

WMS WIDEBAND O2 SENSOR

The WMS Wideband O2 sensor is a digital instrument capable of accurately measuring Air / Fuel ratio (AFR or Lambda) from 9.65:1 AFR to 20:1 AFR. Bosch technology is used including a Bosch LSU 4.2 sensor and Bosch calibration chip that controls the sensor.

Components of the System

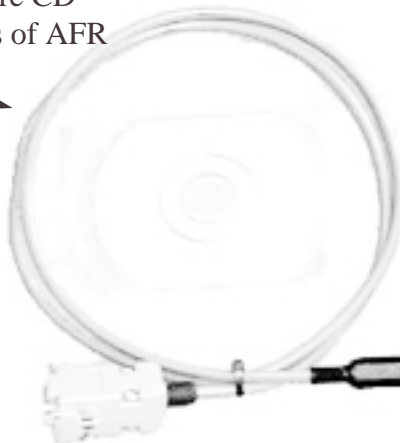
- Main Harness - The small plug of this harness plugs into the back of the WMS Wideband Control box. The large plug goes to the Bosch O2 sensor.



- WMS Wideband Control box and LCD Display - This small dash mounted box is the brains of the system and also displays AFR with the 4 digit LCD display.



- Datalogging Cable and Software CD - Allows datalogging and analysis of AFR and rpm with a laptop



- Bosch LSU 4.2 O2 Sensor - Bosch's newest technology in wide-band Lambda sensors that measure a range of AFR.



Caution

The Oxygen Sensor is heated and gets very hot when powered or when in the exhaust. Do not touch the hot sensor. Do not let a hot sensor touch a combustible surface or use near flammable liquids or gases. Failure to follow these warnings may result in severe burns, explosions or fires.

When installed in the exhaust, the oxygen sensor MUST be connected and powered by the WMS Wideband control box whenever the car is running. An un-powered oxygen sensor will be quickly damaged when exposed to hot exhaust gases.

Installation of the System

1. Find a suitable mounting place for the WMS Wideband O2 Control Box, where the display is easy to read. It can be mounted on the dash or panel by cutting a hole for the small plug and mounting with double sided tape.

2. The main harness runs from the Control Box out to the O2 Sensor in the exhaust. Route the harness from the location of the sensor on the exhaust to the Control Box through a suitable grommet in the firewall. Note the plug for the Control Box is much smaller than the O2 Sensor plug and is easier to fit through a grommet. Be sure the harness has clearance from the hot exhaust and other moving engine parts.

3. The following wires protrude from the main wiring harness. Note only the red and black wires need to be hooked up for the system to operate.

- **Red Wire** - 12V+ ignition power. Be sure this is 12V power when the ignition is turned on only. There is a noise suppression diode in the red wire, be sure to leave this inline, do not cut the wire short before this.
- **Black wire** - Chassis Ground
- **White**- 0 to 1 Volt signal. This wire simulates a stock O2 sensor for factory computers. If you are using a factory computer or other system that uses a narrow band O2 sensor signal you will hook this wire up to the factory O2 sensor signal wire. See Narrow Band Simulation section for more information on wiring.
- **Orange** - RPM signal input. This wire is used with our datalogging software to log rpm with the AFR. See the RPM Signal section for further information.
- **Purple** - 0 to 5 Volt signal. This signal is standard for most external datalogging systems such as those used on chassis dynos or other onboard loggers.
- **Green** - Analog Ground. This provides a ground reference to the datalogging system when the purple 0 to 5 Volt signal is used.

4. Carefully plug the Control Box into the main harness.
5. Mount the Bosch Wideband O2 sensor in a suitable location in the exhaust. Generally if you are replacing a factory O2 sensor the factory location will be good. See Locating the Sensor for further information you are doing a custom mounting in the exhaust. Note anti-seize compound is used on the O2 sensor threads so it can be removed at a later date.
6. Carefully plug the O2 sensor into the main wiring harness.
7. Turn on the ignition. The red light behind the WMS logo should light up if the unit has power.

Operation of the System

When the ignition is turned on the status led will light up, this will indicate what the system is doing.

- **Blinking Green** - The sensor is on but the engine is not running. The sensor detects a rise in voltage when the engine is started and will start heating the sensor then.
- **Blinking Red** - Engine has started and sensor is warming up. The sensor should warm up within 30 seconds, if not there is a problem. If no sensor is plugged in the light will continue to blink red.
- **Solid Green** - Sensor is ready, the LED display will light up and read an accurate AFR.
- **Solid Red** - Problem with the heating circuit in the sensor. This could be caused by a bad sensor, exhaust that is too cold or too hot.

The WMS Wideband controller uses a voltage sensor to determine when the engine is running to start heating the sensor, this increases sensor life. The sensor must see 13.3 volts to start heating, if it does not the status led will continue to blink green and no AFR will display. If you have a low output alternator or low voltage this may prevent the sensor from working. If this is a problem give us a call and we can solve this for you.

Locating the Sensor

- Sensor must be mounted before the catalytic converters if used.
- If no catalytic converters are used the sensor should be close to the headers where the exhaust is hot.
- Sensor must be installed in the side or top of the exhaust pipe. Don't install the sensor below horizontal as condensation can form in the exhaust pipe and damage the sensor.
- On turbo applications install the sensor after the turbo and before the catalytic converter. The high exhaust pressure before the turbo interferes with the measurement and the high exhaust temperatures encountered can damage the sensor.

Most factory O2 sensor locations are acceptable for the Wideband Sensor but be sure they follow the general guidelines above.

If you require a bung to weld in the exhaust they are available from K&N - part # 85-21688

Narrow Band Simulation

To connect the WMS Wideband White wire to an EFI-computer follow the instructions below, depending on what type of O2 sensor is being used. Many EFI computers, especially factory computers, use the narrow band as one of its main sensors and must be retained for proper operation.

- 1-wire O2 sensor - White wideband wire goes directly to the signal wire.
- 2-wire O2 sensor - With engine off, measure resistance between each wire and the sensor body. The low resistance wire is the heater power for the sensor. Connect the White Wideband wire directly to the other wire. Leave the heater power wire unconnected.
- 3-wire O2 sensor - Typically the 3 wires are heater power, ground and signal and are 2 white wires with 1 black wire. Connect the White Wideband wire to the black wire(signal) going to the EFI computer. Leave the other wires unconnected. If the wiring colors are different,
 - Heater power: 12V or more with engine running
 - Ground: low resistance to chassis ground with engine off.
 - Signal: The signal wire should fluctuate around 0.45V when the engine is warmed up. Connect the White Wideband wire to this wire.
- 4-wire O2 sensor - connect the same as the 3 wire sensor above, there is one additional ground in a 4 wire sensor.

Some EFI-computers will create a fault when the heater power wires of the oxygen sensor are disconnected. In this case it is easiest to leave the stock O2 sensor where it is and weld in a new O2 bung for the Wideband. Leave the heater wires connected to the stock sensor so no fault codes are set.

Calibration of the Sensor

No external calibration of the sensor is required as this function is controlled by the Bosch calibration chip in the WMS Wideband Control box. Many other systems require the user to do a frequent 'free air' calibration but this is a far less accurate method and is necessary because of inferior electronics.

Leaded Fuel Warning

Any O2 Sensor, including the Bosch Wideband sensors cannot tolerate leaded gasoline and will be permanently damaged after a short period of use. We recommend that you DO NOT use the sensor with engines that burn leaded gasoline. If you do need use the WMS Wideband O2 with leaded gasoline do as few runs as possible and remove it from the exhaust immediately after use. Bosch technical guidelines state a lead content of .15 g/l

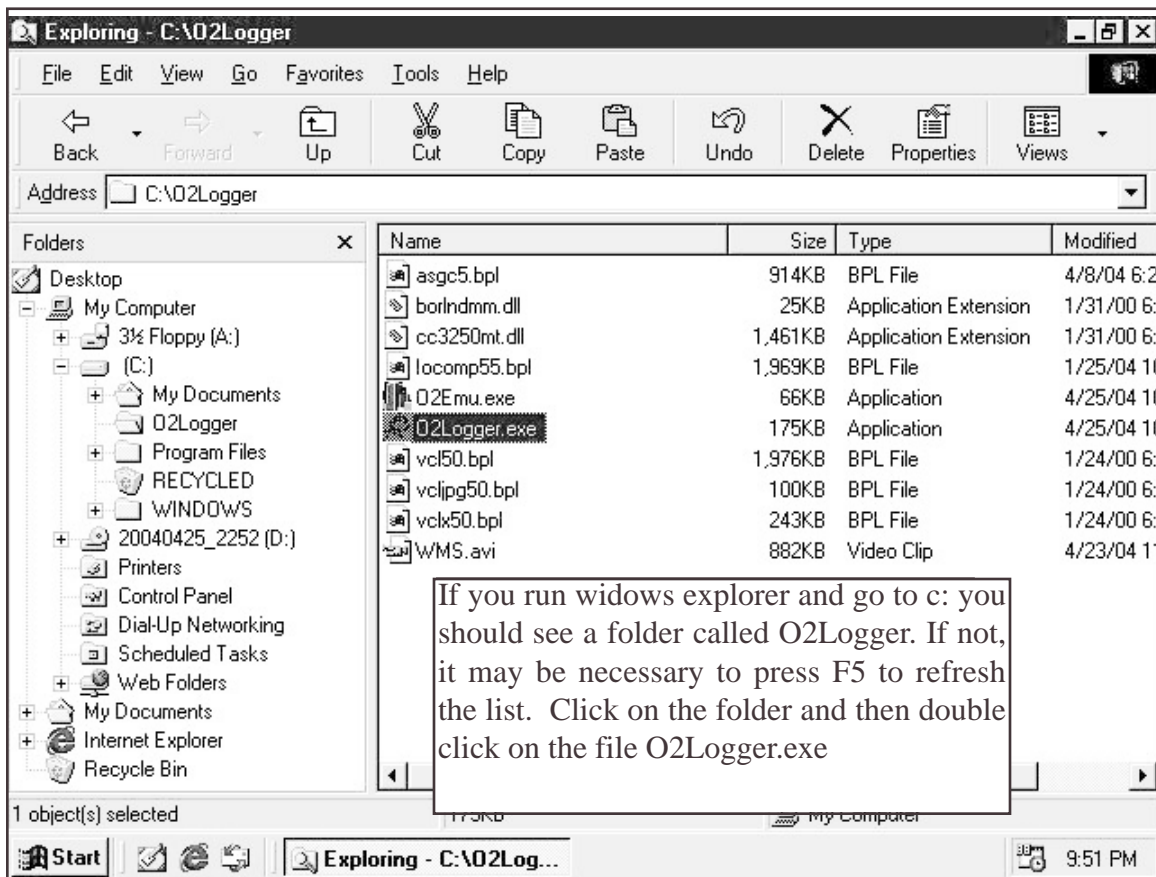
Datalogging Functions

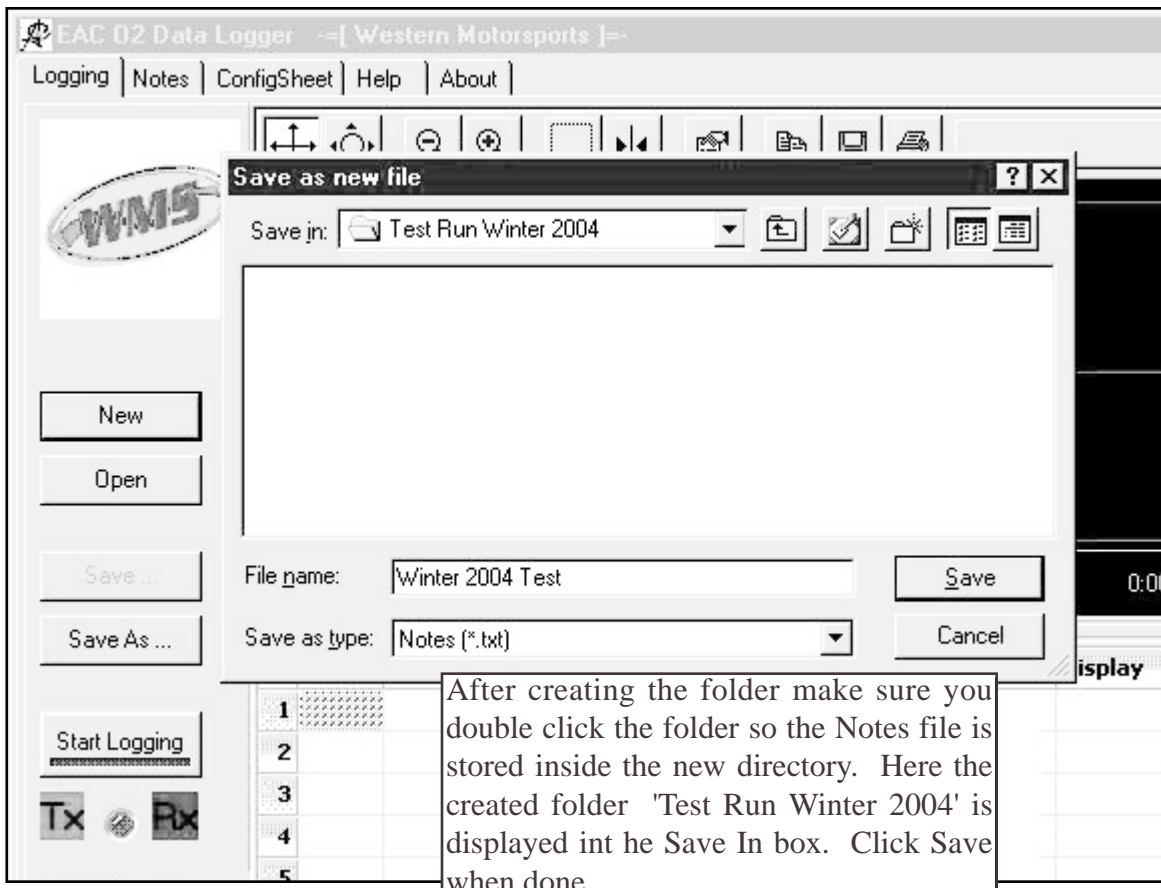
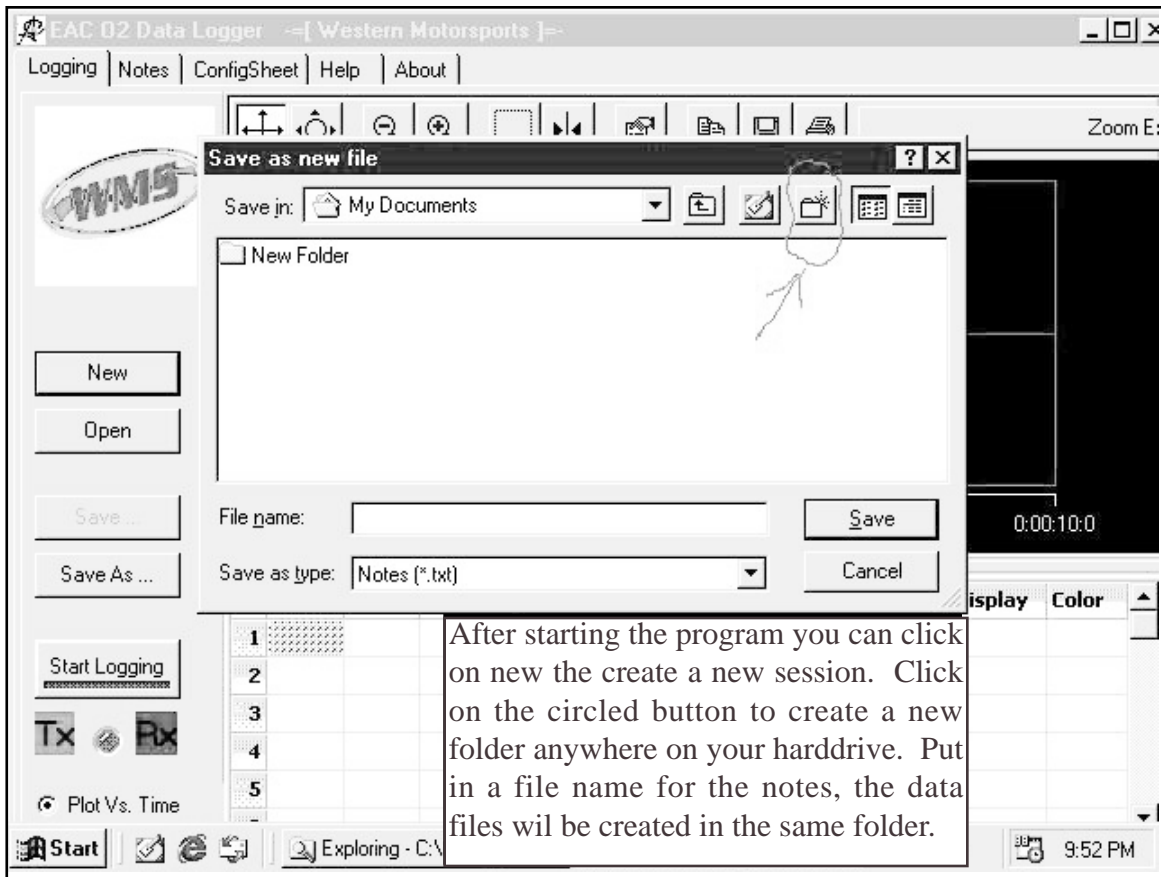
A datalogging cable and software is included with the WMS Wideband. This allows you to log both AFR and RPM to a laptop. The length of time of datalogging will depend on the memory of the laptop but most will be able to log hours of information.

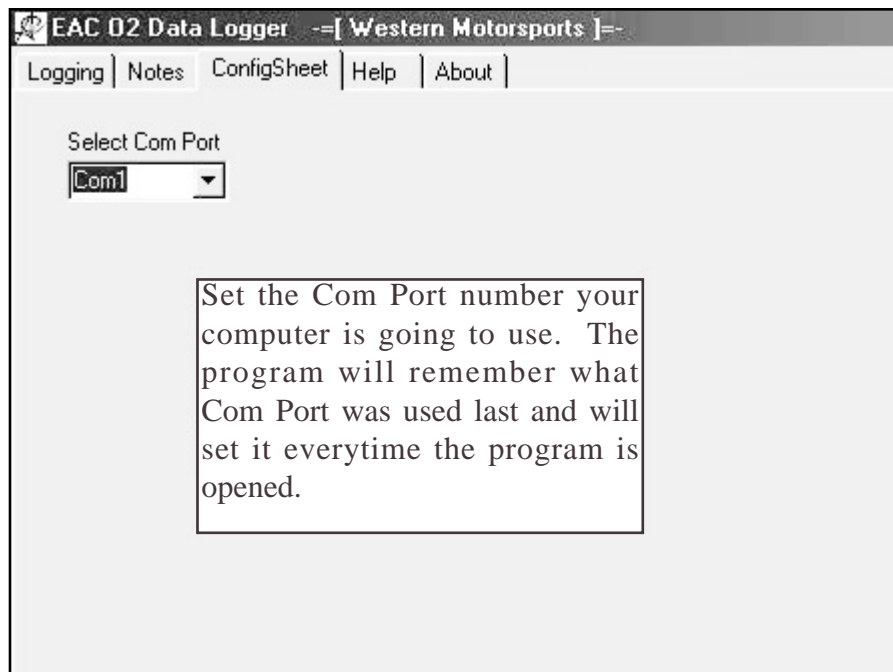
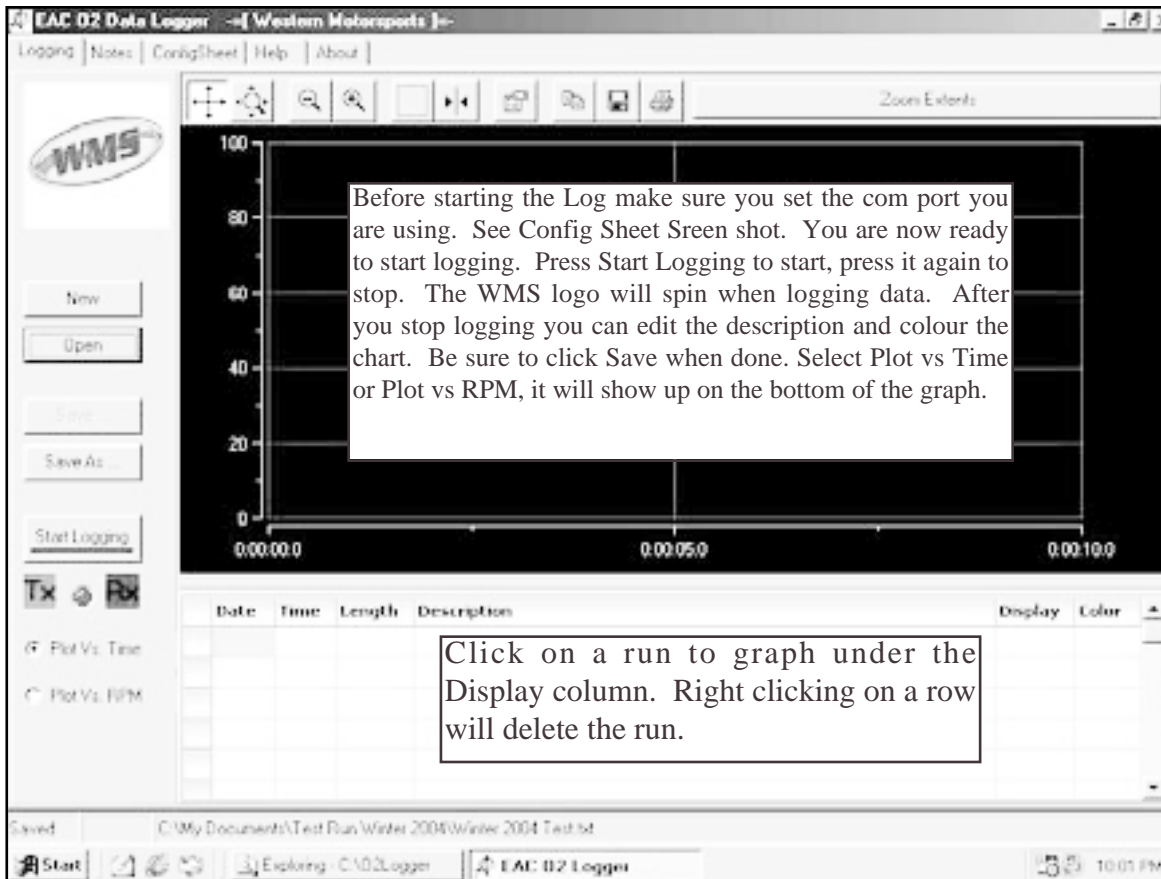
To use the datalogging functions you must install the software supplied on the mini CD and plug the WMS Wideband controller into the laptop using the supplied grey datalogging cable.

To install the software, insert the mini CD and double click on O2 Logger, it is a self extracting file and will install the necessary files on your harddrive as show below. Double click on the O2 Logger.exe to start the program.

The following screen shots with tips help to explain the software.







EAC O2 Data Logger -=[Western Motorsports]=-

Logging | Notes | ConfigSheet | Help | About

Zoom Extents

Pan the display by dragging the X or Y axis.

Zoom in (+) or out (-)

Create cursor to view data at a specific points

Edit the properties of the chart.

Copy a picture of the graph to the clipboard to paste in another document.

Save a picture of the current view of the graph.

Print the current view of the graph.

Zoom by dragging the X or Y axis.

Zoom by dragging a window on the graph.

Zoom extents displays all data on the graph.

New

Open

Save...

Save As...

Start Logging

Tx Rx

Plot Vs. Time

Plot Vs. RPM

Date	Time	Length	Description	Display	Color

Saved C:\My Documents\Test Run Winter 2004\Winter 2004 Test.txt

Start Exploring - C:\O2Logger EAC O2 Logger 10:01 PM

EAC O2 Data Logger -=[Western Motorsports]=-

Logging | Notes | ConfigSheet | Help | About

You can type any thing you want in here.
 Hold down CTRL, and press tab to insert tabs in here.
 You can copy and paste text in here using your right mouse button.

Type any notes you want here.
 Don't forget to save by clicking back on the Logging Tab.

Changed C:\My Documents\Test Run\win 2004\win 2004 Test.txt

Start Exploring - C:\O2Logger EAC O2 Logger 10:01 PM