Instructions for Using the Moates.Net _O-Meter_ Display
(updated January 2, 2007)

1.   Connecting the O-Meter

Warning: Do **NOT** connect the O-Meter to the data jacks of the Innovate LC-1 or LM-1 wiring! The O-Meter **must** be wired in separately as described below. You can tie Signal Ground, chassis ground, and Heater Ground for the wideband and O-Meter together.

There are three wires needed: Ground (base of connector), 12v switched (middle of connector), and 0-5v analog signal (tip of connector). The signal wire should be a 0-5 volt signal. Impedance should not matter. The device can be made portable or mounted in a semi-permanent fashion. You can use the external stereo cable provided, and preferred wiring methods are shown under the Documentation section of www.moates.net for your reference. There's pictures, so check it out!

The hot ticket is to install a female 1/8" stereo jack on your wideband harness (such as the Innovate LC-1) that is connected to Ground, Ignition, and 0-5v analog output. Then all you need to do is plug in the 1/8" stereo cable and you're good to go. The O-meter comes with a 1/8" stereo cable (male on both ends) as well as a 1/8" stereo jack for in-line installation.

2.   Power-Up and Start-Up

When the device powers up, the firmware version will be displayed. Then it will begin acquiring and rendering data according to the settings that are stored on the unit. All you need to do is apply power, ground, and 0-5v signal and the O-meter does the rest.

Note: Due to the large digit size and I/O constraints, the leading digit (the 1 in 14.7 for example) can only be displayed as partials of the digit '1'. So, for values of 20.0-29.9 the 2 is represented as the upper segment being lit. For 30.0-39.9 the lower segment is lit.

3.   Configuration settings and menu navigation

a)   To enter the configuration, hold the left button down for approximately 2 seconds. The unit will display 'Co' for config menu. Release the left button.
b)   To scroll through the various parameters, tap the right button repeatedly.
c)   When you get to the one you want to adjust, tap the left button to select it. The list loops back around, so if you miss the one you want, that's OK. Just keep hitting the right button and you'll see it again.
d)   Once selected, the current value for the chosen parameter will be selected. To increase the value, tap the right button.
e)   If you hold the button down, the value will rapidly increment.
f)   If you want to decrement the value, hold the right button down and press the left button while continuing to hold the right button.
g)   To enter and commit the new displayed value to the chosen parameter field, tap the left button without holding the right button. You will be returned to normal operation.

The adjustable parameter items and menu item appearance, a description, the default value, and the minimum and maximum allowable values are listed as follows:

Co: Indicates that you are in the configuration menu.
EC: Select this item to exit the configuration menu and return to normal operation.
dE: Resets the units to factory defaults.

br: Brightness, default=10, range=1-50.
         This changes the brightness of the display during normal operation. Higher is brighter.

dP: Decimal point mode, default=1, range=0-1.
         When set to 1, decimal points will be displayed if needed. When set to 0, decimal point display is suppressed.

dU: Display units, default=AF
         Options = AF(default selection:air-fuel ratio), 0.5(0-5volts), LA(lambda without decimal point).

Fr: Frequency, default=4, range=1-60.
         This is the rate at which samples are stored during datalogging mode. At low values (<10), it is approximately equal to the number of samples per second (Hz), but at higher values this becomes less representative. Lower values are good for longer storage times (drive to work / cruising around), higher values are useful for good time resolution (1/4 mile pass / dyno pull).

Lo: Low alarm in AFR, default=7.0,range=0.0-39.7 (May not exceed Hi alarm value)
        When AFR drops below value, display will flash 'Lo'. During data storage, actual values are still captured. You can also touch a button during alarm display to see what the current value is. Alarm values are in AFR regardless of display units.

Hi: Hi alarm, default=25.0, range=0.5-39.9 (must be greater than Lo alarm value)
        Similar to Lo alarm threshold. Will flash 'Hi' when exceeded.

0.A: AFR value which corresponds to 0v input, default=7.4, range=0.0-39.7
        Cannot exceed AFR value which corresponds to 5v input. Again, these settings are in AFR regardless of what display units are being used. Default values should match Analog Out 2 on the Innovate LC1 device.

5.A: AFR value which corresponds to 5v input, default=19.0, range=0.5-39.9
        Similar constraints as shown above. Again, default value should match Analog Out 2 on the Innovate LC1 device.

bi: Bias factor, default=100, range=80-120.
        This is a multiplier (in %) that is applied to the incoming voltage. If your AFR somehow does not match what it should because of impedance loading or other effects, then the value can be biased up (110 will make 2.0v show 2.2v) or down (95 will make 2.0v show 1.8v).

Fi: Filter factor, default=10, range=1-50
        Filtering factor for incoming voltage. If you want it to react very quickly put a small number in here. To reduce signal noise and smooth the readings out, put a larger number in here. This is a weighting divisor for fresh incoming values.

4.   Datalogging Menu

The O-Meter can store data in two ways: RAM and EPROM. The RAM storage is lost when the unit is powered down. The EEPROM data is stored in nonvolatile memory that 'sticks' when you power the unit down. By using both memories, you can have two different modes of collection, more storage area, and two separate recordings. The data is played back at the same storage frequency and display units with which it was collected, so you get a 'realtime' feel. The data can't be offloaded to a PC, but the playback to the display is useful.

When recording or playing back, the display will 'blink' each time a new datapoint is being stored or retrieved. This gives you an indication of how quickly the data is being updated.

To enter the datalogging menu, hold down (you guessed it!) the right button for a couple of seconds. An indication 'dL' will be shown to let you know that you have entered the datalogging menu. To scroll through options tap the right button. To select the displayed option, tap the left button. Here are your options from the datalogging menu:

dL: Indicates that you're in the datalogging menu
EL: Exit logging menu, go back to normal operations.
Pr: Playback stored RAM data.
PE: Playback stored EEPROM data.
rr: Record data to RAM storage.
rE: Record data to EEPROM storage.

When you select one of the playback or record options by tapping the left button, a decimal point will light up in between the letters of the displayed option. This serves as an indicator that you are on 'hot standby' to take action. To initiate a session (either recording or playback) from this point, tap the left button again.

When the session is initiated, a dashed line will travel from left to right across the middle of the display and the session will commence. To terminate the session early, tap the right button. Otherwise, the session will self-terminate when the end of the playback log or the end of available memory is reached. The end of the session is indicated by the dashed line moving across from left to right at the bottom of the display. Remember also that the display will flash each time a datapoint is stored or retrieved, so this also serves as an indicator of whether the session is in progress or has ended.

The amount of memory available for data storage in terms of data points is 600 in RAM and 500 in EEPROM. The EEPROM will eventually wear out (after several hundred thousand logging sessions), so only use it if you want to keep the data. Otherwise use RAM (it's bigger anyways). To give an example of how much data this is, at 4 samples per second (fairly reasonable default rate), you can store 150 seconds (or 2.5 minutes) of data. While this isn't incredibly long, it's very useful.

5.   Stealth / Sleep Mode

To turn the display off, tap both buttons at the same time (first left, then right, and then release both) while the unit is in normal operating mode. This will turn off the display. To wake it back up, tap a button or cycle the power.