

# DOS SOFTWARE MANUAL

# **Perfect Power**



# SMART TUNER

Product Marketing

by:

*Digital*

TECHNOLOGY (pty) Ltd

# DOS SMT MANUAL

## OPERATORS MANUAL FOR DOS VERSION OF SMT

### Index

	Page no:
1. SOFTWARE INSTALLATION	1 - 2
2. SCREEN EXPLANATIONS	3-8
3. CONNECTING TO THE SMT	9-11
4. TUNING COMMANDS	12
5. SETTING THE ANALOG DEFLECTION (CALIBRATION)	13
6. SETTING THE RPM DEFLECTION (CALIBRATION)	14
7. MAP SWITCHING	15
8. LOADING A MAP IN TO THE SMT	16
9. SAVING A MAP FOR FURTHER REFERENCE	17

# 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
SMTFU.SCN	Fuel screen layout
SMTIG.SCN	Ignition screen layout
SMT.HLP	Help file, short version
SMT.PFG	SMT DOS OPERATING MANUAL (This one!)
LOADSMT.BAT	Batch file to install the software
DDS.SMT	A (blank) tune map

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

```
A:loadsmt
```

The SMT 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 file. This file is protected, and no changes are allowed.
.SMT	A tune map (file).

- .EXE        This is the tuning program
- .HLP        A short help file. It can be printed. Not protected

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](http://www.perfectpower.com/downloads.htm)

## 2. 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.

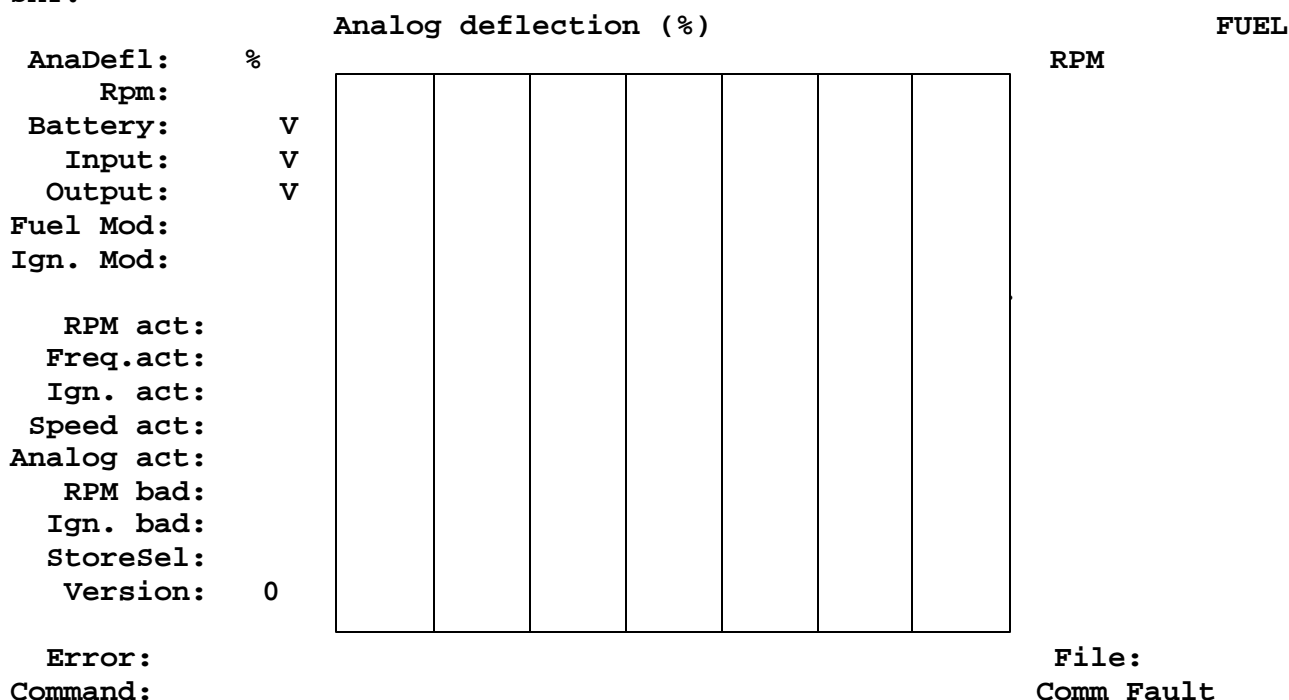
The function keys select

F1	FUEL	Fuel map display.
F2	IGN	Ignition map display
F3	GLOBAL	Global parameters
F4		
F5		
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.
F10	QUIT	Same as pressing ESC. Exits the software

The above functions are available on all maps.

### FUEL MAP

SMT:



The map is identified on the right hand side. The left-hand side of the screen displays the data from the SMT-xxx hardware.

## **COMMON DISPLAY:**

All units have a common display area on the left side of the screen.

<b>AnaDefl</b>	Analog deflection in percent This is a measurement of the actual input.
<b>RPM</b>	The RPM as measured by the SMT unit
<b>Battery</b>	The battery voltage. Important during starting!
<b>Input</b>	The analog input voltage, which is used for fuel tuning.
<b>Output</b>	The analog output voltage, resulting from the input.
<b>Fuel Mod</b>	Fuel modifier, a ZERO means NO modification. This is the value which is used from the fuel map.
<b>Ign. Mod</b>	Ignition modifier. The ignition map value, which is used at present. A ZERO means NO modification.
<b>RPM act</b>	Shows that a transition is detected on the RPM deflection input
<b>Freq.act</b>	Shows that a transition was detected on the fuel frequency (IG2IN) input.
<b>Speed act</b>	Shows that a transition was detected on the speed input.
<b>Analog act</b>	Shows that the analog input is greater than 0.2 volts.
<b>RPM bad</b>	The received RPM can't be processed. It is too high or too low.
<b>Ign. bad</b>	The ignition calculation has resulted in an overflow. Check your ignition map!
<b>StoreSel</b>	The map selected (A or B)

**Version**            The SMT software version

## FUEL SCREEN (F1) MAP

Fuel map:            The throttle (8) and RPM (16) steps result in 128 values. If not needed, make all values zero! (CF command)

IGNITION (F2)

**SMT:**

<b>AnDefl:</b>	%	<b>Analog deflection (%)</b>						<b>IGNITION</b>		
<b>Rpm:</b>		<table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>								<b>RPM</b>
<b>Battr.:</b>			- retards							
<b>Input:</b>	V		+ advances							
<b>Output:</b>	V									
<b>Fuel Mod:</b>										
<b>Ign. Mod:</b>										
<b>RPM act:</b>										
<b>Freq.act:</b>										
<b>Ign. act:</b>										
<b>Speed act:</b>										
<b>Analog act:</b>										
<b>Ign. bad:</b>										
<b>StoreSel:</b>										
<b>Version:</b>	0									
<b>Error:</b>										
<b>Command:</b>							<b>File:</b>			

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

## IGNITION SCREEN (F2) MAP

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

## GLOBAL (F3) SCREEN

SMT:

### GLOBAL PARAMETERS

AnaDefl: ___%			
Rpm:		Cylinders:	Ign input polarity:
Battery: V		Analog Fuel zero calib.:	Ign output polarity:
Input: V		Universal op mode:	Bipolar (Magn.) inp:
Output: V		Teeth per turn (incl.miss):	High freq or speed:
Fuel Mod:		Road speed adj: %	Low freq. diviation:
Ign. Mod:		Teeth per firing:	Interlaced (Miss=0):
		Fuel upper limit:	V One missing tooth:
RPM act:		Fuel lower limit:	V Missing tooth method:
Freq.act:		Upper freq. limit: KHz	0=No, neg edge!
Ign. act:			
Speed act:		(Ignition limit):	∅
Analog act:		Upper speed limit:	
RPM bad:		Fuel limit (inject above):	
Ign. bad:		Max. Rpm experienced:	
StoreSel:			
Version:			

Error: File:  
Command:

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

## GLOBAL MAP DETAILS:

### Cylinders:

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

### Analog 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.



**Universal on mode:**

A number, which specifies the operating mode for the SMT-UNI only. See SMT-UNI technical manual.

**Teeth per turn:**

Only used for missing tooth pickup systems. Enter the amount of teeth per revolution, e.g. 60. Note: The number must be even divisible by 4!

**Road speed adj:**

The number typed in specifies the percent deviation between the auxiliary 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 5.0 volts.

**Upper frequency limit:**

Only applicable to the SMT-PRO. The output frequency can be limited to this value.

**Ignition limit:**

The amount by which the ignition can be retarded or advanced. The number is calculated automatically.

**Upper Speed limit:**

A number, which restricts the speed governor, output (Speed\_out) 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.

**Ignition input polarity:**

1 = trigger on positive input edge  
0 = trigger on negative input edge

**Ign output polarity:**

Normally the same as the ignition input polarity.

**Bipolar (Magn.) inp:**

Bipolar input crosses through zero (as opposed to a swing from 0 to +12V). It is produced by a magnetic (reluctance) sensor. A "1" specifies a import trigger level of 0,6Volts, a "Ø" 4.5Volts.

**High freq. or speed:**

The frequency range of the SMT-UNI can be switched.

**Low freq. deviation:**

Only applicable to PRO. The fuel frequency tuning sensitivity can be lowered.

**One missing tooth:**

Enter "1" for one missing tooth, otherwise "0" for two missing teeth.

**Missing tooth method:**

Missing tooth detection is enabled by entering "1". Only applicable to ADV!

**Interlaced:**

When having 2 input signals on different wires. Typically when using a external wasted spark signal.

### 3. CONNECTING TO THE SMT

You need a SMT tune cable, which is available from your distributor. You can also make your own with the following information.

SMT pin 1 GND  
pin 2 input, PC TX  
pin 3 output, PC RX

The tune cable works on all versions of SMART TUNERS, except SMT-UNI for which a special cable is required.

In order to work (initially) with the SMT, 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 SMT 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.



Customized PC software can "read" the map from a SMT which was tuned with a public software, but not the other way around. A SMT, which was tuned by customized software, can only be read by this particular customized software.

Numbers in the upper left screen indicates good communication. A matching "password" protection is indicated by the map data display.

If the SMT maps are not updated, the company display in the top line shows the last company who has programmed the unit. This can be "over-written" by downloading (DL) your own maps and company information, regardless of the software version (public, customized) you use. Thus you can always "force" your own map on to a unit!

See: Loading of a map (file)	LF name
Programming	DL (or PG)

If the unit has power, then the whole display should show numbers. If not download a standard "zero" map and confirm it.

1. Load the standard map to the screen LF DDS
2. Download it to the working SMT DL (or PG)
3. Observe that the map pointers are displayed. These are the "highlights" which move when the engine operates.
4. Exit Esc
5. Start again SMT
6. Observe that the whole map fills with numbers

Note: If you have a "customised" map for a specific engine, then you can load it instead of the dds-zero map.

## 4. TUNING COMMANDS

Start the program:	SMT
Exit the program:	Esc
Loading a map from the harddisk:	LF name
Saving a map to the harddisk:	SF name
Note1: do not use any file extension!	
Note2: Do not use any disk directives!	
Downloading a map to the SMT:	DL (or PG)
Uploading a map from the SMT:	UP
Tuning a column (pointed at by cursor)	TC fact (0.1-3)
Reset the SMT	XX
Set the RPM scale start	RS nnnn
Set the RPM scale top	RE nnnn
Set the analog deflection scale start	AS %
Set the analog deflection scale end	AE %
Clear ignition map	CI
Clear fuel map	CF
Clear ignition and fuel map	CL
Set column to value	SC val
Set speed governor maximum	SS nnn
Set the SMT to map A	MA
Set the SMT to map B	MB

## 5. SETTING THE ANALOG DEFLECTION (CALIBRATION)

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.

### **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 AS 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 AE 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 SMT will do a linear extrapolation for the 6 points in between.
7. For unlinear analog deflection: see SMTWIN

### **SETUP SEQUENCE FOR NEW ENGINES**

1. Choose cylinders
2. Choose RPM scale
3. Choose ANALOG deflection scale (0-99% for starting)
4. Clear fuel and ignition maps (CL)
5. Save map under your name

## 6. 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 (start, bottom) RPM deflection (scale)                      RS nnnn

Set Maximum (end, top) RPM deflection (scale)                              RE 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).



## 7. MAP SWITCHING

The SMT 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 SMT 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 SMT via the PC from hardware or software.

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

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

## 8. LOADING A MAP IN TO THE SMT

A tune map is a bunch of numbers describing the fuel, ignition and global maps. Here is a printout of the dds.smt "zero" map, which is available from the Internet.

Perfect Power Association

Tel: 02711 7915947

Fax: 02711 7929818

E-mail: info@perfectpower.com

SMT: SMART TUNER

Date: 10-18-2000 Time: 11:28:15 File: dds.smt

SMT software version: 14 Type:

MAPS:

```
GLOBAL= 4 0 255 28 128 1 255 0 1 189 44 159 255 0 255 8
GLOBAL= 0 0 0 0 0 0 0 0 51 79 107 135 163 191 219 247
GLOBAL= 3 170 2 127 1 228 1 134 1 71 1 25 0 246 0 219
GLOBAL= 0 198 0 180 0 165 0 153 0 142 0 132 0 124 0 117
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
FUEL = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
IGN = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

End of SMT map

It is called a "zero" map because the FUEL and IGNITION are all zero.

To load a map:

LF name

Eg: LF dds

Do not use any extension!

This map is now visible on the screen, but it is not the map in the SMT unit.

To download the "screen" map, type: DL (or PG)

This "dumps" the screen map data in to the selected MAP (see: map switching) inside the SMT unit. The map will stay there until overridden by another download.

## 9. SAVING A MAP FOR FURTHER REFERENCE

Once a car has been tuned, the tune map remains in the SMT unit. It should also be saved to the harddisk for further reference, or similar installations.

Once a PC is connected to the SMT (and the SMT program runs) the screen fills with the selected map data.

Save map to the harddisk SF myname

Note1: No file extension !

Note2: The file name can have a maximum of 8 characters !

If you like to "refresh" the screen map, which is to say that you like to load the data from the SMT memory to the screen, then:

Upload SMT memory map to screen: UP

This refreshes all screen data.

The tune maps are saved on the harddisk with the extension .SMT. That is to say that you can find the following map files on your computer:

DDS.SMT  
MYNAME.SMT  
(\* .SMT)

These files can be transmitted via the Internet, or printed.