

# **Analogic**

*by*



## ***USER MANUAL FOR THE ANALOGIC GAUGE***

*FIRMWARE VERSION 1.1*

[www.aeroforcetech.com](http://www.aeroforcetech.com)

*Made in the USA!*

## **WARNING**

Vehicle operator should focus primary attention to the road while using the *Interceptor*. The information provided by this device should be observed as part of a normal sequence of observations performed in the operation of the vehicle, as with any gauge or other instrumentation. *Interceptor* settings should be changed only during conditions when it is safe to do so. **Focusing on the road should be the primary concern of the driver.**

Aeroforce Technology shall not be held liable in any way for any incidental or consequential damages to the vehicle, driver, passengers, and or other involved parties or property occurring while using the *Interceptor* scan gauge.

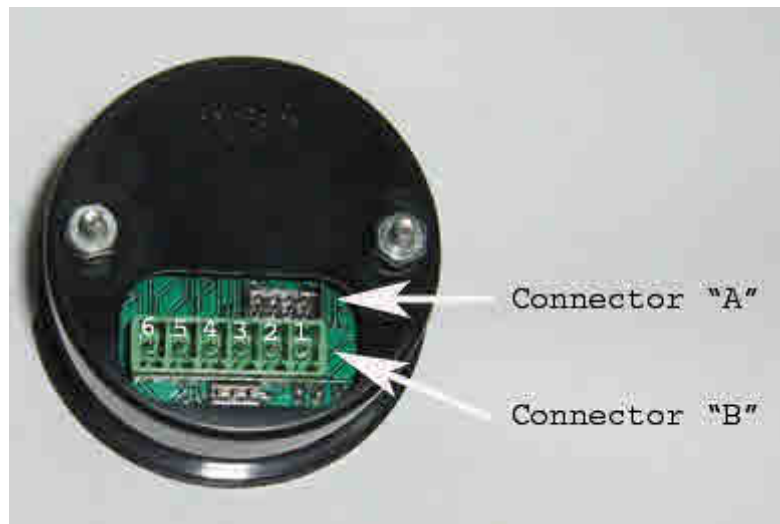
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## INSTALLATION

1. **Make sure the car's ignition is turned off.**
2. **Connect power.** Connect switched 12v (ACC) power to pin 1 of the 6 terminal green connector. See *figure 1* and *chart 1* below. These circuits are commonly known as “accessory” circuits because they are only “hot” when the ignition is turned on. A recommended way of doing this step is to use a product called an “*Add a Circuit*”, made by *Littelfuse*, available at most car parts outlets. These kits, which sell for under \$10, allow you to easily use an existing circuit in the fuse block to power an add-on accessory such as the *Analogic* without the need to cut or splice any wires. Of course, you can also simply splice into an existing 12v switched power wire using traditional methods. Connect ground to pin 2 of the 6 terminal green connector.
3. **Connect sensors.** Connect the 0-5v sensor outputs to the analog inputs (connector A) and EGT outputs (type K thermocouple) to *Analogic* EGT inputs (connector B) if used. See *figure 1*. See *Chart 1* below for pin designations. Press the *Analogic* into the gauge pod or mounting hardware. Follow instructions in step 2.n) (page 7) below to configure the analog inputs.



**Figure 1**

Connector A pinout and cable color codes		
Pin 1	RED	ANALOG 4 -
Pin 2	BLACK	ANALOG 4 +
Pin 3	WHITE	ANALOG 3 -
Pin 4	GREEN	ANALOG 3 +
Pin 5	BLUE	ANALOG 2 -
Pin 6	BROWN	ANALOG 2 +
Pin 7	ORANGE	ANALOG 1 -
Pin 8	YELLOW	ANALOG 1 +

Connector B	
Pin 1	12VDC
Pin 2	GROUND
Pin 3	EGT2 -
Pin 4	EGT2 +
Pin 5	EGT1 -
Pin 6	EGT1 +

Chart 1

4. **Turn vehicle on.** With the key on and engine off, or engine running, the *Analogic* will power up and display the *Analogic* and *Aeroforce* logos. The first time it is powered up you will be taken to the “**Setup**” screen where you will select the inputs that you want to monitor or see in normal “**Scan**” mode. Once in Scan mode these are the inputs that will be available. You can always go back into this “**Setup**” menu selection later if your needs change.

## OPERATION

- 1a. **SCAN.** Once the *Interceptor* has been installed and set up, with the vehicle on, you will see an upper and lower field containing a description and input value. The right button will change the upper input field, the left button the lower. One push of the button will toggle to the next parameter. Holding the button down will recall the peak value for the given input since the last rest. There are two ways that the stored peak values are reset. First is by going into the menu and selecting “Zero Peaks” or power the unit down and back up again.
- 1b. **MULIT-SCREEN MODE:** While in scan mode you can access a multi-parameter, scrolling graph, and bar graph mode by pressing and holding both buttons for 4+ seconds. Before this will function however, you need to set up cyclic scan as described below in section 2e. These special displays use the parameters chosen in **Cyclic Scan** to be displayed. The exception is if you hold the two buttons for 5 or more seconds the first two parameters displayed in multi, bar, or scoll, will be the current two parameters shown in normal scan mode rather than the first two chosen in **Cyclic Scan**. Once in this mode, you will see one of the three screens just described. Hitting the left button will toggle to the next screen, hitting the right button will return you to normal scan mode where you left off previously.

## Multi-screen



This screen will display the 6 inputs chosen in **Cyclic Scan**, or the two parameters that were last displayed in normal **Scan** mode plus the last 4 in **Cyclic Scan**.

## Scrolling graph



This graph will show the first two parameters chosen in cyclic scan or the two parameters last displayed in normal scan mode depending on how long you held the buttons when you initiated the multi-screen mode. The digital value on the top left is the first cyclic parameter, or top parameter from normal scan mode. The associated graph is the solid (filled) graph. The left axis applies to this graph. The value on the top right is the second or bottom parameter from normal scan mode. Its graph is the thin line. As time progresses, the graph moves to the left. While in this mode you can hit both buttons to freeze the graph and it will not update until both buttons are hit again. This allows you to stop the graph to review it later or more closely at a more opportune time rather than lose the data as it scrolls off to the left. Some of the axis scales are pre-set, some will “grow” as the values change. In most cases RPM will be preset from 0-about 10k. Others such as Mass Air Flow will re-range as the values increase. The axis may only show 0-10 lb/min at first while cruising, but after a hard acceleration with values approaching 50 the scale will adjust to 50 max.

## Bar graph



This graph mode displays the first 4 parameters programmed into cyclic scan or the 2 parameters from normal scan mode and the third and fourth from cyclic mode depending on how long the two buttons were held as described above. In most cases, the range of values (max height of each bar) will “grow” or adjust based on the max value observed. Some however are pre-set with a max range that should never be exceeded.

2. **PEAK RECALL.** Press and hold the left button to temporarily display the high value stored in memory for the current parameter displayed in the top field. Press and hold the right for the lower parameter. Once the button is released the current value is displayed once again.
3. **MENU.** Pressing both buttons at the same time will take you to a menu screen. Here you will have 21 choices. Use the left button to toggle down to the desired choice. The current selection will be highlighted. Push the right button to select this choice and proceed to the associated screen.

Choices are:

- a) **SCAN.** This is the standard mode of operation for the unit and the default mode when powered up. In this mode the unit is scanning and displaying data.
- b) **SETUP.** When powered for the first time, you will be required to edit a list of inputs that will be available for scan. These are the four 0-5v inputs and two EGT inputs. Select all that will be used by hitting the right button to place an "\*" next to the input. Scroll to other used inputs and select them the same way. You can deselect the same way. When finished select "EXIT" or simply push both buttons.
- c) **CYCLIC SCAN.** This selection will activate the cyclic scan mode that you set up in "CYCLIC SETUP" described below. Cyclic scan is an optional function and does not need to be used nor set up. If either of the two buttons is pressed while in CYCLIC SCAN the gauge will go to normal SCAN mode.
- d) **CYCLIC SETUP.** This menu option will allow you to choose certain inputs from the main list you choose in the **Setup** routine to display on a pre-determined rotation. For example, you may choose to view analog 1 and analog 2 (screen 1) for a certain amount of time, then EGT 1 and EGT 2 (screen 2) for a period, and so on for up to 3 combinations or 6 inputs. When you first enter this selection, the list of inputs you chose in **Setup** will be shown, under the heading "**Screen 1 Field 1**". The input you select, by scrolling down with the left button and selecting with the right, will be displayed in the top field of screen 1 during **Cyclic Scan** mode. To deselect the input, simply select a different one. Once selected the input will have an "\*" next to it on the list. After the input is selected you will go to the bottom of the list and select "**Next**", or hit both buttons simultaneously to move on to the next selection. Selecting "**Next**" or pushing both buttons performs the same function. You will then go to "**Screen 1 Field 2**". Repeat these steps for the bottom parameter field of screen 1. You must repeat these steps for all three screens. After the third screen is configured and exited you will return to the main menu. Each screen will now be displayed for 10 scans before the next screen comes up. You can change this time frame by selecting "**cyclic time**", which is the next menu option after "**cyclic setup**". This selection will allow you to enter a number of scans between each screen change. There will be approximately 10 scan per second so keep this in mind when entering the value. If a screen is not configured it will default to the factory setting of analog 1 for its turn in the cycle.  
*If the input list in Setup is changed, the Cyclic Setup must be completed again.*
- e) **CYCLIC TIME.** Choosing this will allow you to enter a number of scans (time) between screen (input) changes in **cyclic scan** mode.
- f) **RECORD.** Upon selecting **record**, the unit will return to normal scan mode except the first letter of each field description will be replaced with a square block to indicate that **record** is active. When you press any button the unit will automatically start recording and displayed data for approximately 40



seconds. When recording begins, the display colors will invert as an alert. The recorded file will be saved for replay until record is selected again and record is initiated, which will overwrite the old stored data. The *Analogic* will maintain the file even when powered down. If in **record** mode, you wish to return to normal **scan** mode, access the menu screen and select **record** again. This will disable it until selected again via the menu.

- g) **PLAY**. Once **play** is selected the *Analogic* will return to the normal **scan** screen but will show the first frame of a recorded log. You will notice the field descriptions flickering to indicate playback mode is in effect. Pushing the right button will toggle forward to the next frame in chronological order, the left button will toggle backwards, or to the very last frame if done at the beginning of the file. Holding either button down will quickly scroll through the data until the button is released. The backlight will flash every time a new frame is displayed. In other words, push a button once and the light will blink once. Hold a button down and the light will blink quickly as each new frame is displayed. **Play** will not be selectable if the record buffer is empty.
- h) **INVERT**. This menu option inverts the colors on the display. If the display currently has a black background with blue characters for example, inverting will make it blue with black characters. A dark background is called a negative image, and is ideal for low light situations such as driving at night. A light colored or white background is called a positive image, and is easier to read in bright sunlight.
- i) **DIMMER**. Selecting “Dimmer” will take you to a new screen with a brightness value displayed, between 0-10. 0 is the dimmest, 10 the brightest. Using the left button you can raise this value until you reach 10 after which it will restart back at 0. Once the desired brightness is reached press the right button to return to the menu screen.
- j) **SCAN RATE**. Choosing scan rate allows you to adjust the speed in which the display will update. When selected, a number from 1 to 6 will appear, the higher the value the slower the scan rate. The left button can be used to alter this value. Select the new value by hitting the right button, which will send you back to the main menu
- k) **ANNUNCIATOR/OUTPUT**. This selection will allow you to enter a value that once reached will turn on the bright LED warning lights. Or, you can choose any one or combination of two previously selected inputs (in step “b”, **Setup**) to monitor and once an entered threshold is reached activate these lights. The combination of inputs can be used with an “And” or “Or” statement. For example, Air Fuel ratio (analog 1) goes above 12.5, *and* EGT 1 is above 1200 deg F. Or, Coolant Temp (analog 2) goes above 225 *or* Oil Pressure (analog 3) falls below 20 psi. Whatever is set will also trigger the optional relay output if used and selected in step **u**) below. **To program the warning lights:** First, you will select the warning scheme you would like, single input, “P”, two inputs using the “And” statement, “P1&P2”, or two inputs using the “Or” statement, “P1ORP2”. Next you will be asked to select the first (or only) input you wish to monitor. Once selected you’ll enter a 5 digit value, starting from left to right. Hitting the left button will cause the

digit above the cursor to change from 0-9, including a decimal point which can be placed in any position. Once the correct digit is entered, hit the right button to move to the next digit and repeat until all 5 digits are correct. After entering the last digit hit the right button to take you to the next screen where you will select “above” or “below” depending on if you want the warning light to activate above or below the set point you entered. Again, right button puts the star next the selection, left button scrolls down. To exit select “Exit” at the bottom of the screen. If you are only monitoring this one input, you are done and will be sent back to the main menu. If you’ve selected a two input scheme you will then repeat the steps above. Once the second input is entered you will be sent back to the main menu. The rate at which this comparison process takes place is dependent on the “**scan rate**” you have chosen in step “j” above. To activate the annunciator/output function you must then activate it as shown below. *If the list of inputs is changed in Setup, the annunciator parameter will also need to be reset.*

- l). **ANNUNCIATOR/OUTPUT ON.** Select this to activate the annunciator/output function. When the gauge first powers up it will indicate the status of the annunciator (“on” or “off”).
- m). **ANNUNCIATOR/OUTPUT OFF.** Select this to disable the annunciator/output function.
- n). **ANALOG 1.** Select this to set up the #1 analog input. You will initially see:

Slope  
001.0

Enter the conversion coefficient for slope (slope x voltage + intercept = units). Any digit can be 0-9, “-”, or decimal point. If entering a negative value, the negative sign must be in the first digit. For example, -3 can be entered as -3.00, or -0003, etc. Once all digits are entered you will see:

Intercept  
000.0

Follow same rules to enter this value. Refer to your sensor instructions for these values. To read raw volts, enter “001.0” for slope, and “000.0” for intercept. This is the default factory setting. For example, say you want to input the analog output of a wide band O2 sensor kit. You know from the kit’s documentation that the output is scaled such that 0v=10 A/F ratio, and 5v = 20 A/F ratio. The conversion would then be a slope of 002.0, with an intercept of 010.0. In other words, voltage multiplied by 2 plus 10 would equal A/F ratio. In this example, a voltage of 5 would result in  $5*2+10$  equals 20 A/F ratio. Another common use for these analog inputs is for MAP sensors. The GM 2 bar MAP is a common sensor used to measure high levels of boost. The conversion for this sensor would be  $V*5.8-13.2$ , or a slope of 005.8, intercept of -13.2. The intercept can be tweaked if the sensor does not read “0” with the key on, engine off. Our personal 2 bar MAP had a slight

zero offset due to either differences in sensor and gauge grounds or altitude, that we adjusted by changing the intercept value.

Once finishing this step you will then be asked to enter the description you want associated with this input. This description will be shown above the data in “Scan” mode.

Exception: if you are using either our fluid or air temperature sensor kits, you will not need to enter coefficients. Simply scroll past these values and select the “Fluid Temp 1”, “Fluid Temp 2”, or “Air Temp” description. “Fluid Temp 1” is for the 1/8” fluid sensor, “Fluid Temp 2” is for the 3/8” sensor. Once one of these is selected the proper 6<sup>th</sup> order conversion is used in the gauge to convert the input voltage to temperature.

- o). **ANALOG 2**. Same as item “g” above except for analog input #2.
- p). **ANALOG 3**. Same as item “g” above except for analog input #3.
- q). **ANALOG 4**. Same as item “g” above except for analog input #4.
- r). **LOGO**. Allows you to choose from a small selection of logos upon power up other than the “Analogic” logo.
- s). **C O R F**. Toggles the temperature units for EGT1 and EGT2 between SAE standard and metric units.
- t). **ZERO PEAKS**. Resets the stored peak values in memory. When the unit is powered down and powered back up again the peak values will also be reset.
- u). **RELAY**. This selection will enable/disable the relay output. Analog 4 acts as the output line. When enabled analog 4 is used to trigger the 12v relay. It can no longer read analog input values. The output is triggered when the annunciator lights are lit.

## Powering down

The *Analogic* will automatically shut itself off within seconds of the ignition being turned off.

## Non-Volatile Memory

The *Analogic* does not require batteries or a continuous power source to maintain its memory. This means that your data will not be lost if you disconnect the vehicle battery or disconnect the cable from the OBD2 port.

## Precautions

The *Analogic*'s display is designed to operate continuously at temperatures up to 122 deg. F (50 deg. C). The display may appear “washed” out for a minute or so if exposed to direct sunlight in hot climates after the car has been parked for an extended period of time. If the gauge is mounted in such a way that it can be exposed to direct sunlight, such as on top of the dash, you may want to consider a windshield shade, or unplugging the display for a minute or two until it and the car cool off a little.

## Limited Warranty

Aeroforce Technology warrants this product and its accessories against defects in material and workmanship for a period of 1 year from the date of purchase. Aeroforce Technology will repair or replace this product with new or refurbished products or parts, at Aeroforce's option, free of charge in the USA.

This warranty extends only to the original purchaser. A purchase receipt or other proof of date of original purchase from and authorized dealer (including Aeroforce Technology) is required on order to have warranty service performed.

Before sending an *Analogic* back for warranty service, you must obtain a Return Materials Authorization number from Aeroforce Technology. This can be done by emailing [service@aeroforcetech.com](mailto:service@aeroforcetech.com) including a description of the problem and date/place of purchase. An RMA number will be returned to you as well as a return address.

This warranty covers failures due to material or workmanship defects only.

This warranty does not cover cosmetic damage or damage due to accident, misuse, abuse, negligence, commercial use, acts of God, or modifications of, or any part of the product, including accessories.

## A1 – User tips

1. **MAP sensors:** The conversion coefficients given for these assume the sensor is at or near sea level. If this is not the case you can correct for this by “zeroing” the sensor with key on/engine off. In this condition the gauge should read “0”. If you are at a high altitude and it reads -0.5 for example, you can change the Intercept value by lowering it by 0.5. For example, it was -14.7 and you change it to -14.2. This will result in a reading of 0.0 now with key on engine off.

2. **Thermocouples (EGT sensors):** The negative side (red wire) of the EGT sensor should be connected to vehicle ground. This allows the open circuit detection of the gauge to function properly. If an EGT sensor fails open the gauge will then read FFFFF. The easiest way to do this is to add a jumper (standard wire) from the negative EGT terminal (pins 3 or 5) to the ground terminal (pin 2) on connector “B”. This step is not required, the gauge will still read temperature accurately, but if the EGT fails the readings will float around rather than read FFFFF.

3. **Resetting gauge:** When connecting input wires to the gauge with it powered up, it is possible for the micro processor to “lock up” due to intermittent connections and voltage levels. If this happens you may see “0” volts as the input value even if you know the actual value is something else. To reset the gauge simply remove power by removing the rear connector, **AND** removing the input voltage. Both must be removed for the gauge to reset. Plug everything back in and all should be working properly.