Created by Dan Hourigan
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Lambda	AFR - Petrol	Methanol	LPG	CNG	Diesel	Ethanol	E85	E90	50% Petrol / 50% E85	E10
1,21	17,787	7,7444598	18,755	21,1145	17,54491893	10,89	11,737	11,495	14,762	17,0973
1,2	17,64	7,680456	18,6	20,94	17,3999196	10,8	11,64	11,4	14,64	16,956
1,19	17,493	7,6164522	18,445	20,7655	17,25492027	10,71	11,543	11,305	14,518	16,8147
1,18	17,346	7,5524484	18,29	20,591	17,10992094	10,62	11,446	11,21	14,396	16,6734
1,17	17,199	7,4884446	18,135	20,4165	16,96492161	10,53	11,349	11,115	14,274	16,5321
1,16	17,052	7,424	17,98	20,242	16,81992228	10,44	11,252	11,02	14,152	16,3908
1,15	16,905	7,36	17,825	20,0675	16,675	10,35	11,155	10,925	14,03	16,2495
1,14	16,758	7,296	17,67	19,893	16,53	10,26	11,058	10,83	13,908	16,1082
1,13	16,611	7,232	17,515	19,436	16,385	10,17	10,961	10,735	13,786	15,9669
1,12	16,464	7,168	17,36	19,264	16,24	10,08	10,864	10,64	13,664	15,8256
1,11	16,317	7,104	17,205	19,092	16,095	9,99	10,767	10,545	13,542	15,6843
1,1	16,17	7,04	17,05	18,92	15,95	9,9	10,67	10,45	13,42	15,543
1,09	16,023	6,976	16,895	18,748	15,805	9,81	10,573	10,355	13,298	15,4017
1,08	15,876	6,912	16,74	18,576	15,66	9,72	10,476	10,26	13,176	15,2604
1,07	15,729	6,848	16,585	18,404	15,515	9,63	10,379	10,165	13,054	15,1191
1,06	15,582	6,784	16,43	18,232	15,37	9,54	10,282	10,07	12,932	14,9778
1,05	15,435	6,72	16,275	18,06	15,225	9,45	10,185	9,975	12,81	14,8365
1,04	15,288	6,656	16,12	17,888	15,08	9,36	10,088	9,88	12,688	14,6952
1,03	15,141	6,592	15,965	17,716	14,935	9,27	9,991	9,785	12,566	14,5539
1,02	14,994	6,528	15,81	17,544	14,79	9,18	9,894	9,69	12,444	14,4126
1,01	14,847	6,464	15,655	17,372	14,645	9,09	9,797	9,595	12,322	14,2713
1	14,7	6,4	15,5	17,2	14,5	9	9,7	9,5	12,2	14,13
0,99	14,553	6,336	15,345	17,028	14,355	8,91	9,603	9,405	12,078	13,9887
0,98	14,406	6,272	15,19	16,856	14,21	8,82	9,506	9,31	11,956	13,8474
0,97	14,259	6,208	15,035	16,684	14,065	8,73	9,409	9,215	11,834	13,7061
0,96	14,112	6,144	14,88	16,512	13,92	8,64	9,312	9,12	11,712	13,5648
0,95	13,965	6,08	14,725	16,34	13,775	8,55	9,215	9,025	11,59	13,4235
0,94	13,818	6,016	14,57	16,168	13,63	8,46	9,118	8,93	11,468	13,2822
0,93	13,671	5,952	14,415	15,996	13,485	8,37	9,021	8,835	11,346	13,1409
0,92	13,524	5,888	14,26	15,824	13,34	8,28	8,924	8,74	11,224	12,9996
0,91	13,377	5,824	14,105	15,652	13,195	8,19	8,827	8,645	11,102	12,8583
0,9	13,23	5,76	13,95	15,48	13,05	8,1	8,73	8,55	10,98	12,717
0,89	13,083	5,696	13,795	15,308	12,905	8,01	8,633	8,455	10,858	12,5757
0,88	12,936	5,632	13,64	15,136	12,76	7,92	8,536	8,36	10,736	12,4344
0,87	12,789	5,568	13,485	14,964	12,615	7,83	8,439	8,265	10,614	12,2931
0,86	12,642	5,504	13,33	14,792	12,47	7,74	8,342	8,17	10,492	12,1518
0,85	12,495	5,44	13,175	14,62	12,325	7,65	8,245	8,075	10,37	12,0105
0,84	12,348	5,376	13,02	14,448	12,18	7,56	8,148	7,98	10,248	11,8692
0,83	12,201	5,312	12,865	14,276	12,035	7,47	8,051	7,885	10,126	11,7279
0,82	12,054	5,248	12,71	14,104	11,89	7,38	7,954	7,79	10,004	11,5866
0,81	11,907	5,184	12,555	13,932	11,745	7,29	7,857	7,695	9,882	11,4453
0,8	11,76	5,12	12,4	13,76	11,6	7,2	7,76	7,6	9,76	11,304
0,79	11,613	5,056	12,245	13,588	11,455	7,11	7,663	7,505	9,638	11,1627
0,78	11,466	4,992	12,09	13,416	11,31	7,02	7,566	7,41	9,516	11,0214
0,77	11,319	4,928	11,935	13,244	11,165	6,93	7,469	7,315	9,394	10,8801
0,76	11,172	4,864	11,78	13,072	11,02	6,84	7,372	7,22	9,272	10,7388
0,75	11,025	4,8	11,625	12,9	10,875	6,75	7,275	7,125	9,15	10,5975
0,74	10,878	4,736	11,47	12,728	10,73	6,66	7,178	7,03	9,028	10,4562
0,73	10,731	4,672	11,315	12,556	10,585	6,57	7,081	6,935	8,906	10,3149
0,72	10,584	4,608	11,16	12,384	10,44	6,48	6,984	6,84	8,784	10,1736
0,71	10,437	4,544	11,005	12,212	10,295	6,39	6,887	6,745	8,662	10,0323
0,7	10,29	4,48	10,85	12,04	10,15	6,3	6,79	6,65	8,54	9,891

WBC Volts	Petrol AFR
0	10
0,0625	10,1
0,125	10,2
0,1875	10,3
0,25	10,4
0,3125	10,5
0,375	10,6
0,4375	10,7
0,5	10,8
0,5625	10,9
0,625	11
0,6875	11,1
0,75	11,2
0,8125	11,3
0,875	11,4
0,9375	11,5
1	11,6
1,0625	11,7
1,125	11,8
1,1875	11,9
1,25	12
1,3125	12,1
1,375	12,2
1,4375	12,3
1,5	12,4
1,5625	12,5
1,625	12,6
1,6875	12,7
1,75	12,8
1,8125	12,9
1,875	13
1,9375	13,1
2	13,2
2,0625	13,3
2,125	13,4
2,1875	13,5
2,25	13,6
2,3125	13,7
2,375	13,8
2,4375	13,9
2,5	14
2,5625	14,1
2,625	14,2
2,6875	14,3
2,75	14,4
2,8125	14,5
2,875	14,6
2,9375	14,7
3	14,8
3,0625	14,9
3,125	15
3,1875	15,1
3,25	15,2
3,3125	15,3
3,375	15,4
3,4375	15,5
3,5	15,6
3,5625	15,7
3,625	15,8
3,6875	15,9
3,75	16
3,8125	16,1
3,875	16,2
3,9375	16,3
4	16,4
4,0625	16,5
4,1875	16,7
4,25	16,8
4,3125	16,9
4,375	17
4,4375	17,1
4,5	17,2
4,5625	17,3
4,625	17,4
4,6875	17,5
4,75	17,6
4,8125	17,7
4,875	17,8
4,9375	17,9
5	18

(Volts * 1.6)+10 = AFR

Resultant Stoich = (%ofAdditive * Stoich of additive + (100-%ofAdditive) * Petrol Stoich) /100

Resultant Stoich	% Additive	Additive Stoich	Petrol Stoich
12,2	50,00	9,7	14,7

New AFR	Tuned Petrol AFR		Petrol Stoich		Blend Stoich
14,45901639	12		14,7		12,2

Notes:

An engine tuned to 12.5 gas AFR will run at the equivalent of 13 gas AFR with a 10% ethanol blend.

Of course, when running in closed loop, the engine will run at 14.13 AFR instead of 14.7. O2 sensors (incl. widebands) don't measure AFR, but Lambda. Lambda is defined as actual AFR/stoich AFR. It's a ratio.

In closed loop part throttle the engine is just running at Lambda 1.0, regardless of fuel. The same would be true for other Lambda values when running closed loop at WOT using a wideband (most vehicles don't run CL at WOT) . The engine would run at the tuned Lambda and everything would be fine. Open loop systems would need to be retuned for alcohol blends though.

Fuel injection is tuned to mix a certain amount of fuel for a given amount of air, the resulting mixture would be leaner when using a fuel with lower stoich AFR.

Ratios of hydrogen to carbon, and oxygen to carbon

%Ethanol	%Gasoline	H/C Ratio	O/C Ratio	AFR(Stoich)
0	100	1,65	0	14,191
10	90	1,734	0,031	13,667
20	80	1,824	0,065	13,142
30	70	1,924	0,101	12,618
40	60	2,033	0,142	12,093
50	50	2,153	0,186	11,569
60	40	2,286	0,236	11,044
70	30	2,434	0,29	10,52
80	20	2,6	0,352	9,9995
85	15	2,691	0,325	9,733
90	10	2,787	0,421	9,471
100	0	3	0,5	8,946