O2ALERT
Air/Fuel Warning and Recording System

⚠ Warning!

During use of this system the Oxygen sensor becomes very hot. Do not touch sensor. Do not place sensor near combustible materials. Failure to do so can result in serious injury.

Do not expose Oxygen sensor to hot exhaust gases unless sensor is connected to the O2ALERT control unit and the O2ALERT is powered. Hot exhaust gas will quickly damage a non-powered Oxygen sensor. THEREFORE IT IS RECOMMENDED THAT POWER IS APPLIED TO O2ALERT AT THE SAME TIME OR BEFORE IGNITION.

O2ALERT is to be used for racing purposes only.

Altronics Inc. is not responsible for the use or misuse of the O2ALERT product.

Table of Contents

O2ALERT *FEATURES*

- Records Up to 2 Wide Band Air/Fuel Sensors
- Records Engine RPM
- Records Battery Voltage
- Records Thermocouple Temperature (optional)
- Records 2 Analog Voltage inputs (optional)
- Air/Fuel Voltage Outputs (optional)
- Warning Output with Settable Air/Fuel Ratio
- On screen Readout.
- PC Not Needed
- Adjustable Sample Rate
- Download and Data Analysis Software
- Starts on RPM or Switch

OVERVIEW

The O2ALERT system is designed to measure and record Air/Fuel ratio (AFR) for an internal combustion engine. An AFR of 14.7 pounds of air to 1 pound of fuel is the optimal ratio for a gasoline engine. This is equivalent to a Lambda of 1 and is also referred to as the stoichiometric ratio. The stoichiometric ratio is achieved when all available fuel is consumed by air in the combustion cycle. When Lambda is less than 1 the engine is rich and the combustion cycle leaves unburned fuel in exhaust. When Lambda is greater than 1 the engine is lean and the combustion cycle leaves unused Oxygen in the exhaust. The O2ALERT uses a Wideband Oxygen sensor to measure the amount of fuel in the exhaust to determine the Air/Fuel Ratio.

Typically an engine makes maximum power with a Lambda of .8 to .9

Stoichiometric values for various fuels:

Gasoline   14.7
Methanol   6.4
Ethanol   9.0
CNG   17.2
Diesel   14.6
E85   9.7

INSTALLING SYSTEM

Mount O2ALERT Unit in an easily accessible area on vehicle.
Connections to green terminal strip: (use #18 gauge wire)

GND – Ground - chassis ground.
PWR – POWER +12 or +16 volt DC source (vehicle battery). Fuse at 10 amps quick blow.
RPM – Engine RPM – connect to rpm output from ignition (DIGITAL Tach Signal Only. Do NOT connect to coil)
1R – EGT 1 red side
1Y – EGT 1 yellow side
A1 – Analog 1 input (5 volt DC max!)
A2 – Analog 2 input (5 volt DC max!)
WRN – Warning Output – Normally Open contact, switched to Power (vehicle battery) upon warning activation. Connect to device you want to control when warning is activated. (Warning Light, NOS disable, Retard timing, shut off ignition). Output can only supply up to 2 amps, so if more power is needed connect warning output to a higher power control relay.
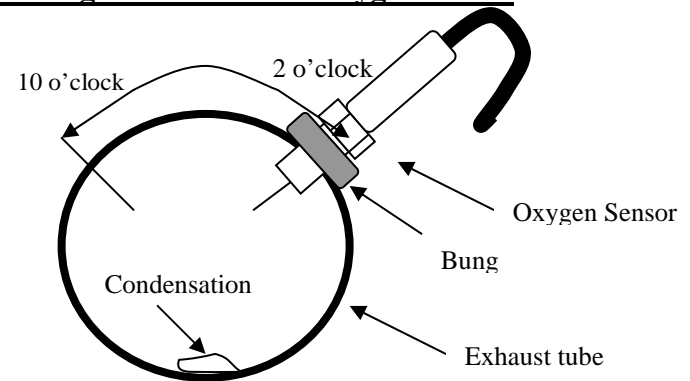
Air/Fuel 1 – Connect supplied cable and Oxygen Sensor.
Air/Fuel 2 – Connect second supplied sable and Oxygen Sensor.

Use following drawings to install Air/Fuel Oxygen Sensors.

Installing Weldment and Oxygen sensor

Position and weld bung in top or side of exhaust tube.   Do not mount in bottom of tube where condensation will damage sensor. Sensor can be mounted anywhere in exhaust system from approx 8 inches from exhaust port in header or exhaust manifold to collector or tail pipe.

Install upstream from catalytic converters.

Install downstream from turbo chargers.

NOTE: Installing close to exhaust port:
The temperature of the sensor at the bung can not exceed 900 ˚F or damage will occur. Therefore is it recommended to provide a heat sink made out of a small piece of copper sheet 0.060"thick. 4-5". Drill ¾" hole in center of sheet and mount as shown.
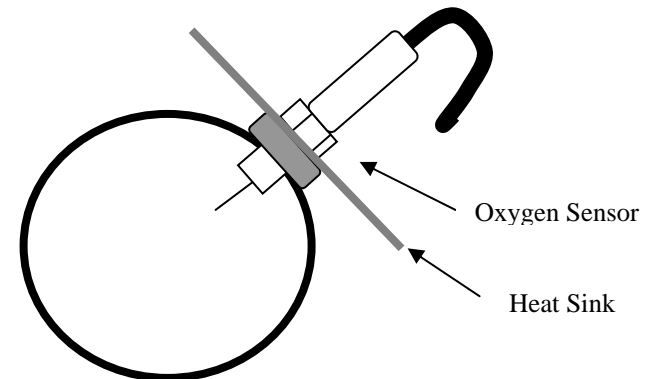
EGT (Thermocouple) WELDMENT INSTALLATION

1) Weldments should be placed equal distant to headers flanges. Up to 4" away is acceptable. **Weldments should be placed the <u>same</u> distance away from the flange on each header**, this is very important. They should also be in the same position in each header. Weld in small increments around the weldment as to not get the weldment excessively hot, which will cause it to warp.

2) After weldment is welded in place, screw on the <u>lower</u> section of compression fitting.

3) Using the hole in the compression fitting as a guide, drill a 3/16" hole through the header tube.
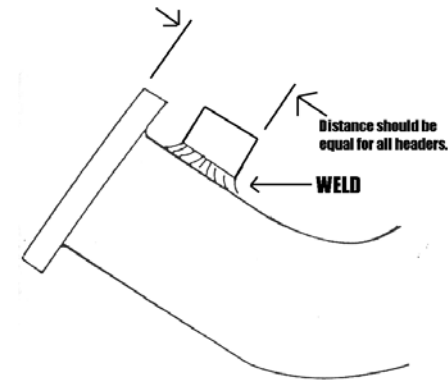
EGT (Thermocouple) BAYONET INSTALLATION

1) BAYONET **should be placed the <u>same</u> distance away from the flange on each v header**, this is very important. Up to 4" away is acceptable. They should also be in the same position in each header.
2) Drill a 1/4" hole through the header tube. Tighten clamp onto header at desired location.
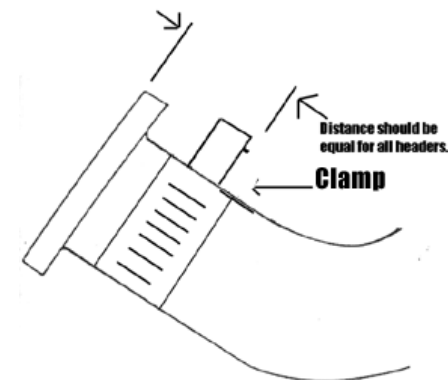
OTHER SENSORS

The O2ALERT allows for recording up to 2 analog inputs. These inputs can be from sensors which can measure EGT, Pressure, Vacuum, Position, Acceleration, Air/Fuel, or any other 0-5 volt signal.

The O2ALERT can also output Air/Fuel Ratios in voltage form. This is useful in connecting to other data acquisition equipment or vehicle ecu's.

Contact Altronics Inc. for more info 1-888-464-2587 or visit our website www.AltronicsInc.com

SET UP

To enter **SETUP** you must press and release the MODE key when "O2ALERT" appears on the LCD Display immediately after powering up the system.

After SETUP is entered the screen will prompt you to set the number of engine cylinders:

NUM OF CYL->_

Use the UP/DOWN buttons to set the appropriate number of cylinders. Then press SELECT.

Next select the Start on RPM:

START ON RPM->Y or N

Using the UP/DOWN buttons your can set to start recording off of an engine RPM or Manual.
Then press SELECT.

If you select Y (Yes) you will be prompted to set the start RPM:

RPM->(value)

Using the UP/DOWN buttons your can set the RPM to start Recording. Then press SELECT.

Next set the Warning AFR:

WARN AFR->(value)

Using the UP/DOWN buttons your can set the air/fuel ratio that will activate the Warning Output.

Next set the Warning RPM:

WARN RPM->(value)

Using the UP/DOWN buttons your can set the RPM value that will allow activation of the Warning Output.

Note: This feature allows the warning output to only be activated when the engine rpm is above entered value. This allows system to be armed and recording when engine is not running or at idle.

Then press SELECT.

Next set the FUEL TYPE:

FUEL TYPE->Y or N

Using the UP/DOWN buttons to confirm setting fuel type.
Then press SELECT.

If you select Y (Yes) you will be prompted to set the fuel type:

Using the UP/DOWN buttons your can select compatible fuel types.

Then press SELECT.

Next set the Sample Rate:

SAMPLE RATE->1, 10, 100

Using the UP/DOWN buttons your can set the Sample Rate to 1, 10 or 100 samples per second. The slower the rate the longer the units will record and vice-versa. 1-200 minutes, 10-20 minutes, 100-2 minutes.

Then press SELECT.

CALIBRATION

DO NOT CALIBATE A NEW SYSTEM! They are already factory calibrated.

The following calibration is done in open air only. The sensor should be removed from exhaust and left in the open air. Before calibrating you can check if the sensor is out of calibration by selecting PLAYBACK -> A/F1 or A/F2 -> REALTIME. This will show the real-time AFR of the selected sensor. The open air AFR should be 100. If the reading is not 100 then you should calibrate the sensor using the following procedure.

After selecting sample rate you will be prompted with the option to Calibrate sensor.

CALIBRATE-> Y or N

Using the UP/DOWN buttons your can choose Y to calibrate sensor.

Then press SELECT.

The display will then show **CALIBRATING!** This can take a couple of minutes to complete calibration. After calibration is complete verify that the open AFR is 100.

NOTE: to verify sensor and system is operating, simply breathing on sensor should cause AFR to change to a value of less then 100.

OPERATING THE SYSTEM

After applying power to the system a greeting will be displayed as follows:

O2ALERT
By Altronics
VERSION 1.0

INITIALIZING!

Then will show:
RECORD

By using the UP/DOWN Buttons you can select one of the operating modes **RECORD**, **PLAYBACK**, or **DOWNLOAD**. You can enter into any of these modes by then pressing the **SELECT** button.

RECORD

It is recommended that you go through SETUP before RECORDING data.

Depending on how the system was configured in SETUP the display will read either Recording! or Armed!. If Start On RPM was enabled then the display will read Armed! until the preset RPM has been reached. Once the RPM has been reached the display will change to say Recording!. If Start On RPM was disabled the system will say Recording! immediately upon selecting the RECORD mode.

The unit will record until one of the following conditions has been met.
1) Max recording time has been reached.
2) The MODE key is pressed
3) The RPM dropped below 500RPM and Start On RPM was enabled.

If WARNING is activated during recording the a WARNING! Message will be displayed alternating with the Recording! message
After recording has stopped the display will read Complete!
If a WARNING was activated during recording it will show the Air/Fuel Sensor number that tripped the warning after recording is complete.

PLAYBACK

After entering the PLAYBACK mode you can choose which channel you want to view by using the UP/DOWN buttons. Once the channel you want is displayed press the SELECT button.

Now you can choose between 4 Playback modes. **MIN/MAX**, **STEP**, **REALTIME**, or **LAUNCH.** Press the SELECT button after using the UP/DOWN buttons to enter the playback mode desired.

MIN/MAX: Shows the Minimum and Maximum value of channel and time during recording that value occurred

STEP: Show the value of channel and time at each time interval during recording. Use the UP/DOWN buttons to scroll through the time of recording.

REALTIME: Shows the real time value of channel.
NOTE: Warning will activate during real time operation if warning AFR is met. This is useful if system will be operating for long periods of time and recording is not necessary.

LAUNCH: Shows the channel value at beginning of recording.

Press MODE button to jump back to and select another channel to

DOWNLOAD

Download should only be selected when system is connected to and prompted by the O2ALERT software running on you Personal Computer.

Press MODE button to exit DOWNLOAD mode.

INSTALLING SOFTWARE

IMPORTANT: INSTALL SOFTWARE IN FOLLOWING ORDER ONLY!

The O2ALERT transfers data to your PC through a USB (Universal Serial Port). In order to install the "DRIVER" which allows the O2ALERT to communicate with your PC the following steps must be performed.
After USB is installed then O2ALERT software can be installed.

The USB driver will attach itself to one of your computers Comports. After driver is installed you will need to determine which Comport it has installed itself to.

There are two files located on the O2ALERT CDROM that detail the USB installation. View one of the following files depending on which Windows operating system you have to help with installation.
USB Install Win 98-XP.DOC
USB Install Win 2000.DOC

1) Power up both O2ALERT and PC.
2) Place O2ALERT CDROM in PC's drive.
3) Connect USB cable to O2ALERT and then to PC.
4) Your PC should automatically find new hardware and start driver installation process.
5) When prompted choose to Search for Driver and select CDROM drive.
6) Select Next, then Finish to complete installation of USB driver
7) Now right mouse click on MY COMPUTER and select properties.
8) Select Hardware/Device Manager and go to the PORTS (Com &LPT) section.
9) Click + sign and you should see listed USB Serial Port (COM #).
10) Remember which COM # it is.
11) Now install O2ALERT Software
12) Run the Setup.exe file on the O2ALERT CDROM
13) Follow Prompts on screen.

OPERATING SOFTWARE

To run the O2ALERT software simply select O2ALERT from the **Programs** directory in the **Start** menu, as you would for any other program installed for Windows.

You can also create a shortcut to run the O2ALERT program from your desktop. Refer to Windows help on creating shortcuts.

Before selecting the Download or Real Time Button select the correct Comport #

Download:

When Download is selected a File Select pop up menu will appear. You should enter the name of a file to keep the data you are going to download.
Ex: Indy_run_1.dat
All files should be kept in the C:\Program Files\O2ALERT\Runs directory

After entering a file name and selecting OK another pop up panel will appear with directions for downloading. The O2ALERT should now be connected to the computer with the cable provided.

You will see the word Downloading appear on the O2ALERT display and also see "Downloading in Progress" appear on your computers monitor.

Wait unit it reaches 100%. When downloading is complete the Run Information box will appear and you can enter any parameters you may want for that run. Then press Save Run Info.

O2ALERT will return to its main menu and you can select to review the run. The Data Analysis interface will now appear on your monitor.

You can now click on the enabled channels and then hit GRAPH to plot them out.

Note: The small color boxes next to the enabled channel can be selected, which will then bring up a color chart, so you can select a different color to plot out the channel.

CURSOR: You can use your mouse to click on any point on the graph and a cursor will automatically be set showing the time and data value of that point. You can now use the arrow keys to move back and forth along the graph.

SMOOTHING: This feature allows you to set the amount of filtering for the graph. If there is noise in the plot of a channel to can use you mouse and click on the Smoothing slider to increase the amount of filtering. Click on GRAPH again to see a smother plot.

SET START OF RUN: You can set time = 0 at any point on the graph by left mouse clicking on at desired place on graph, then hit SET START OF RUN Button and then hit GRAPH button.

ZOOM: Hold CTRL key and Left mouse click on graph to ZOOM

PAN: Hold CTRL and SHIFT key and Left mouse click and drag on graph to PAN.

Review:
When Review is selected a File Select pop up menu will appear. You should select one of your previously downloaded runs for reviewing from the C:\Program Files\O2ALERT\Runs directory.

After selecting your run the Data Analysis interface will appear on your monitor

Review Multiple Run:
When Review Multiple Runs is selected two File Select pop up menus will appear to select base run and then to select Compare run.
After selecting your runs the Data Analysis interface will appear on your monitor

Real Time:
Allows for viewing real time data of all enabled channels in O2ALERT on PC.   Select Correct Comport before pressing Real Time.

WARRANTY

The O2ALERT by **ALTRONICS INC** is warranted for 1 Year against any defect in materials and workmanship from date of purchase. ALL WARRANTIES AND GUARANTEES ARE VOID if the O2ALERT enclosure is opened or altered. Sensors are not warranted.

ALTRONICS INC shall not be liable for injury, consequential, or other types of damages resulting from the use or misuse of the O2ALERT

TECHNICAL SUPPORT
Email: tech@altronicsinc.com

When sending a unit in for repair or update: Fill out a "Service Form" which is available from the Technical Support Section of our website-> www.altronicsinc.com

ERROR CODES and TROUBLE SHOOTING

Error codes will be shown after the system initializes on the respective Air/Fuel Channel (AF1 or AF2 sensor error). The following table shows definition of error codes.

Error Code	Error	Possible Causes	Fix
1	Overheated Sensor	1. Sensor to close to exhaust port. 2. Sensor damaged 3. Cable damaged. 4. O2Alert heater control damaged	1.Install heat sink on sensor. 2.Replace Sensor 3.Replace Cable 4.Send o2alert in for repair.
63,2	Heater Shorted	1. Sensor damaged 2. Cable damaged	1.Replace Sensor 2.Replace Cable
127	Open Circuit	1.Cable connectors loose 2. Sensor damaged	1.Tighten Connectors. 2.Replace Cable/Sensor
191	Heater Shorted	1.Sensor damaged 2.Cable damaged	1.Replace Sensor 2.Replace Cable
207,243,252	Sensor Short Ground	Sensor damaged	Replace Sensor
223,247,253	Low Voltage	Low Battery	Verify 12 volts to system, Charge Battery
239,251,254	Sensor Short Battery	Sensor Damaged	Replace Sensor

Note on error code 1: If the O2Alert is displaying error code 1, you can do the following check to verify if the overheating problem in being caused by hot exhaust or if it is a system problem.

Turn system ON without engine running. Leave system ON for at least five minutes. If error code does not come on, then problem is due to sensor mounted to close to exhaust port and needs to have heat sink installed.

MAIN MENU

1   **RECORD**
2   **SETUP**
            A. NUMBER OF CYLINDERS
            B. CYLINDER ORDER
            C. START ON RPM
               a. RPM VALUE
            D. WARNING AFR
            E. WARNING RPM
            F. FUEL TYPE
            G. SAMPLE RATE
            H. CALIBRATE
3   **PLAYBACK**
            A. CHANNEL SELECT
               b. MIN/MAX
               c. STEP
               d. REALTIME
               e. LAUNCH
4   **DOWNLOAD- Download data base into PC**