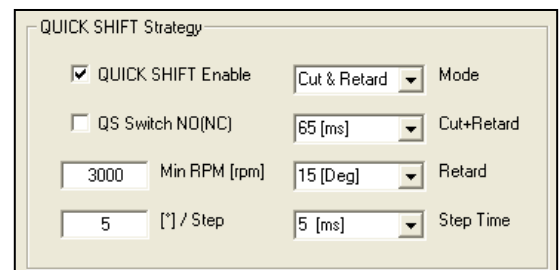
Shifter switch types

The shift input can be programmed for use with the following type of switch:

- Switch that is 'normally closed' and opens the circuit when the shift level is pressed such as the Ducati Corse load-sensing lever.
- Switch that is 'normally open' and closes the circuit when the shift level is pressed such as the Nemesis shifters.

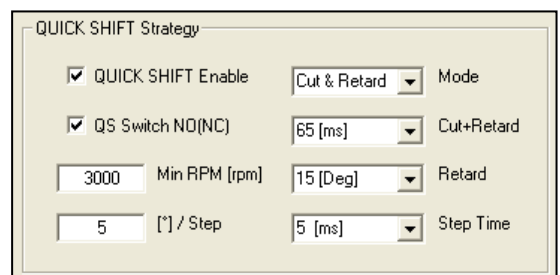
The quick shifter status can be viewed in real time within the **WinTC View**

- Press **OK** to apply your changes.
- Press this button  to update the TCS module with your new map file.
- This process will take approx 6 seconds.
- During the transmission process and for 4 seconds afterwards the TC-Pod will flash an Error 5 and the bike cannot be started. This is perfectly normal.



QUICK SHIFT Strategy

<input checked="" type="checkbox"/> QUICK SHIFT Enable	Cut & Retard	Mode
<input type="checkbox"/> QS Switch NO(NC)	65 [ms]	Cut+Retard
3000 Min RPM [rpm]	15 [Deg]	Retard
5 [°] / Step	5 [ms]	Step Time



QUICK SHIFT Strategy

<input checked="" type="checkbox"/> QUICK SHIFT Enable	Cut & Retard	Mode
<input checked="" type="checkbox"/> QS Switch NO(NC)	65 [ms]	Cut+Retard
3000 Min RPM [rpm]	15 [Deg]	Retard
5 [°] / Step	5 [ms]	Step Time

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Author – Mick Boasman

7.02 Shift / examples.

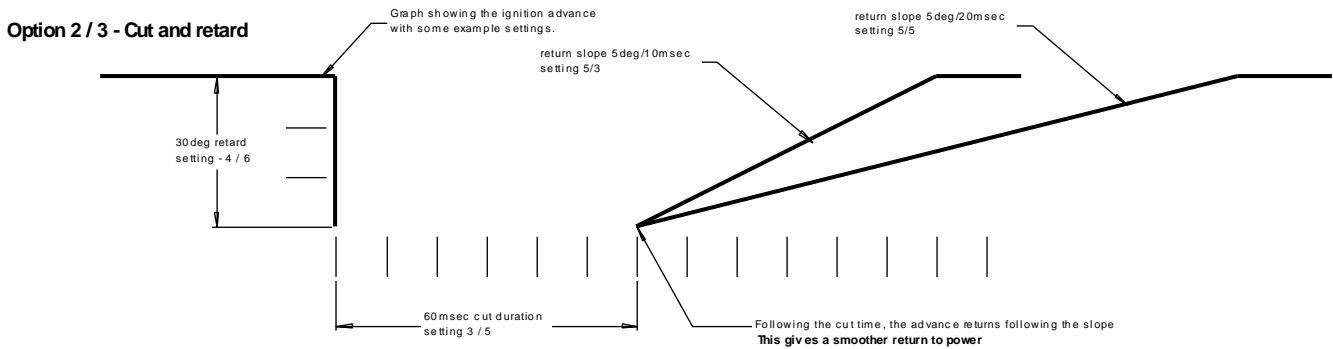
In this example I have chosen a cut and retard.

The ignition is removed for 60msec.

When the ignition is re-activated there is a 'retard' of 30deg to make the power come back in at a lower level, and then a slope to return the power back to normal levels.

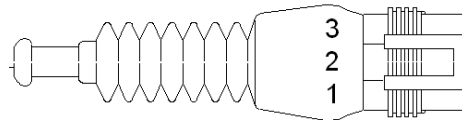
This stops the bike breaking traction after a shift by applying all of the power very quickly.

Note that the following diagrams shows a sloped return, in reality these are steps.



Shift connector.

1	Battery +	red
2	ground	black
3	signal	white

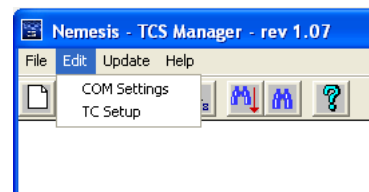


8.01 USB Interface – Driver installation / Com port

The **WinTC-USB** interface cable is a dedicated device for PC communication between the **Win-TC** software and the TCS hardware on the bike. Note that communication is only possible with the bike ignition switched on.

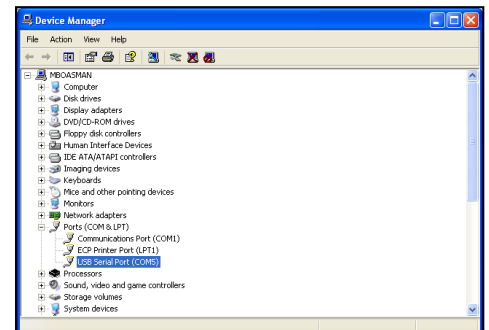
Plug in the **WinTC-USB** to any available USB port on your PC, it will say '**new hardware found**' and start installing the software drivers for this device. If your PC does not find a correct driver for this part it can be found on the **Win-TC** CD under the 'Drivers' folder.

When the device is installed correctly you should open the **System / Device manager** in the **Control panel** and see which COM Port number has been applied to this new device. In the example shown to the right the USB Serial Port has been given the number 1 so the Win-TC software should be set as follows:



Select **Edit** from the upper menu followed by **COM settings**.

Set the **COM line** to the correct number.



Do not change the **Baud Rate**


Note – The Win-TC software only permits the use of Com port 1>22. If your WinTC-USB adaptor is given a Com port number higher than this you should use the advanced settings of your Com Port hardware manager to apply a different number.

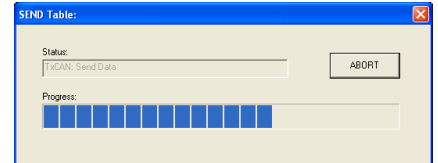
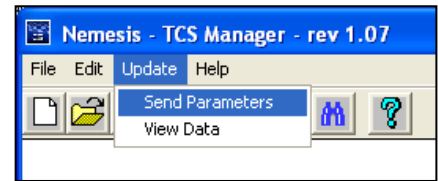
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Author – Mick Boasman

9.01 Win-TC / Files – Transmitting the files to the TCS module


To transmit a new map file to the TC module.

- Turn on bike power.
- Load a BIKE, TYRE and Config file (or an assembled S19 file)
- Connect the WinTC-USB adaptor between your PC and Bike.
- Wait until the TC-Pod has completed the start up sequence.
- Press the Send Parameters option, or this button ----- 
- A progress bar will appear and indicate when the transmission is completed.
- During the transmission process and for 4 seconds afterwards the TC-Pod will flash an Error 5 and the bike cannot be started. This is perfectly normal.

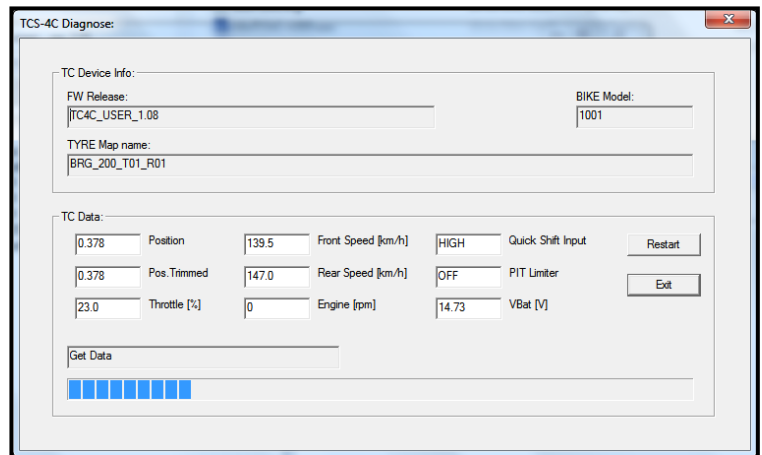


Systems Type Hardware version
 Bike..... Bike model.
 Bike position Position and orientation of the TC Module on the bike.
 Specification bike (tyre, or other variation) in specification.
 Release..... Slip map update level, incremented if we make changes.

10.01 TC View Data

From the upper menu select this icon  to open this window.

This window provides real time data from the primary system inputs and allows you to check that the installation has been done correctly.



FW Release Internal firmware release of the TC module.
 Tyre MAP Name Name of the slip map as loaded by you or your dealer.
 Bike Model..... Internal reference number relating to the bike model you have loaded

TC Data

Vbat Internal monitor of system voltage (may be up to 200mV different from the battery).
 Position Internal position sensor with value offset specific to the bike installation.
 Throttle Internally calibrated throttle angle, should be between minus 2 and plus 2.5 with the throttle closed. If not, contact your dealer. The max value can be anywhere between 90 and 110 and is mostly not important.
 Front speed..... Value in Km/h – minimum measurable value is 11km/h.
 Rear speed Value in Km/h – minimum measurable value is 11km/h.
 Quick shift Turns from HIGH to LOW or LOW to HIGH depending on the type of shifter.
 Speed limit Pit limiter switch status OFF or ON.

The bar graph at the bottom of the screen moves continually when the system is communicating with the TCS module.