to L1H1
Sensor

GREEN = Power
RED = Enabled

to
5301

TE-WB ver 1.5

Red +ve

Black GND

The Tech Edge Wideband Oxygen Interface version 1.5 (**TE-WB 1v5**, called the **WB unit**) interfaces to the **NTK UEGO** (**L1H1** sensor) and provides an accurate indication of the air fuel ratio (**AFR**) of petrol (gasoline), gas (LPG), and diesel automotive engines by measuring the residual components in the exhaust gas. The TE-WB may be connected to the **5301 LED display** for numeric readout of AFR. It may also be connected to a number of devices (**Palm** PDA, Windows **PC**, etc.) for logging AFR and other quantities including **RPM** and two user voltage inputs.

Connection to Power & LED indicators

The WB unit requires a reliable power supply of at **least 11.0 V**olts and **1.5 A**mps current. The 5301 display increases the current drawn by less than **0.1 A**mps. The WB unit is supplied with two heavy duty cables that connect to vehicle ground (**GND**) and battery positive (**Vbatt**), usually via a **relay** activated by the vehicle's ignition switch. Note: The **positive** lead is identified with a **RED** heatshrink flash.

Two **LED**s indicate operational status. **GREEN** LED (left) indicates power is supplied, and **RED** LED (right) indicates the sensor is heated sufficiently to begin measuring AND the battery voltage is above about 11 Volts. Never run the sensor un-powered or with the RED LED unlit for long periods of time as it can dramatically shorten the sensor's operational life. When the red LED is lit, the unit is producing a valid wideband voltage **Vout** signal (see later). At other times Vout will be fixed at **2.50** Volts, indicating the battery voltage is too low, or the L1H1 sensor is not hot enough. The NTK sensor should heat from cold to operational temperature in less than 60 seconds.

Connection to L1H1 Sensor

Pin	L1H1	Usage
1	Red	Vs (Sense Voltage)
2	Black	Virtual GND (4.0 Volts)
3	White	Ip (Pump Current)
4	Blue	CalR A
5	Green	CalR B
6	Yellow	Heater –
7	Orange	Heater +

The WB unit plugs into the NTK L1H1 sensor via a **2.6** or **4.0** metre cable. The connections to the cable are shown at left (with L1H1 wire colours), and the numbering scheme at right (looking at the connector's mating surface pins).

View of socket's mating face
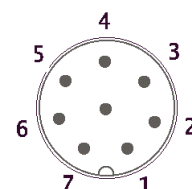
Sensor - Part #, Life Expectancy

Tech Edge does not sell the L1H1 sensor. It is known commercially as the **Bosch 13246**, the **Echlin ECHOS791**, or the **Honda 36531-P07-003**. Check the web site for information on where this part may be obtained. The sensor has a projected life of 160,000 km (100,000 miles) when run on unleaded (pump gas), but this will be dramatically shorter when run on leaded fuels.

Connection to 5301 Display or Data Logger

The right end of the WB unit has a **male DB9** connector that is similar to a serial (**RS232**) connector found on PCs. However, please note that this plug also carries non-RS232 signals and should **NOT** be connected directly to a PC without a special cable. The 5301 display **is** designed to connect directly to the WB unit using the long cable (the short cable is the low speed RS232 output that carries only the AFR data and is updated 5 times per second). The connections to the DB9 plug are shown below.

1	LO RPM Logger input
2	RS232 – logger data Out
3	n/c
4	WBlin – Linear WB out
5	GND (for RS232 & WBlin)
6	GND (for Vout)
7	Vout - WB output signal
8	n/c
9	Vbatt – Battery Positive
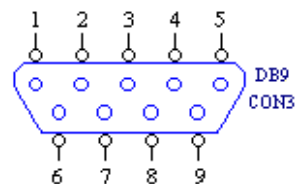
A Palm or PC cable should **ONLY** connect pins 2 and 5 of the WB unit's DB9.

You may need to make up a special cable if you wish to use the 5301 display AND any other signals. Check the web site or the Yahoo list (oz-diy-wb) for any current information on how to do this.

5301 Seven Segment 3 digit LED Display

The **5301 display** shows AFR for petrol (pump gas) between the limits of **10.0** (rich) to **25.0** (very lean). It can be modified to display *Lambda (see the web site for details)*. The table at right shows **AFR**s for different fuels. This table can be used to convert the Petrol column (as displayed by the 5301 LEDs) to the AFR for an alternate fuel.

25.∃

10.ⴹ

When the AFR is **greater than 25.0**, or is **less than 10.0**, one of the two display formats shown at left will occur (**this is NOT a fault**).

In-built RS232 Logger

The data access (D/A) cable provides a convenient connection point for the unit's I/O signals. These are shown below. The pins are numbered **1** at the end of the cable and **6** closest to the circular metal 5 pin plug. The Circular plug is numbered similarly to the 8 pin sensor plug described above.

Colour	pin	Usage	I/O
Black	1	user ADC #1	input
Brown	2	user ADC #2	input
Orange	3	N/B 0-1v	output
White	4	Ground	GND
Green	5	RPM Pulse	input
Blue	6	RPM Coil (12v)	input

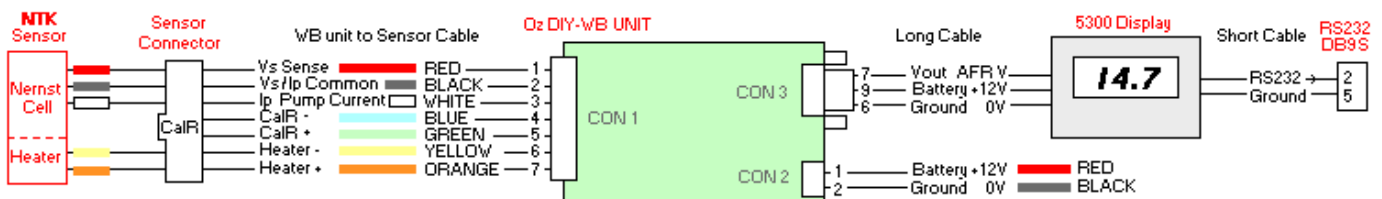it can be used in either of the RPM inputs.

Refer to the web site for the current range of software that will work with the logger's output.

Your RPM signal may need some extra pulse conditioning before

AFR for Some Fuels *vs.* V_{out}

V_{out}	*Lambda*	Petrol	LPG	Diesel
1.40	*0.686*	**10.08**	10.63	9.94
1.45	*0.696*	**10.23**	10.79	10.09
1.50	*0.706*	**10.38**	10.94	10.24
1.55	*0.716*	**10.53**	11.10	10.39
1.60	*0.727*	**10.69**	11.27	10.54
1.65	*0.739*	**10.86**	11.45	10.71
1.70	*0.750*	**11.03**	11.63	10.88
1.75	*0.762*	**11.20**	11.81	11.05
1.80	*0.774*	**11.38**	12.00	11.23
1.85	*0.787*	**11.57**	12.20	11.41
1.90	*0.800*	**11.76**	12.40	11.60
1.95	*0.814*	**11.96**	12.61	11.80
2.00	*0.828*	**12.17**	12.83	12.00
2.05	*0.842*	**12.38**	13.05	12.21
2.10	*0.857*	**12.60**	13.29	12.43
2.15	*0.873*	**12.83**	13.53	12.66
2.20	*0.889*	**13.07**	13.78	12.89
2.25	*0.905*	**13.31**	14.03	13.13
2.30	*0.923*	**13.57**	14.31	13.39
2.35	*0.941*	**13.84**	14.59	13.65
2.40	*0.960*	**14.11**	14.88	13.92
2.45	*0.980*	**14.40**	15.18	14.20
2.50	***1***	**14.7**	**15.5**	**14.5**
2.55	*1.037*	**15.25**	16.08	15.04
2.60	*1.078*	**15.84**	16.70	15.62
2.65	*1.121*	**16.48**	17.38	16.26
2.70	*1.169*	**17.18**	18.11	16.95
2.75	*1.220*	**17.93**	18.91	17.69
2.80	*1.276*	**18.76**	19.78	18.50
2.85	*1.337*	**19.66**	20.73	19.39
2.90	*1.405*	**20.66**	21.78	20.38

System Connection Diagram

How the display, sensor and battery are interconnected.

Sensor Positioning

The sensor requires an 18 mm (1.5 mm/thread) bung. This should be placed before the catalytic converter and far enough from the exhaust port so that the exhaust gasses will **not** be hotter than the sensor. An extra bung just before the cat is considered the best position. Tailpipe sensing is not recommended as the sensor can be cooled and the cat will affect the unit's measurements. Turbo installations should **never** place the sensor on the **high-pressure** side of the turbo as the sensor's measurements are made relative to an atmospheric reference (and it's generally way to hot for the sensor here too).

The sensor should be mounted between a 10 o'clock and 2 o'clock orientation, never upside down or horizontal. This prevents condensation (mostly during starting from cold) from dripping on to the sensor's hot ceramic internals and causing immediate failure. Never point the sensor into the gas flow, as this will rapidly clog the internal diffusion chamber.

12 Month from Date of Purchase Original Purchaser Warranty

The WB unit has a 12 months return to manufacturer warranty for the original purchaser. You should first contact Tech Edge by email peter@techedge.com.au before returning any unit you believe is faulty. Tech Edge will repair (or replace) and pay for return postage for any unit found to be defective due to our own negligence. Users are responsible for their own shipping costs to our repair facility (as will be advised). All returns must first be authorised and a written fault report with original order number, name & return address must be included.