Air Density Meter #130014

INSTRUCTIONS

Air Density and Engine Performance

Fuel, oxygen, and a heat source are the three necessary components for combustion. The heat source, (ignition system) sparks combustion and the fuel and oxygen burn to create energy. The amount of energy that can be produced is based on the amount of fuel that is burned and the amount of fuel that can be burned is dependent on the amount of available oxygen. The amount of oxygen carried in the air is affected by the density or weight of the air. Two factors that influence air density are temperature and barometric pressure. Higher temperatures cause lower air density and higher barometric pressures cause higher air density. The opposite is true for lower temperature and lower barometric pressures. As air density increases, more fuel can be burned and power output levels increase. As air density decreases, less fuel can be burned and the result is a loss of power. Adjustments to the fuel mixture are also necessary to maintain correct air to fuel ratios at these different air densities.

An air density meter contains metal components that expand and contract with changes in temperature and barometric pressure. As the meter responds to these changes, the meter needle shows a relative movement up or down in reference to the air density. Racers and engine tuners can monitor the changing air density and use this information to calculate fuel mixture adjustments and predict the power output change that the engine will have. Understanding and using this information will give a competitive edge over racers that do not use air density as a tuning factor when racing.

Using the Air Density Meter

The meter must be removed far enough or completely from the padded case to allow free circulation of air through the vent holes on the sides of the meter body. The meter should be kept in a shaded area away from any heating or cooling source that will cause inaccurate readings.

Always use your meter to tune your race car. It is not uncommon for two meters to show different readings. This is not necessarily important because we are looking for a relative change as opposed to any absolute number. Using readings from different gauges will make for inconsistent tuning calculations.

Establishing a Baseline and Data Base

Establishing a tuning baseline is the necessary first step to using your air density meter. On some given day, you must race the engine and make jet changes to determine the best jet settings for your engine's performance on that day. These jet numbers and the reading from the air density meter must be recorded in your log book. This will be the baseline standard for all future calculations. Each time you make a calculation and a tuning change, also record this information in your log book. After a period of time, you will have a chart for which jet you should run for each air density reading. If you drag race, recording the jet number and the car's E.T. for each air density will give you a baseline and data base for setting your dial-in.

Calculating Air Density and Jet Changes

The amount of jet change required is equivalent to the amount of change in air density. In order to calculate the amount of air density and jet flow change required, use these formulas:

AIR DENSITY CHANGE = PRESENT A/D READING MINUS BASELINE A/D Reading
BASELINE A/D READING

(continued)

For further questions, please contact our technical department at (706) 864-8544.

Example:

Your baseline A/D number from your original testing day is 92. Today the reading is 98. To factor the change, subtract your baseline A/D number from the present reading and divide that number by the baseline number.

$$\text{A/D Change} = \frac{98 - 92}{92} = \frac{6}{92} = .065 \text{ or } 6.5\%$$

Since this change was an increase in the A/D number, it will be a positive and will increase the jet number. If the A/D number decreases, the change percentage number will be negative and will decrease the jet number. To calculate the jet change, you must first multiply the A/D change percentage by the area in square inches of your baseline jet. This amount must then be added or subtracted from the baseline jet area. The new jet required will be the jet that is closest in area in square inches to this new number. Use the jet size and area for jet orifice sizes and area values.

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Example:

Your baseline testing was done when the air density meter read 92 and the engine performed best with #76 jets in the carburetor. The air density meter now reads 98 as stated in the air density change example. From the jet chart, we see that a #76 jet has a drill size of .084 inches which has a square area of .005542. The amount of area change required is equal to the area of the baseline jet multiplied by the decimal equivalent of the A/D change percentage. Adding or subtracting this area change to the original area of your baseline jet will give you the total area required for the new jet. Remember to add the change for air density increases and subtract the change for air density decreases.

Jet Area Change = .005542 x .065=.000360
New Jet Area Size = .005542 + .000360=.005902

From the jet chart we see that the new area required is slightly larger than a #77 jet and a #78 jet will be a little on the rich side. This indicates the need for at least one number richer jetting than the #76 baseline. Always use the engine's actual performance as the true guide for tuning fuel mixture. Charting the optimum jetting and engine performance of your vehicle at each air density will give you an absolute competitive edge over the other racers that do not.

JET NO.	DRILL SIZE	AREA (SQ.")	JET NO.	DRILL SIZE	AREA (SQ.")	JET NO.	DRILL SIZE	AREA (SQ.")
50	.049	.001886	67	.068	.003632	84	.099	.007698
51	.059	.001964	68	.069	.003739	85	.100	.007854
52	.052	.002124	69	.070	.003848	86	.101	.008012
53	.052	.002124	70	.073	.004185	87	.103	.008332
54	.053	.002206	71	.076	.004536	88	.104	.008459
55	.054	.002290	72	.079	.004902	89	.104	.008459
56	.055	.002376	73	.079	.004902	90	.104	.008459
57	.056	.002463	74	.081	.005153	91	.105	.008659
58	.057	.002552	75	.082	.005281	92	.105	.008659
59	.058	.002642	76	.084	.005542	93	.105	.008659
60	.060	.002827	77	.086	.005809	94	.108	.009161
61	.060	.002827	78	.089	.006221	95	.118	.010936
62	.061	.002922	79	.091	.006504	96	.118	.010936
63	.062	.003019	80	.093	.006793	97	.125	.012272
64	.064	.003217	81	.093	.006793	98	.125	.012272
65	.065	.003318	82	.093	.006793	99	.125	.012272
66	.066	.003421	83	.094	.006940	100	.128	.012868