

ZALTECH™

ENGINE MANAGEMENT SYSTEMS

haltuner

AIR-FUEL MIXTURE INDICATOR



PRODUCT INSTRUCTION MANUAL AND INSTALLATION INSTRUCTIONS

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PRODUCT DESCRIPTION.

EXHAUST GAS ANALYSIS WITH LAMBDA/OXYGEN SENSOR.

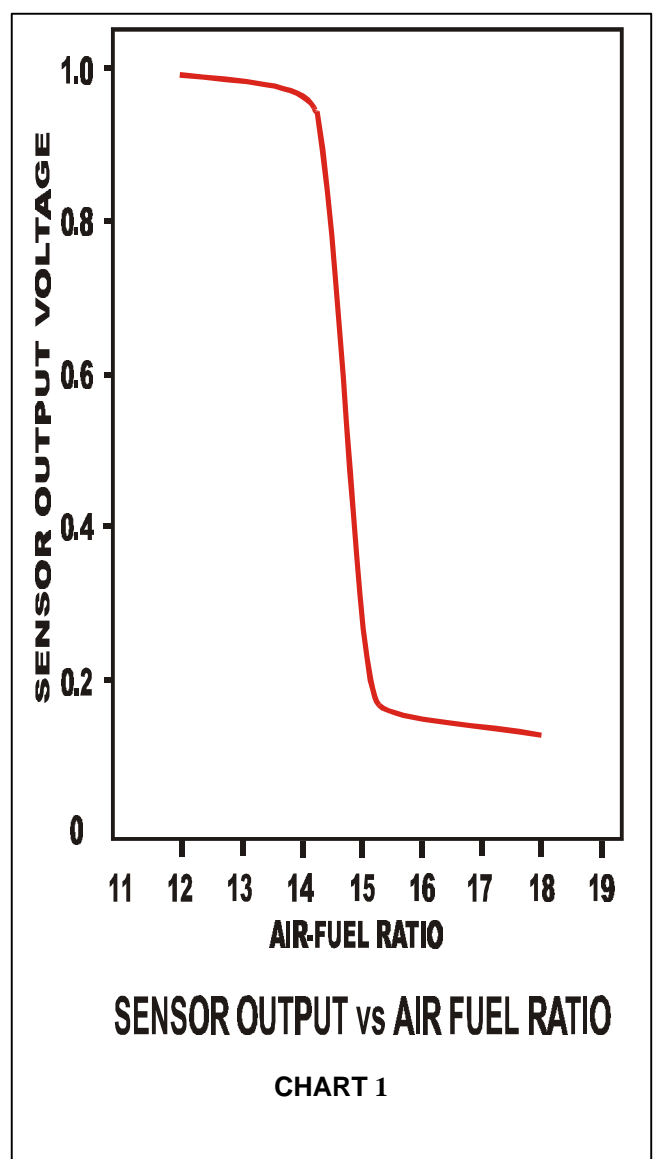
Measuring exhaust gases to determine the air-fuel ratio has been a problem for every serious engine builder/tuner. The only reliable and accurate way was to use an infrared exhaust gas analyser. However because of its slow response - up to 8 seconds before a stable reading - the use of this kind of equipment could cause engine damage when lean mixtures were experienced. Further transient response was difficult to analyse. With new technologies there are now a series of high speed high performance air-fuel ratio monitors (such as HALTECH™ UEGO air fuel ratio meter) but these still tend to be expensive.

The need for a high performance, high speed air-fuel ratio monitor is now fulfilled by the HALTECH™ HALTUNER via an oxygen sensor transmitting its signal to a 30 segment LED type display.

OPERATING PRINCIPLES

O₂ sensors work by measuring free oxygen and create a signal when fitted in an exhaust system when the exhaust gas temperature is between 360°C (680°F) and 900°C (1650°F).

With the HALTECH™ HALTUNER the signal is shown via a 30 segment LED type display: 10 red lights for lean mixtures, 10 green lights for around stoichiometric (Lambda 1) and 10 orange lights for rich mixtures. The latter is of special interest for high performance and racing engines. Racing engines give best power when running slightly rich, whilst for emission conscious vehicles a mixture closer to stoichiometric (Lambda 1) is desirable. Looking at Chart 1 you will see the typical output curve of an oxygen sensor installed on a gasoline fuelled engine. Note that the output signal extends from an air-fuel ratio of about 12:1 to 17.5:1, but that it is only highly accurate in the 14.1:1 to 15:1 range. The HALTUNER works with most fuels and is auto calibrating, therefore it is not feasible to assign exact air-fuel ratio numbers to specific LED's on the HALTUNER's scale. The middle of the display (green LED's) is the stoichiometric air-fuel ratio of 14.7:1 on normal pump gasoline. For alcohol the stoichiometric ratio is 6.5:1 for propane it is 15.6:1. The last rich light on the scale is approximately 11.5:1 for gasoline (5.3:1 for alcohol, 13:1 for propane). The last lean light is approximately 16.5:1 for gasoline (7.7:1 for alcohol, 18.1:1 for propane).



CAUTION

The use of leaded fuel will seriously reduce the life of the oxygen sensor. If leaded fuel is used (pump fuel or race fuel), remove the sensor and install the plug after tuning. Certain other fuel additives may damage the sensor over extended periods. A damaged sensor will indicate a leaner reading that is correct for the same operation.

TUNING FOR POWER OR ECONOMY

Tuning for optimum power requires a richer ratio than tuning for optimum economy. Chart 2 shows that with a typical engine the best power occurs near a 12.5:1 air-fuel ratio (gasoline). In the same engine, the best fuel economy occurs near a 15.5:1 air-fuel ratio (gasoline).

Whether tuning for power or economy, a properly set-up fuel system will give a richer reading during acceleration and a leaner reading during deceleration than the optimum numbers above. Use your HALTUNER as an instrument to evaluate the effect of tuning changes or as an indication of maintenance problems such as a dirty air filter, more importantly it can be used as a safety device to notify the driver of a lean mixture that may cause engine damage,

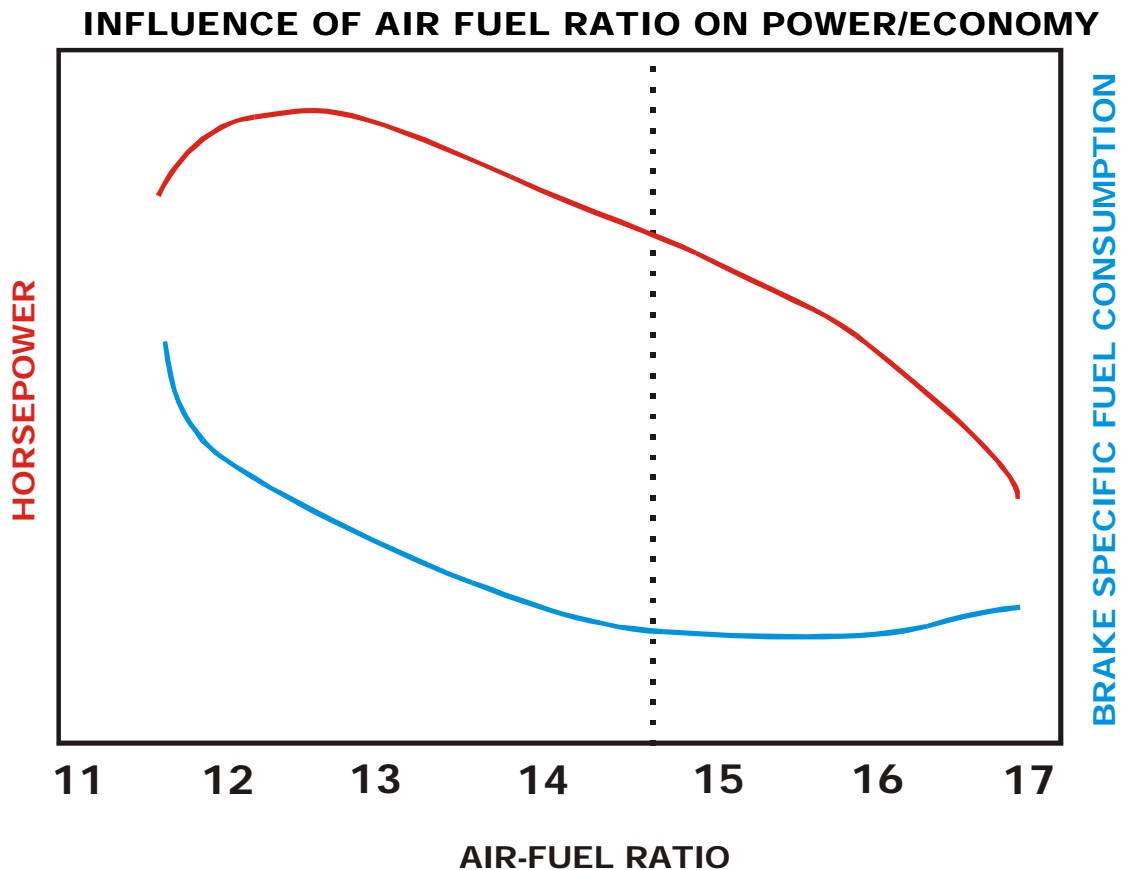
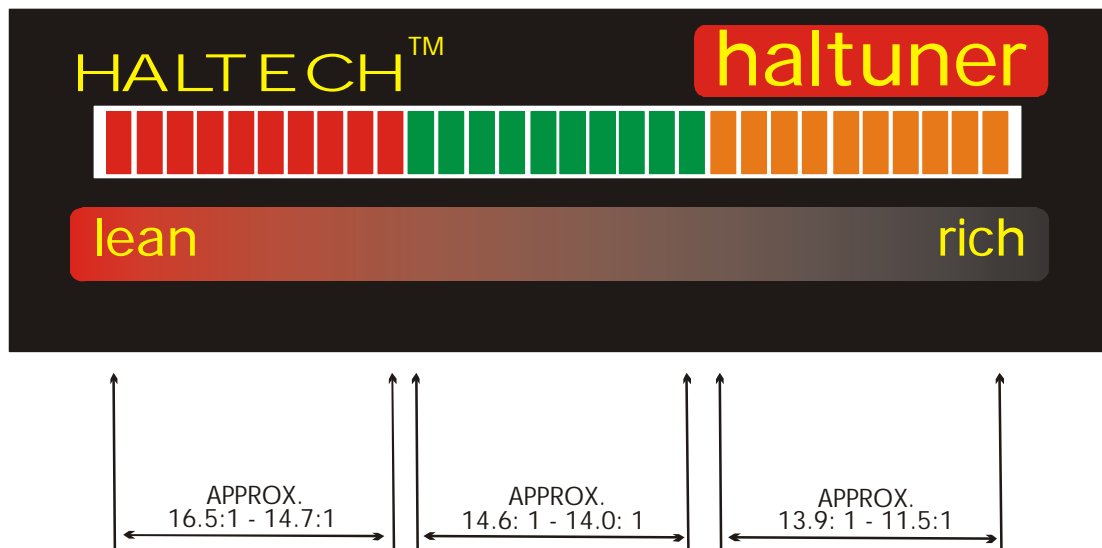


CHART 2

WHAT TO EXPECT THE HALTUNER TO INDICATE.

The HALTUNER will display approximately the following led's for a particular air-fuel ratio, Please note that the output of an O2 sensor will reduce as the exhaust gas temperature increases so THESE VALUES ARE MEANT AS AN INDICATION ONLY. Because of this it is not possible to assign an exact air-fuel ratio to a particular LED. Please note this device is sold as an indication only, HALTECH™ accept no liability for loss or damage caused by the use of this unit.



TECHNICAL TIPS

NOTE: When fitted to fuel injected vehicles it is quite common for the meter to read off scale to the lean side (left side) of the meter on closed throttle, this is not a fault rather the HALTUNER is showing the ecu's deceleration fuel cut feature.

It is also quite common to see the mixture oscillate either side of the stoichiometric range when at idle/light load. This is the HALTUNER showing the closed loop correction feature of the ecu.

If you find that your HALTUNER is changing its reading when the headlights are turned on/off, or high load electrical devices are activated (e.g thermofan) then the problem is most likely a ground problem, to rectify this problem make sure that the HALTUNER is grounded at the same point as the O2 sensor. This will not be a problem if using the HALTECH™ supplied loom and sensor however it may be a problem when fitted to factory systems.

INSTALLATION PROCEDURE.

NOTE: PLEASE READ THESE INSTRUCTIONS COMPLETELY BEFORE ATTEMPTING INSTALLATION OF THIS UNIT

The HALTECH™ HALTUNER mixture indicator is supplied as an easy to install kit. The HALTUNER will provide years of trouble free operation if installed in a professional manner, and used with a non-leaded fuel.

INSTALLATION OF COMPLETE KIT

PARTS INCLUDED IN COMPLETE KIT

- 1 - HALTECH™ HALTUNER MIXTURE INDICATOR METER**
- 1 - 4 WIRE O2 SENSOR WITH CONNECTOR FITTED**
- 1 - WIRING HARNESS**
- 1 - WELDABLE SENSOR BOSS AND BLANKING PLUG**
- 2 – VELCRO™ ADHESIVE MOUNTING STRIPS**

MOUNTING THE O2 SENSOR

1. The weldable O2 sensor boss should be located in the exhaust after the exhaust collector. The correct hole size should be drilled into the exhaust tube and the boss welded in place. Screw the O2 sensor into the boss and tighten, Be sure to use an anti-seize lubricant on the threads of the sensor so that the sensor may be easily removed later if necessary.

NOTE: Most factory late model cars use O2 sensors. DO NOT REMOVE THE FACTORY O2 SENSOR TO INSTALL THE HALTECH™ O2 SENSOR. The factory electronics need the factory O2 sensor for the system to work properly. Install the HALTECH™ O2 sensor close to the factory O2 sensor if possible. HALTECH™ recommends using separate O2 sensors to prevent erratic engine performance that can result from sharing sensors or electronics between the HALTECH™ HALMETER and the factory installed equipment.

2. Locate an existing hole through the firewall of the vehicle. This hole need to be large enough to pass the wiring harness through. If a hole is drilled be sure to use a rubber grommet to avoid chafing of the wiring harness.
3. Connect the 3 way plug on the wiring harness to the three way plug on the O2 sensor. Use cable ties to keep the wiring harness away from the exhaust heat. Be sure not to obstruct any moving parts.
4. Push the end of the wiring harness with the 6 way plug through the firewall leaving the long RED and Black wires in the engine compartment. Locate a +12V ignition source that is switched “on” when the ignition key is “on” and “off” with the ignition key in the “off” position, Connect the RED wire to this +12V source. Ground the black wire to the chassis of the vehicle or another suitable ground source.
5. From the inside of the vehicle pull the wiring harness through the firewall, There will be 1 BLUE wire left to connect, this wire controls the headlight dimmer function of the HALTECH™ HALTUNER, for this feature to function it needs to

be connected into your headlight/dashlight circuit. Locate a source that has +12V supply when the headlights are “on” and 0V when the headlights are “off”, connect the BLUE wire to this source.

6. Locate a desirable location for the HALTUNER meter and secure it in place using the self adhesive Vecro™ supplied NOTE: Double sided tape can be used in place of the Velcro™ if preferred
7. Route the wiring harness to the location of the 6 way plug on the HALTUNER meter and connect the wiring harness to the HALTUNER meter.
8. Cable tie the excess wiring harness ensuring that it does not interfere with anything.

INSTALLATION OF METER ONLY KIT

PARTS INCLUDED IN METER ONLY KIT

- 1- HALTECH™ HALTUNER MIXTURE INDICATOR METER
- 2- VELCRO™ SELF ADHESIVE MOUNTING STRIPS
- 1- 6 PIN WEATHERPACK CONNECTOR WITH PINS AND SEALS

The HALTUNER meter can be installed using wiring diagram on the last page of this manual.

ADJUSTMENT OF HALMETER'S CALIBRATION RANGE

The HALTUNER meter can be used to monitor the output from any factory O2 sensor if desired, The unit is factory calibrated to work with the 4 wire O2 sensor that is supplied when a full kit is purchased.

The HALTUNER has been designed so that it has a quite large range of adjustment, the effective range of the HALTUNER is approximately 0-0.75 Volts if adjusted for minimum gain and approximately 0-6 volts if adjusted for maximum gain. Even though the HALTUNER has been given this range it is very rare for an O2 sensor to exceed 1 volt as its maximum output.

It is recommended that the unit should first be tried without adjustment before any adjustments are made as the unit is calibrated for a range of approximately 0-1 volt. If adjustments are necessary then the following procedure should be followed.

- 1- Remove 4 screws holding HALTUNER's endplate to main casing
- 2- Locate adjustment screw as indicated below in Figure 1.
- 3- Using a small screwdriver rotate screw clockwise (looking from back of HALTUNER) to increase to range of the HALTUNER or anti-clockwise to decrease the range of the HALMETER.
- 4- It is good practice to lock the adjustment screw by placing a small amount of correction fluid/nail polish on the screw.

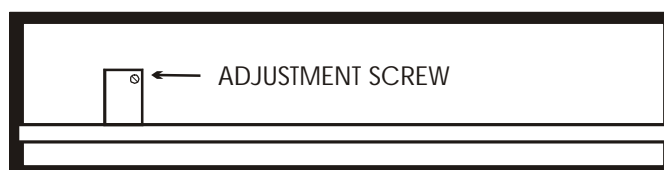
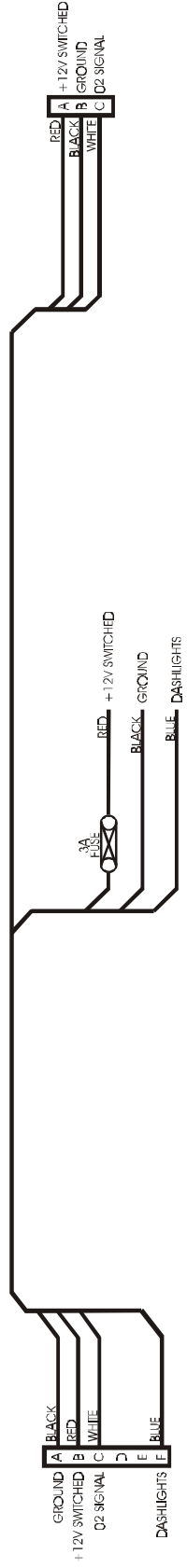


FIGURE 1

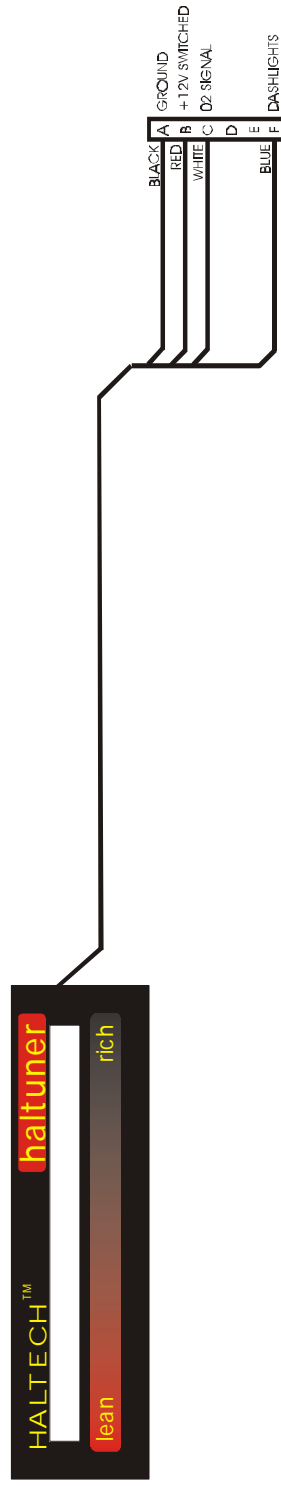


HALTUNER WIRING INFORMATION

HALTUNER WIRING HARNESS DIAGRAM



HALTUNER METER CONNECTIONS



LIMITED WARRANTY

Invent Engineering Pty Ltd trading as HALTECG™ warrants the HALTECH™ HALTUNER air/fuel mixture indicator to be free from defects in material or workmanship for a period of ninety days from the date of purchase.

Proof of purchase, in the form of a bill of sale or receipted invoice, which indicates that the products is within warranty period must be presented to obtain warranty service. Invent Engineering Pty Ltd trading as HALTECH™ suggests that the purchaser retain the dealers dated bill of sale as evidence of the date of retail purchase.

If the HALTECH™ HALTUNER is found to be defective as mentioned above, it will be replaced or repaired if returned pre-paid along with proof of purchase. Invent Engineering Pty Ltd trading as HALTECH™ reserve the right to repair or replace any component. This shall constitute the sole liability of Invent Engineering Pty Ltd trading as HALTECH™. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations, either expressed or implied, including any implied warranty or merchantability or fitness. In no event shall Invent Engineering Pty Ltd trading as HALTECH™ be liable for any special or consequential damages.