

**Perfect
Power**
www.perfectpower.com



SmartTuner
SMT 6

DOS Operations Manual

Version: 1.1



Table of Contents:

Page no:

1.	SOFTWARE INSTALLATION	1
2.	PROTECTION	2
3.	SCREEN EXPLANATIONS	2
3.1	ANALOG MAP (F1)	3
3.1	COMMON DISPLAY	3
3.2	INJECTION MAP (F2).....	4
3.3	IGNITION (F3)	5
3.4	GLOBAL (F4) SCREEN.....	6
3.5	GLOBAL MAP DETAILS.....	7
4.	CONNECTING TO THE SMT6	8
5.	TUNING COMMANDS	9
6.	SETTING THE ANALOG DEFLECTION (CALIBRATION)	10
6.1	ANALOG DEFLECTION CALIBRATION	10
7.	SETTING THE RPM DEFLECTION (CALIBRATION)	11
8.	MAP SWITCHING	11
9.	SAVING A MAP FOR FURTHER REFERENCE	12
10.	SMT6 MONITOR SOFTWARE MANUAL (SM)	13
10.1	INTRODUCTION.....	13
10.2	GETTING STARTED	13
10.3	CONFIGURATION	15
10.4	DATA LOGGING.....	16
10.5	CONVERTING DATA FOR USE IN EXCEL.	16

1. SOFTWARE INSTALLATION

By now you should have "UN-ZIPPED" the download file from the Internet and the following files should be included:

SMT.EXE	Executable, tuning program
SMT.CFG	Configuration file
SMTGL.SCN	Global screen layout
SMTAN.SCN	Fuel screen layout
SMTIG.SCN	Ignition screen layout
SMTIN.SCN	Injection screen layout
SMT.HLP	Help file, short version
LOADSMT6.BAT	Batch file to install the software

The program starts on any PC in DOS. If not re-install it by:

```
A:loadSMT6
```

The SMT6 program runs after loading. If you like to start the program again, then:

Change to the subdirectory: CD \TUNE

Start the program: SMT

Exit the program: Esc

All tuning software is installed in a
Directory C:\TUNE

Do not choose any different name or location.

File Naming conventions:

.SCN	A screen file. You may change the wording in the screen but not the location of the variables
.CFG	The configuration files. This file is protected, and no changes are allowed, except to the port numbers
.ULB	A library file
.UMP	A tune map
.EXE	This is the tuning program
.HLP	A short help file. It can be printed. Not protected
.TMP	A temporary saved library file. See Protection .

It is suggested that the original download be saved, so that you can re-install it at any given time. New downloads are available at: www.perfectpower.com/downloads.htm or www.perfectpower.com/products/SMT6.asp

2. PROTECTION

A SMT6 is shipped "OPEN" from PERFECT POWER. That is to say that the "NO TUNE" option is disabled.

The "NO TUNE" option can be invoked by a dealer, who has a "customized" configuration file (SMT.CFG) specific for him. Once a tune map is downloaded to the SMT6, then the "NO TUNE" option is set in the SMT6. Once the SMT6 is in the no-tune mode, it will not display any map information or allow any tuning.

The units are "BRANDED" before shipment to the neutral "PERFECT POWER" name. The branding can be changed by the customized configuration file (SMT.CFG).

A customer, who "re-tunes" the map, will reset the branding (company name) of the unit to the neutral name.

3. SCREEN EXPLANATIONS

Once the program runs on the PC under DOS, a SCREEN is displayed (with blanks). Three screens can be selected with the FUNCTION KEYS F1 to F3, as indicated on the bottom of each screen.

The function keys select

F1	ANALOG	Analog map display.
F2	INJECT	Injection map display
F3	IGN	Ignition map display
F4	GLOBAL	Global parameters
F5	LOGG	Start recording log file
F6	F-UP	Fuel up. This works only while the engine is running. The fuel is incremented at the indicated engine operating point.
F7	F-DOWN	Fuel down. As above. Decreases the fuel.
F8	I-UP	Ignition up. As above. Increases (advances) the ignition.
F9	I-DOWN	Ignition down. As above. Decreases (retards) the ignition.

The above functions are available on all maps, except the injection (F2).

- Ign. Mod** : Ignition modifier. The ignition map value, which is used at present. A ZERO means NO modification.
- No Tune** : Shows that the SMT6 can't be tuned.
- Mode bad** : The operating mode is bad. Reload the library.
- RPM bad** : The received RPM can't be processed. It is too high or too low.
- Ign. bad** : The ignition calculation has resulted in an overflow. Check your ignition map!
- StoreSel** : The map selected (A or B)
- Version** : The SMT6 software version

3.2 INJECTION MAP (F2)

It shows the same number and layout as the fuel map:

SMART TUNER SMT6:										WWW.PERFECTPOWER.COM	
Dscr: THIS IS A ZERO MAP, IT DOES NOTHING										zero	
Map: THIS MAP "A" DESCRIPTION CAN BE 64 CHARACTERS LO										C zero	
Analog deflection (%)										INJECTION	
AnaDefl: 100 %	7	16	28	41	53	65	77	90			
Rpm: 4672	0	0	0	0	0	0	0	0	7017	1.00	1.00
An Input: 8.55 V	0	0	0	0	0	0	0	0	6584	1.00	0.95
Eng Temp: 36	0	0	0	0	0	0	0	0	6168	1.00	0.89
AMP: 1	0	0	0	0	0	0	0	0	5744	1.00	0.84
AFR:11 7 1.00V	0	0	0	0	0	0	0	0	5303	1.00	0.79
AnOutput: 8.55 V	0	0	0	0	0	0	0	0	4883	1.00	0.73
Fuelmod: 0	0	0	0	0	0	0	0	0	4456	1.00	0.68
Inject: 0	0	0	0	0	0	0	0	0	4027	1.00	0.63
Ignmod: 0	0	0	0	0	0	0	0	0	3595	1.00	0.57
	0	0	0	0	0	0	0	0	3167	1.00	0.52
No Tune:	0	0	0	0	0	0	0	0	2738	1.00	0.47
Mode bad:	0	0	0	0	0	0	0	0	2311	1.00	0.41
RPM bad:	0	0	0	0	0	0	0	0	1884	1.00	0.36
Ign bad:	0	0	0	0	0	0	0	0	1456	1.00	0.31
StoreSel: A	0	0	0	0	0	0	0	0	1028	1.00	0.25
Version: 255	0	0	0	0	0	0	0	0	600	1.00	0.20
									RPM		F_AMP
Error:										SmtLib=	

3.3 IGNITION (F3)

The analog deflection (8) and RPM (16) steps result in 128 ignition modification sites. If not needed make all values zero! (CI command)

```

SMART TUNER SMT6:                               WWW PERFECTPOWER COM
Dscr: THIS IS A MEANINGLESS MAP, IT TEST ALL VALUES
Map: JUNK MAP DATA          JUST TESTING, WILL A ENGINE RUN WITH IT ???
      Analog deflection (%)                                IGNITION
AnaDefl: 84 %          7  16  28  41  53  65  77  90
Rpm: ?????          0  0  0  0  0  0  0  0  0  7017  -1  0.70
AN Input: 0.78 V      0  0  0  0  0  0  0  0  0  6584  -1  0.67
Eng Temp: 127         0  0  0  0  0  0  0  0  0  6168  -1  0.63
AMP: 0.25             0  0  0  0  0  0  0  0  0  5744  -1  0.60
AFR:26 4 0.00V       0  0  0  0  0  0  0  0  0  5303  -1  0.57
An Out : 0.82 V      0  0  0  0  0  0  0  0  0  4883  -1  0.53
An mod: 4             0  0  0  0  0  0  0  0  0  4456  -1  0.50
Inject: 0             0  0  0  0  0  0  0  0  0  4027  -1  0.47
Ignmod: 0             0  0  0  0  0  0  0  0  0  3595  -1  0.43
                   0  0  0  0  0  0  0  0  0  3167  -1  0.40
No Tune:             0  0  0  0  0  0  0  0  0  2738  -1  0.37
Mode bad:            0  0  0  0  0  0  0  0  0  2311  -1  0.33
RPM bad: X           0  0  0  0  0  0  0  0  0  1884  -1  0.30
Ign bad:             0  0  0  0  0  0  0  0  0  1456  -1  0.27
StoreSel: A          0  0  0  0  0  0  0  0  0  1028  -1  0.23
Version: 0           0  0  0  0  0  0  0  0  0  600   -1  0.20
                                RPM      I_AMP
Error:

```

Again, the SMT6 data are displayed on the left-hand side.

Only positive numbers can be entered in the range 0-255, which results in opening the external injector (drive) for $n \cdot 0.1$ ms.

3.4 GLOBAL (F4) SCREEN

SMART TUNER SMT6: WWW PERFECTPOWER.COM
 Dscr: THIS IS A MEANINGLESS MAP, IT TEST ALL VALUES
 Map: JUNK MAP DATA JUST TESTING, WILL A ENGINE RUN WITH IT ???

GLOBAL PARAMETERS

AnaDefl: 84	Road speed div: 99	Operations mode: 10	Pos in pol: Y
Rpm: ?????	Road speed limit: 0	Cylinders: 4	Pos out pol: Y
AN Input: 0.78 V	Analog zero: 0	Teeth per rev : 2	Low levl in:
Eng Temp: 126	Ign Dwell time : 0.0	Teeth per fire: 1	High freq:
AMP: 0.25	Fuel upper limit:9.99	Ign adv limit: 12	Low diviat :
AFR:26 4 0.00V	Fuel lower limit:0.12	Ign ret limit: -12	Interlaced:
AN Out : 0.82 V	Fuel freq limit: 7.0 KHz		One Miss T:
An mod: 4			Multi coil:
Inject: 0	RPM limit:		Nox (inject):
Ignmod: 0	Temperature limit:	Test dates Init	Lambda inp :
	AMP limit:	_____	Lambda unl : Y
No Tune:	Deflection limit: 50		:
Mode bad:	: 255		:
RPM bad: X	: 255		:
Ign bad:	: 255		:
StoreSel: A	: 255		:
Version: 0	: 255		:

Error:

On the left-hand side the SMT6 data are displayed.

The following map details may not be accessible to you: See [Protection](#).

3.5 GLOBAL MAP DETAILS

Cylinders:

3,4,5,6,8,10 cylinders are allowed. Note that change in cylinders also changes the RPM scale.

Fuel zero calibration:

A number, normally 0, which must be changed up or down so that the fuel input equals the fuel output. This is done by connecting a voltmeter BETWEEN the terminals and changing the number until the voltmeter reads zero.

Operations mode:

A number, which specifies the operating mode for the SMT6 only. See SMT6 technical manual.

Teeth per turn:

Enter the amount of teeth per revolution, e.g. 60. **Note: The number must be even divisible by 4.**

Road speed deviation:

The number typed in specifies the percent deviation between the input and output signal (frequency!). A -10% entry results in a 10% slower output signal than the input.

Teeth per firing:

The number of input pulses (teeth) per firing. It influences the RPM indication.

Fuel upper/lower limit:

The fuel output can be limited between the specified voltage settings. The range is limited from 0.0 to 10 volts.

Upper frequency limit:

The output frequency can be limited to this value.

Ignition limit:

The amount by which the ignition can be retarded or advanced. Advance requires a positive limit, retard is specified with a negative limit.

Road Speed limit:

A number, which restricts the speed governor, output frequency. The lower the number, the higher the speed is. The speed limit can be set by driving the car close to the ECU road speed governor limit and pressing SL.

Max. Rpm experienced:

The highest rpm encountered.

4. CONNECTING TO THE SMT6

You need a SMT6 tune cable, which is available from your distributor.

In order to work (initially) with the SMT6, connect power to it.

BLACK WIRE Ground, or NEGATIVE (-) of battery
RED WIRE +12 Volt, POSITIVE (+) if battery

Connect the tune cable and start the SMT6 program. You should see the top left hand side of the screen fill with numbers (may be zeros). If this does not happen, then the COMMS PORT must be changed. That is to say, you have connected the cable to port #2, but the software "talks" on port #1 (or vice versa). You can plug the cable in to the other port (if you have one) or you can tell the software to select the other port. Ask your PC laptop supplier if the internal mouse is installed on port #1, and let him solve a port conflict problem.

To change the software port: open the SMT.CFG file with a text editor and change the port number on the file.

DO NOT CHANGE ANYTHING BEFORE THIS! IT RENDERS THE FILE USELESS AND REQUIRES RE-INSTALLATION.

5. TUNING COMMANDS

Start the program	SMT
Exit the program	F10, or ESC
Loading a map from the hard disk	LF name
Saving a map to the hard disk	SF name

Note1: do not use any file extension!

Downloading a map to the SMT6	PG
*Uploading a map from the SMT6	UP
Reset the SMT6	XX
*Set the RPM scale start	RL nnnn (no less than 600rpm)
*Set the RPM scale end	RH nnnn
*Set the analog deflection scale start	DL %
*Set the analog deflection scale end	DH %
*Set a analog deflection point	DM p %
Set column to value	SC val
Set speed governor maximum	SS nnn
Set the SMT6 to map A	MA
Set the SMT6 to map B	MB
Set map indication	MI (text) 64
Set description	DE (text) 64
Set temperature calibration low	TL p dis (cnt)
Set temperature calibration high	TH p dis (cnt)
Set AMP calibration low	AL p dis (cnt)
Set AMP calibration high	AH p dis (cnt)
Read maximum recordings	RR
Reset maximum recordings	RH
Read test dates	RT

6. SETTING THE ANALOG DEFLECTION (CALIBRATION)

This function may not work on your SMT6, if you are having a pre-programmed unit: See [Protection](#).

The analog deflection input (brown wire) has a range of 0 to 5V. It can be connected to any voltage source (DC), which changes with the engine load. The change can be less than 5 volts, and the unit can be calibrated to the input. If the input is larger than 5 volts, then a suitable resistor divider must be used.

6.1 ANALOG DEFLECTION CALIBRATION

This procedure is required to link the analog deflection detection to the cursor row movement. The analog voltage for this movement may come from:

ANALOG AIRFLOW METER
Throttle sensor
Other

The voltage is normally LOAD dependant, but anything can be used.

1. Put the engine to IDLE, or no LOAD, or throttle closed and read of the percentage displayed under: **AnaDefl: ss%**
2. Type in DL ss, where ss is the number just read from the display.
3. Put the engine under full load, or throttle wide open, and read the number Displayed under: **Ana.Defl:ee%**
4. Type DH ee, where ee is the number just read from the display.
5. This completes the calibration.
6. Obviously, you can enter other analog deflection limits to achieve the desired effect. The SMT6 will do a linear extrapolation for the 6 points in between.

It is possible to set any analog deflection point, thus spreading the mid section of the scale. The command is:

DM p %

Where: p = position 0-7
% = percentage throttle

It is the operator's responsibility to assure that the percentages are logical: the lowest on the left at position 0.

7. SETTING THE RPM DEFLECTION (CALIBRATION)

The RPM deflection input is also the IGNITION #1 input. The input level can be set later. However, before setting the RPM deflection (scale), the number of cylinders MUST be entered in the GLOBAL screen (F3). Then decide on the minimum and maximum RPM you like to TUNE. This does not have to be the range the engine is operating in, but should be the range you like to TUNE. The DOS version assumes linear steps between the minimum and maximum points. In the WINDOWS version each point can be set individual.

Set minimum (low, bottom) RPM deflection (scale) RL nnnn (no less than 600rpm)
Set Maximum (high, top) RPM deflection (scale) RH nnnn

If the unit is connected, then the changes are transmitted and stored in the unit. If a unit is not connected, then it is best to save the map (changes).

8. MAP SWITCHING

The SMT6 has two complete tuning maps, which can be selected by switching the GREY wire to ground.

Switch open	A map
Switch closed (ground)	B map

Switching the map from a switch is called a hardware map switch.

The map can be switched while driving.

The map can also be switched from the PC with the MA and MB commands. This will select the desired map, but the SMT6 will revert back to the switch map when:

- a) the unit is reset
- b) the unit is powered up
- c) the switch is operated

Switching the map from PC is called a software map switch.

Thus the map can be switched while tuning the SMT6 via the PC from hardware or software.

The selected map is indicated on the left side of the screen (bottom).

Map switching is not effective when the SMT6 unit is not running.

10. SMT6 MONITOR SOFTWARE MANUAL (SM)

10.1 INTRODUCTION

The SMT6 monitor software gives the SMT6 user the ability to view vital input and output signals real time all at the same time. The software does this by displaying graphs derived from data received from the unit through the comm's port of a laptop or pc.

10.2 GETTING STARTED

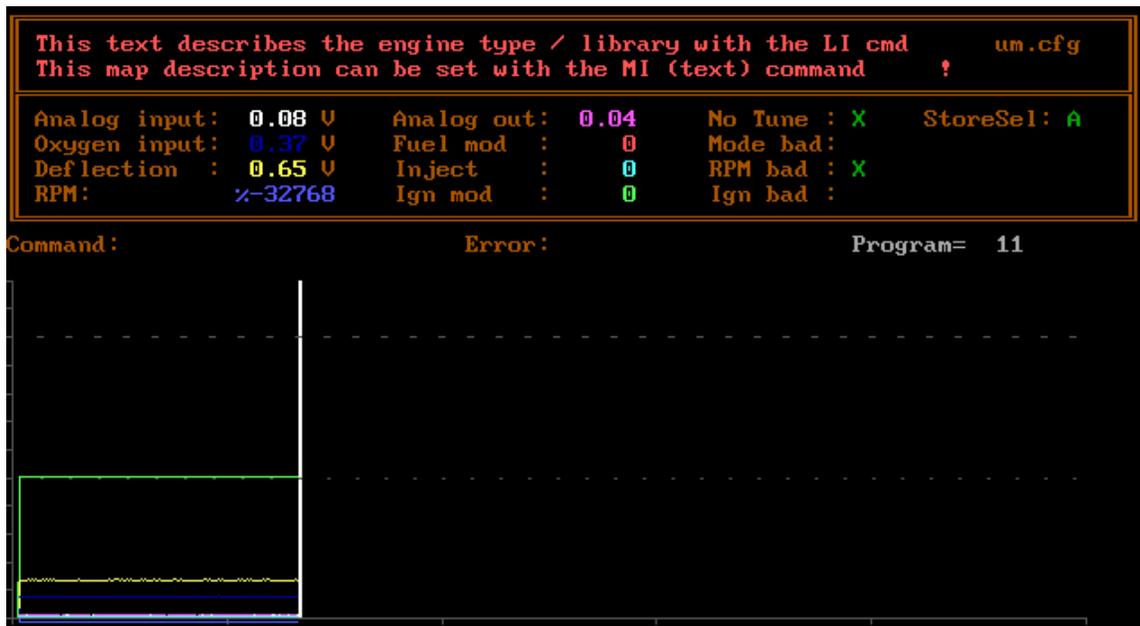
The first thing you need to do before running the UM program is connect the SMT unit under test to the comm's port of a laptop or pc. The unit must also have power in order for a signal to be read from it. The following files make up the UM software:

SM.EXE	The executable file.
SM.SCN	UM screen layout.
SM.CFG	UM configuration file.
SM.HLP	UM help file.

These files should be copied into the same directory as your SMT software. To start the program type:

```
SM          <ENTER>
```

Upon loading the software you should get a screen that looks similar to the following picture.



The top block on the screen shows the library and map that is currently loaded into the unit.

The next block contains all the inputs and outputs that are measured, notice that the data next to the variables are color coded to match the graphs being drawn on the screen below. The input/outputs measured by the software are:

Input/Output	Description
Analog in.	Analog input, blue wire.
Analog out.	Analog output, violet wire.
Oxygen input.	Analog oxygen reading, black/brown
Deflection.	Analog deflection, brown.
RPM.	RPM reading, yellow.
Ignition mod.	Ignition modification from map.
Fuel mod.	Fuel modification from map.
Injector mod.	Injector modification from map.

Other variables found within the second block are:

No tune:	No tune function enabled.
Mode bad:	Unit is set with incorrect SMT6 mode.
RPM bad:	No rpm signal detected.
Ign bad:	No IGN1 signal detected.

The software has the following keyboard commands:

F1	Enable logging
F2	Disable logging
F10	Quit, same as ESC
QU	Quit

10.3 CONFIGURATION

You also have the option of re-configuring the SM software by modifying the configuration file. Using a standard dos text editor to open the um.cfg file does this. Once opened you should get something that looks similar to the following.

File data	Description
0 port =1	Computer comm's port.
1 Analog input =15, 10.0	Analog input pin.
2 Oxygen input = 1, 5.0	Oxygen input reading.
3 Deflection in =14, 5.0	Analog deflection reading.
4 Analog output =13, 10.0	Analog output pin.
5 RMP = 9, 5000.0	Rpm reading.
6 Fuel mod =12, 256.0	Fuel modification from map.
7 Inject =11, 255.0	Injector modification from map.
8 Ignition mod =10, 256.0	Ignition modification from map.
9 Deflection pos =	
10 RPM position =	
11 Status =	
12 Spare =	
13 Spare =	
14 Spare =	
15 screen = 6	Box color.
16 error = 7	Error text color.
17 grating = 8	Grating color.
18 variable = 2	Color of status flags.
19 id text =12	Id text color.
20 backgr = 0	Background color.
21 End of UM.CFG	

You can modify these functions by changing the text after the equals signs but bear in mind that the positioning of the numbers and commas are set, moving them would result in that variable not functioning correctly. The very first line is the port line changing the number after the equals sign will change the comm. port number used by the software, for example: Port = 2 will result in comm. 2 being used instead of the defaulted comm. 1.

Lines 1-8 deal with the inputs/outputs being measured by the software. The number before the comma represents the color of the measured variable as well as its graph's color, the following table shows which number represents which color.

Colours

0 black	4 red	8 gray	12 light red
1 blue	5 magenta	9 light blue	13 light magenta
2 green	6 brown	10 light green	14 yellow
3 cyan	7 white	11 light cyan	15 high-intensity white.

The variable after the comma represents the scale of the variable, this number is the largest number the drawn graph will go to for example in line 1 you have the line:

```
1 Analog input =15, 10
```

The 10 will mean that the graph will display all values up to 10 volts; any value above this will result in the graph flat lining at the 10 volt level. Modifying the scale of the graph makes it more readable. Another thing to note is that not all measured variables are in voltage, the fuel, ignition and injector mods represent modification numbers obtained from the unit's maps. Rpm is measure in revolutions per second.

Lines 15 – 20 are cosmetic changes you can make to the display, such as grid color, screen color and background color, you can use the same color table here that was used in the color of the graphs.

10.4 DATA LOGGING

One of the extra features of this software is the data logging function, this allows the user to record data and save it to a file so that it can be viewed later. You can start the logging process by pressing the F1 button, the program will then start logging the data, when you press F2 it will stop logging and save the data to a file. Logging is saved to a file called SMT6.XXX, the extension XXX represents a number between 000 and 999, and the program will automatically increment this extension thus allowing for more than one log file. The UM software will display what the log file has been saved as, remember this name for when you want to read the file later.

The log file looks like this:

PERFECT POWER: SMT6 data log: 09-02-2001 11:32:44
File name: SMT6.000

Time	rpm	A-defl	AIN	F.mod	AOUT	OXYIN	IGN	APOS	RPOS	INJ
11:32:44,	2965,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:44,	2965,	1.73,	0.08,	0.00,	0.08,	0.35,	0,	3,	5,	0
11:32:45,	2964,	1.73,	0.04,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:45,	2964,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:45,	2964,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:46,	2964,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:46,	2964,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:46,	2964,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:47,	2964,	1.73,	0.08,	0.00,	0.04,	0.37,	0,	3,	5,	0
11:32:47,	2964,	1.73,	0.04,	0.00,	0.04,	0.37,	0,	3,	5,	0
11:32:47,	2965,	1.73,	0.08,	0.00,	0.08,	0.35,	0,	3,	5,	0
11:32:48,	2965,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:48,	2965,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0
11:32:48,	2965,	1.73,	0.08,	0.00,	0.08,	0.37,	0,	3,	5,	0

End

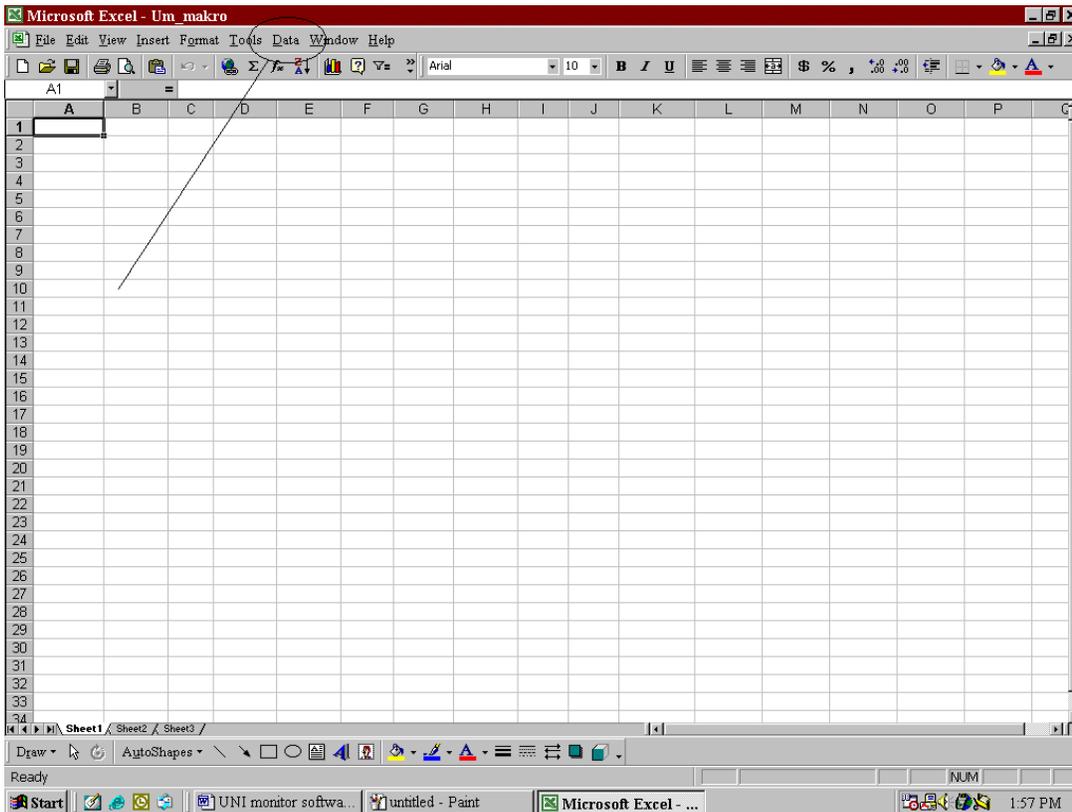
10.5 CONVERTING DATA FOR USE IN EXCEL.

The first step in this process is to extract the data from the file into excel.

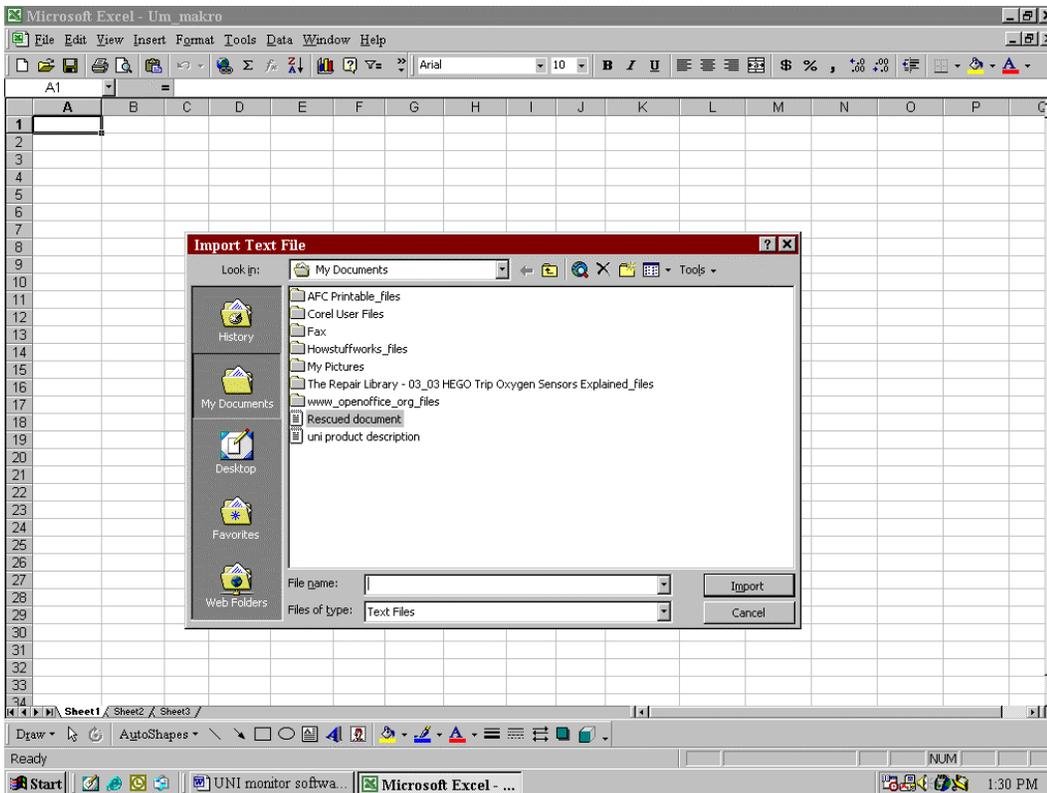
Step 1:

Open the excel file Um_makro.xls included in the DOS Monitor software, the screen will then ask you if you want to enable macro's, click on **Enable macro's** .

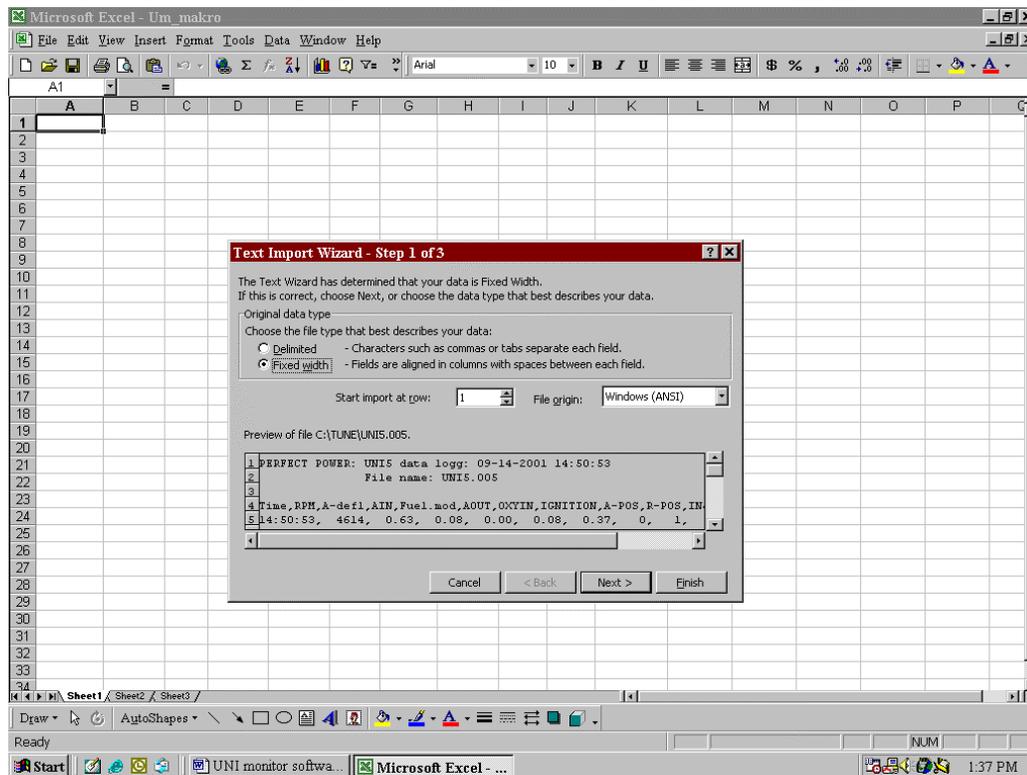
Select **Data** from the upper menu on the excel screen (highlighted in the picture on the next page).



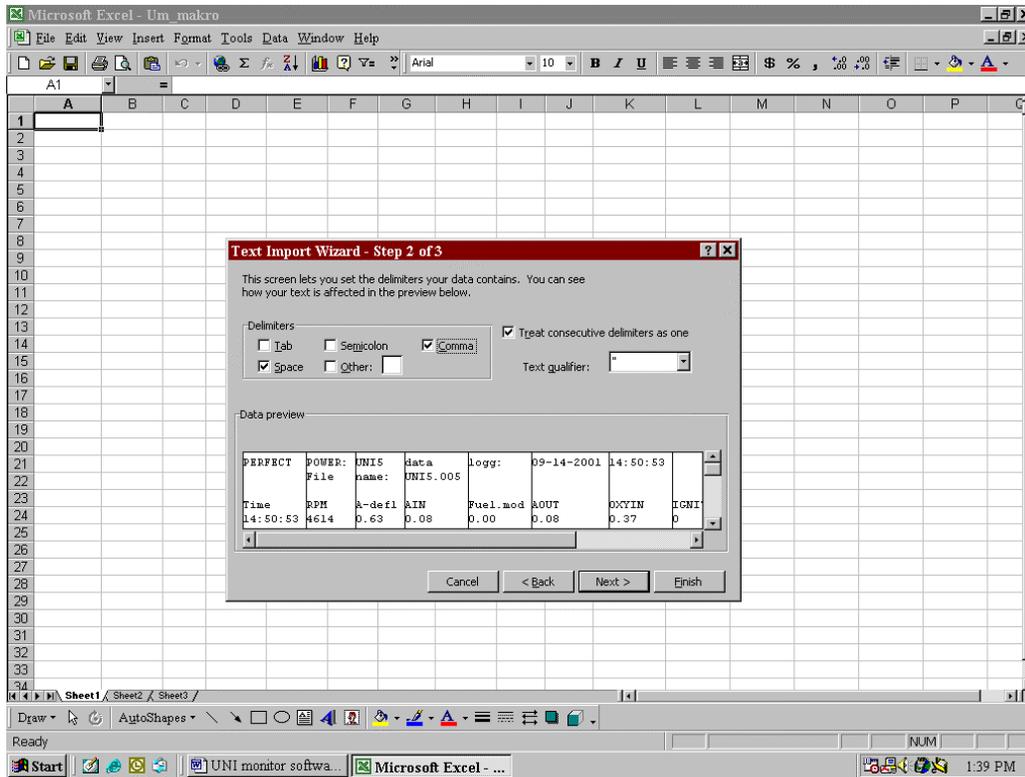
Then select **Get external data**, click on **Import text file** and you should end up with the following screen.



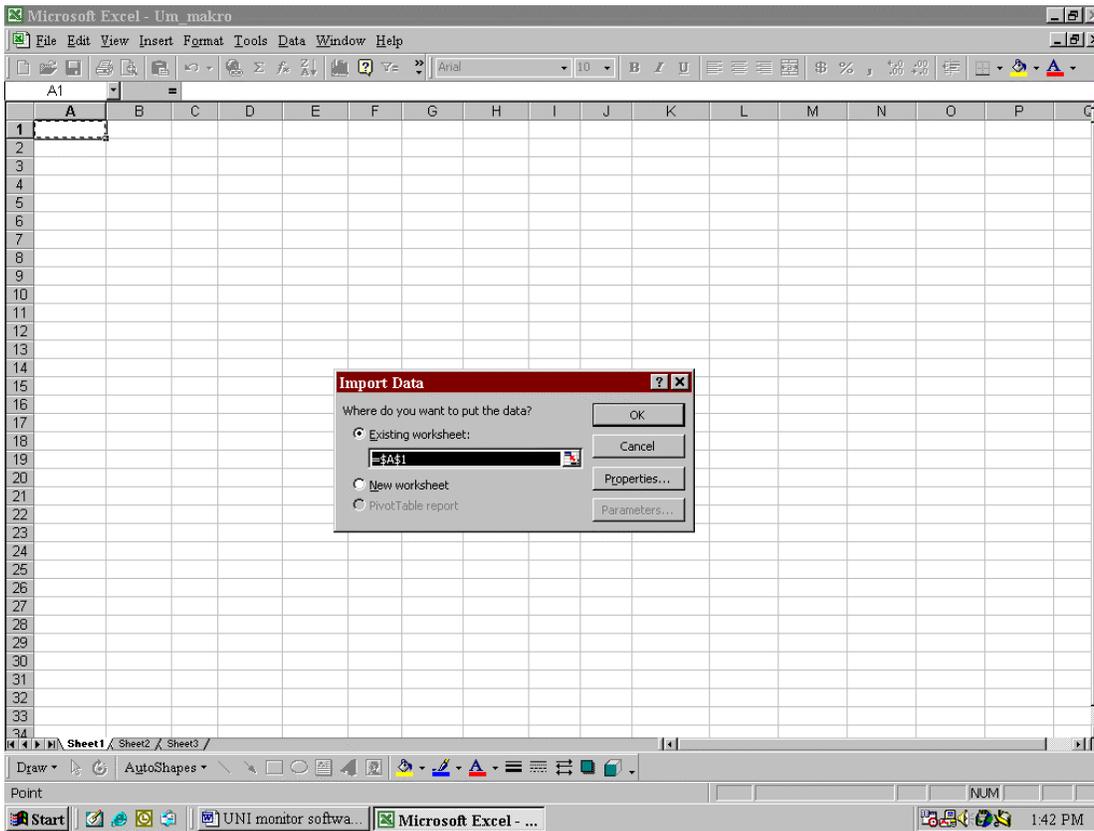
Use the menu to find the log file you want to load. Change the **Files of** type found at the bottom of the menu to "all files". Then go to the directory, which has your SM software. Look for files named SMT6.XXX where XXX denotes an extension with values between 000 and 999. Select the file you want to load and click on **Import**. You should then get the following menu.



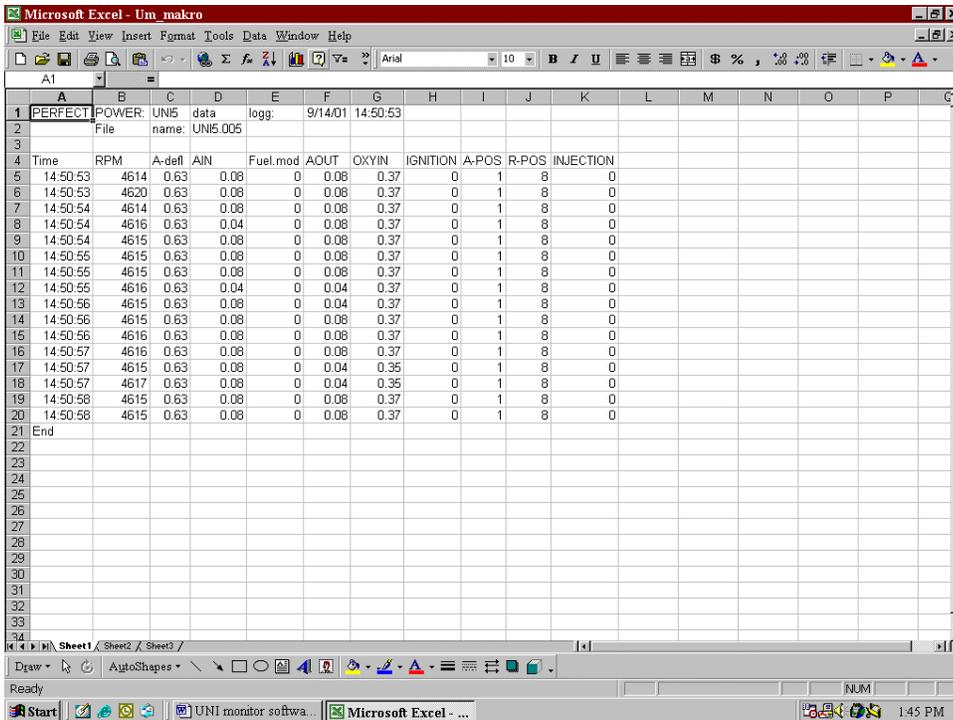
Click on the **Delimited** option, and then click on **Next**.



In the above menu deselect **Tab** and select **Space** and **Comma**. Click on finish. You will then be prompted with an option to save the file as a new worksheet or to paste it to the existing one. Before selecting anything click on Cell A1 of you worksheet, select **Existing worksheet** and then press **Ok**.



You should then end up with a screen that looks similar to this.



Step 2:

This file contains a macro, which will automate the rest of the process, press CTRL+SHIFT+G to plot the graph and you should end up with a graph, which looks similar to this.

