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********** 1975 EPA CITY TEST **********
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\# CONVERTER EFFICIENCY #
\# OXYGEN AIR TO FUEL RATIO #

MD	TIME (S)		CONCENTRATIONS HC (PPM)	CO (PPM)	CO2 (%)	NOX (PPM)	CO2T (%)	O2 (%)	MODAL GRAMS HC	CO	CO2	NOX	VOL (F^3)	D/V (SEC)	F/E (MPG)	A/F	AUX1 -CONV EFF (%)- HC	AUX2 CO	AUX3 NOX	AUX4	AUX5	AUX6
N	4.3	TP	31.301	17.124	.0674	.0580	.030		.0027	.0030	.18284	.0000	5.232	0.000			8.138	.1066	-1.15	5.221	78.49	81.7
		ENG	3250.4	10850.	.6001	-.411		17.2	.2778	1.071	1.6268	-.000	5.232		.000	92.66	99.0	99.8	114.			
I	20.0	TP	1212.8	58829.	10.46	5.971	.290		.0577	5.654	15.799	.0008	2.916	0.000			8.276	.1045	-.926	5.221	78.48	81.8
		ENG	1095.0	56719.	11.30	3.121		1.10	.0522	4.875	17.075	.0004	2.916		.584	13.87	-11.	-16.	-91.			
A	11.0	TP	516.80	22186.	12.68	260.8	1.06		.0392	3.392	30.471	.0579	4.638	0.000			8.769	.1039	-.832	5.221	78.48	81.8
		ENG	725.45	25145.	12.80	352.1		1.27	.0558	3.844	30.753	.0781	4.638		10.3	14.28	28.8	11.8	25.9			
C	84.0	TP	124.13	14997.	13.63	307.1	.833		.0532	12.96	185.27	.3854	26.23	0.000			7.800	.1078	-.828	5.221	78.51	81.8
		ENG	490.71	14759.	13.59	429.3		.811	.2103	12.76	184.64	.5387	26.23		25.6	14.45	74.7	-1.6	28.5			
D	10.0	TP	39.427	327.40	7.340	194.2	.424		.0019	.0319	11.229	.0274	2.952	0.000			7.831	.1118	-.773	5.221	78.55	81.8
		ENG	585.31	2430.1	7.149	193.3		9.66	.0282	.2365	10.938	.0273	2.952		32.7	27.22	93.3	86.5	-.4			
CYCLE	1		DISTANCE = .6759 MI				TP	GR/MI	.3289	32.62	359.48	.6977	41.96	0.000								
							ENG	GR/MI	.9225	34.96	362.55	.9635	41.96		21.1	17.78	75.2	6.53	26.8			
I	38.0	TP	30.660	159.91	13.58	24.35	.323		.0025	.0263	35.161	.0058	4.997	0.000			7.975	.1118	-.605	5.221	78.55	81.8
		ENG	701.99	3184.2	14.13	18.77		.954	.9573	.5244	36.580	.0045	4.997		.401	15.04	95.6	95.8	-30.			
A	42.0	TP	117.60	6707.1	12.87	224.1	1.25		.0389	4.503	135.83	.2484	20.37	0.000			8.393	.1119	-.727	5.221	78.57	81.8
		ENG	1079.4	10343.	12.19	598.8		3.40	.3592	6.944	128.67	.5635	20.37		18.9	16.52	89.2	35.2	62.6			
C	95.0	TP	58.316	599.22	14.73	380.9	1.38		.0423	.8759	338.54	.8081	44.35	0.000			8.806	.1160	-.600	5.221	78.60	82.0
		ENG	1126.3	3615.3	14.33	860.7		.654	.8161	5.285	329.43	1.826	44.35		36.3	14.77	94.8	83.4	55.8			
D	33.0	TP	81.373	88.224	5.166	72.67	.228		.0105	.0229	21.045	.0273	7.862	0.000			8.140	.1164	-.654	5.221	78.64	82.1
		ENG	1395.3	2854.6	4.702	119.9		8.11	.1792	.7397	19.155	.0451	7.862		112.	29.72	94.2	96.9	39.4			
CYCLE	2		DISTANCE = 1.953 MI				TP	GR/MI	.0482	2.779	271.64	.5425	77.58	0.000								
							ENG	GR/MI	.7228	6.988	263.07	1.259	77.58		32.2	17.54	93.3	59.8	56.9			
I	13.0	TP	115.69	81.142	12.51	11.03	.168		.0020	.0028	6.7994	.0006	1.049	0.000			8.752	.1193	-.501	5.221	78.66	82.2
		ENG	1344.2	7245.0	13.66	10.35		1.34	.0230	.2505	7.4265	.0005	1.049		.246	15.06	91.4	98.9	-6.6			
A	20.0	TP	126.91	231.46	14.16	239.9	1.19		.0176	.0646	62.172	.0972	8.470	0.000			8.394	.1185	-.671	5.221	78.67	82.2
		ENG	1369.0	5430.2	13.70	686.1		1.26	.1895	1.516	60.146	.2781	8.470		17.5	15.09	90.7	95.7	65.8			
C	17.0	TP	140.76	154.91	14.65	271.7	.904		.0123	.0273	40.564	.0694	5.342	0.000			8.487	.1212	-.574	5.221	78.68	82.2
		ENG	1295.2	3539.7	14.33	509.4		.727	.1130	.6233	39.655	.1302	5.342		36.6	14.80	89.1	95.6	48.7			
D	14.0	TP	147.40	79.029	5.682	59.02	.232		.0072	.0078	8.8376	.0085	3.001	0.000			8.534	.1169	-.494	5.221	78.70	82.3
		ENG	1463.9	3390.9	6.254	62.59		11.2	.0718	.3285	9.7267	.0090	3.001		62.8	30.55	89.9	97.6	5.7			
CYCLE	3		DISTANCE = .3674 MI				TP	GR/MI	.1063	.2790	322.19	.4782	17.86	0.000								

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                                ENG  GR/MI   1.881 7.399 318.33 1.137 17.86       26.7 18.39  90.2 96.2 57.9


I  5.0 TP   150.59 71.886 10.86 15.69 .293      .0018 .0017 4.0779 .0005 .7246 0.000          8.543 .1202 -.244 5.221 78.74 82.3
       ENG  1366.8 7415.9 13.31 16.52      1.64 .0162 .1771 4.9981 .0006 .7246       .432 15.27  89.8 99.8  5.0

A 13.0 TP   162.29 421.55 13.87 195.8 1.15      .0143 .0750 38.819 .0506 5.400 0.000          8.524 .1166 -.704 5.221 78.73 82.3
       ENG  1420.6 6500.7 13.40 738.8      1.50 .1253 1.171 37.489 .1907 5.400       15.1 15.21  88.6 93.6 73.5

D 14.0 TP   158.15 169.95 10.29 114.1 .310      .0050 .0126 12.009 .0123 2.251 0.000          8.661 .1172 -.596 5.221 78.74 82.4
       ENG  1416.7 4077.8 10.06 340.3      6.97 .0521 .3026 11.743 .0367 2.251       52.5 20.71  88.8 95.8 66.5

CYCLE   4     DISTANCE = .1407 MI TP   GR/MI   .1558 .6353 390.34 .4509 8.376 0.000
                                ENG  GR/MI   1.377 11.74 385.53 1.620 8.376       21.8 17.63  88.7 94.6 72.2


I 18.0 TP   222.72 80.570 12.86 15.73 .210      .0065 .0048 11.216 .0014 1.795 0.000          8.793 .1154 -.486 5.221 78.76 82.3
       ENG  1330.2 7108.4 13.46 16.56      1.50 .0396 .4206 12.517 .0014 1.795       .299 15.18  83.5 98.9  5.0

A 17.0 TP   276.10 375.67 14.25 256.3 1.35      .0363 .0997 59.434 .0987 8.050 0.000          8.661 .1164 -.622 5.221 78.77 82.4
       ENG  1376.2 5915.9 13.63 828.2      1.31 .1818 1.570 56.855 .3190 8.050       16.3 15.18  79.9 93.6 69.8

C 27.0 TP   298.30 161.67 14.67 241.6 .829      .0380 .0416 59.341 .0902 7.806 0.000          8.793 .1164 -.535 5.221 78.80 82.4
       ENG  1298.4 3776.8 14.32 485.0      .702 .1646 .9716 57.918 .1812 7.806       39.3 14.78  76.9 95.7 50.2

D 14.0 TP   307.80 81.605 5.883 74.80 .223      .0161 .0086 8.4085 .0114 3.192 0.000          8.746 .1197 -.450 5.221 78.83 82.4
       ENG  1503.5 3034.0 5.589 78.77      11.8 .0784 .3192 9.4104 .0120 3.192       61.0 33.18  79.5 97.3  5.0

CYCLE   5     DISTANCE = .4446 MI TP   GR/MI   .2181 .3473 311.29 .4536 20.84 0.000
                                ENG  GR/MI   1.043 7.380 307.47 1.155 20.84       27.6 18.34  79.1 95.3 60.7


COLD TRANSIENT MODAL SUMMARY                                              --CONV. EFF.--
GRAMS          HC     CO     CO2    NOX    VOL.   D/V   DIST   F/E    A/F

IDLE   TP    .073   5.69    73.   .009   16.7   0.0   .00
       ENG   .466   8.12    80.   .007   16.7                 182.9  18.04   84.3 29.9 -24.
ACCEL  TP    .146   8.13   327.   .523   46.9   0.0   .64
       ENG   .910  15.05   314.  1.449   46.9                  16.84  15.60   83.9 45.9 63.9
CRUISE TP    .146  13.91   424.  1.353   83.7   0.0  2.42
       ENG  1.304  19.64   612.  2.676   83.7                  33.22  14.65   88.8 29.2 47.4
DECEL  TP    .041    .08    62.   .087   19.3   0.0   .52
       ENG   .410   1.93    61.   .130   19.3                  75.04  20.65   89.9 95.7 33.2
TOTAL  TP    .407  27.82  1085.  1.972  166.6   0.0  3.58
       ENG  3.090  44.73  1067.  4.263  166.6                  28.16  17.83   86.8 37.8 53.7


                EQUIVALENT MASS HAG RESULTS
                ----------GRAMS/MILE----------

                TP      .114    7.77    303.     .551
                ENG     .863   12.49    298.    1.190
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MD	TIME (S)		HC (PPM)	CO (PPM)	CO2 (%)	NOX (PPM)	CO2T (%)	O2 (%)	HC	CO	CO2	NOX	VOL (F^3)	D/V (SEC)	F/E (MPG)	A/F	AUX1 -CONV HC	AUX2 EFF CO	AUX3 (%)- NOX	AUX4	AUX5	AUX6
I	5.0	TP	331.49	71.688	10.97	19.28	.231		.0032	.0014	3.3166	.0005	.5834	0.000			8.898	.1181	-.244	5.221	78.83	82.5
		ENG	1409.1	7194.1	13.22	18.09		1.79	.0134	.1383	3.9971	.0005	.5834		.345	15.39	76.5	99.0	-6.6			
A	15.0	TP	339.64	196.58	14.07	161.8	.742		.0285	.0333	37.513	.0396	5.143	0.000			8.318	.1154	-.600	5.221	78.85	82.4
		ENG	1401.6	4438.4	13.81	524.5		1.28	.1178	.7524	36.814	.1291	5.143		17.5	15.89	75.8	95.6	69.3			
C	14.0	TP	349.91	145.81	14.23	181.8	.538		.0159	.0133	20.559	.0243	2.787	0.000			8.746	.1202	-.581	5.221	78.88	82.5
		ENG	1372.0	4124.2	13.88	427.0		1.14	.0625	.3789	20.049	.0569	2.787		41.8	15.86	74.5	96.5	57.4			
D	9.0	TP	345.78	88.709	9.103	103.3	.214		.0066	.0034	5.4764	.0057	1.161	0.000			8.924	.1170	-.520	5.221	78.89	82.5
		ENG	1437.1	3659.5	8.759	108.8		0.58	.0273	.1400	5.2692	.0060	1.161		55.2	23.37	75.9	97.6	5.0			
CYCLE	1		DISTANCE = .2033 MI				TP	GR/MI	.2602	.2468	321.01	.3348	9.675	0.000								
							ENG	GR/MI	1.061	6.760	317.48	.9244	9.675		26.8	16.70	75.5	96.4	63.6			
I	16.0	TP	340.85	76.148	11.92	21.76	.215		.0097	.0041	10.158	.0017	1.645	0.000			9.143	.1150	-.420	5.221	78.90	82.5
		ENG	1383.6	7378.9	13.35	15.70		1.62	.0372	.4001	11.382	.0012	1.645		.307	15.25	74.0	99.0	-39.			
A	8.0	TP	355.59	439.63	13.75	78.80	.751		.0130	.0325	15.970	.0004	2.241	0.000			8.883	.1148	-.618	5.221	78.93	82.5
		ENG	1394.0	6197.9	13.49	438.1		1.57	.0510	.4578	15.668	.0478	2.241		13.6	15.27	74.5	92.9	82.8			
C	35.0	TP	345.61	152.44	14.47	151.7	.641		.0456	.0406	60.520	.0586	8.072	0.000			8.509	.1172	-.575	5.221	78.95	82.5
		ENG	1341.4	4409.5	14.08	382.9		.974	.1769	1.173	58.900	.1479	8.072		27.8	14.93	74.2	96.5	60.4			
D	9.0	TP	333.73	135.75	8.988	133.0	.236		.0070	.0057	5.9477	.0081	1.277	0.000			7.937	.1213	-.656	5.221	78.97	82.6
		ENG	1406.3	4023.6	8.571	242.1		8.99	.0293	.1694	5.6712	.0148	1.277		51.3	23.94	76.3	96.6	45.1			
CYCLE	2		DISTANCE = .2518 MI				TP	GR/MI	.2908	.3291	367.60	.3052	13.23	0.000								
							ENG	GR/MI	1.169	8.737	363.81	.8373	13.23		23.3	16.24	74.4	96.2	63.6			
I	25.0	TP	340.62	81.620	12.13	18.87	.190		.0130	.0061	14.333	.0020	2.280	0.000			8.187	.1225	-.415	5.221	79.00	82.5
		ENG	1347.2	7328.2	13.42	16.46		1.54	.0582	.5506	15.857	.0018	2.280		.274	15.20	74.1	98.9	-9.8			
A	15.0	TP	338.94	218.66	14.09	173.9	.913		.0274	.0356	36.056	.0411	4.939	0.000			7.673	.1195	-.637	5.221	79.03	82.6
		ENG	1332.2	4970.0	13.58	550.2		1.49	.1075	.8091	34.757	.1300	4.939		16.8	15.28	74.6	95.6	68.4			
D	20.0	TP	329.01	117.68	10.98	164.6	.356		.0105	.0133	19.551	.0270	3.435	0.000			8.246	.1165	-.559	5.221	79.06	82.7
		ENG	1324.7	3806.7	11.18	361.6		5.67	.0743	.4310	19.903	.0594	3.435		43.9	19.07	75.2	96.9	54.5			
CYCLE	3		DISTANCE = .1686 MI				TP	GR/MI	.3487	.3265	414.88	.4158	10.65	0.000								
							ENG	GR/MI	1.376	10.62	418.22	1.134	10.65		20.2	16.51	74.7	96.9	63.3			
I	13.0	TP	333.64	76.271	11.92	18.40	.180		.0063	.0029	7.1099	.0010	1.151	0.000			8.707	.1158	-.391	5.221	79.07	82.7
		ENG	1315.1	7552.6	13.42	14.50		1.56	.0247	.2866	8.0048	.0008	1.151		.266	15.21	74.6	99.0	-27.			
A	22.0	TP	323.34	324.13	14.19	127.6	.709		.0300	.0408	41.714	.0340	5.672	0.000			8.796	.1167	-.564	5.221	79.10	82.7
		ENG	1270.6	4846.1	13.86	486.6		1.15	.1177	.9859	40.735	.1329	5.672		19.6	15.04	74.6	93.3	73.8			
D	12.0	TP	314.70	101.99	9.938	86.34	.201		.0094	.0061	9.3844	.0075	1.822	0.000			8.365	.1212	-.458	5.221	79.13	82.8
		ENG	1278.8	5507.2	10.41	117.8		6.73	.0381	.3308	9.8312	.0102	1.822		32.9	20.17	75.4	98.1	26.2			
CYCLE	4		DISTANCE = .1328 MI				TP	GR/MI	.3433	.5240	438.21	.3249	8.645	0.000								
							ENG	GR/MI	1.359	11.47	440.53	1.077	8.645		19.2	16.40	74.7	95.4	69.8			

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A 18.0 TP   304.60 201.89 13.80 196.8 .941      .0309 .0412 44.427 .0582 6.211 0.000          8.694 .1284 -.554 5.221 79.13 82.8
      ENG  1270.3 4848.9 13.58 592.8     1.44 .1297 .9926 43.691 .1762 6.211      17.5 15.26  76.2 95.9 66.9

D 21.0 TP   284.89 104.62 9.243 116.8 .326      .0162 .0135 18.732 .0219 3.911 0.000          8.520 .1178 -.464 5.221 79.15 82.8
      ENG  1274.0 4805.7 10.86 245.1     6.73 .0614 .6295 20.384 .0459 3.911      40.7 20.43  77.6 97.0 52.3

CYCLE   5      DISTANCE = .1890 MI TP   GR/MI   .2599 .2892 334.25 .4237 10.12 0.000
                                ENG  GR/MI   1.117 8.532 339.11 1.175 10.12      25.0 18.84  76.7 96.6 63.9

A 17.0 TP   277.28 260.12 13.90 191.3 .943      .0264 .0516 42.058 .0534 5.839 0.000          8.452 .1157 -.503 5.221 79.17 82.9
      ENG  1284.9 4937.2 13.57 633.8     1.47 .1226 .9502 41.872 .1768 5.839      18.6 15.27  78.4 94.6 69.8

C 163. TP   187.39 134.38 13.53 177.8 .574      .1105 .1590 253.93 .3069 36.08 0.000          8.265 .1183 -.569 5.221 79.27 83.0
      ENG  1289.1 4950.7 13.12 440.9     2.08 .7599 4.817 245.22 .7611 36.08      42.7 15.79  85.5 96.7 59.7

D 11.0 TP   141.94 96.183 8.730 94.62 .220      .0035 .0048 6.8307 .0068 1.510 0.000          8.877 .1164 -.518 5.221 79.30 83.1
      ENG  2181.3 3728.9 9.167 155.7     8.23 .0538 .1856 7.1724 .0113 1.510      49.3 22.46  93.5 97.4 39.2

CYCLE   6      DISTANCE = 1.359 MI TP   GR/MI   .1033 .1590 222.13 .2702 43.43 0.000
                                ENG  GR/MI   .8803 4.380 215.91 .6984 43.43      39.5 16.13  85.8 96.4 61.3

A 18.0 TP   147.72 177.85 13.60 165.5 .915      .0148 .0359 43.192 .0485 6.127 0.000          8.266 .1184 -.441 5.221 79.40 83.2
      ENG  1883.6 5122.9 13.54 547.8     1.50 .1886 1.035 43.001 .1604 6.127      15.9 15.22  92.2 96.5 69.7

C 32.0 TP   134.79 116.71 13.20 147.1 .467      .0131 .0229 41.080 .0419 5.957 0.000          8.550 .1184 -.598 5.221 79.44 83.2
      ENG  1488.6 4409.8 12.67 353.1     2.68 .1447 .8656 39.120 .1006 5.957      47.6 16.24  98.9 97.4 58.3

D 16.0 TP   128.96 93.652 11.34 120.0 .246      .0040 .0059 11.272 .0110 1.918 0.000          8.328 .1174 -.509 5.221 79.47 83.3
      ENG  1774.7 5341.8 11.27 166.7     4.97 .0556 .3378 11.206 .0153 1.918      56.2 18.23  92.7 98.2 28.8

CYCLE   7      DISTANCE = .3757 MI TP   GR/MI   .9050 .1724 254.12 .2701 14.00 0.000
                                ENG  GR/MI   4.035 5.957 248.44 .7354 14.00      34.8 16.44  91.8 97.1 63.3

I 29.0 TP   123.23 82.102 12.27 10.63 .170      .0048 .0065 15.231 .0012 2.396 0.000          7.987 .1199 -.253 5.221 79.51 83.3
      ENG  1249.6 5893.5 13.63 9.422     1.35 .0489 .4654 16.920 .0011 2.396      .249 15.14  90.1 98.6 -13.

A 18.0 TP   122.11 209.91 14.08 158.9 .927      .0120 .0416 43.867 .0457 6.012 0.000          8.365 .1196 -.531 5.221 79.53 83.3
      ENG  1886.8 5027.6 13.73 584.7     1.24 .1853 1.006 42.773 .1682 6.012      18.6 15.04  93.5 95.9 72.8

D 30.0 TP   111.34 110.38 9.107 81.55 .222      .0073 .0147 19.843 .0157 4.035 0.000          8.543 .1164 -.428 5.221 79.57 83.4
      ENG  2185.5 5719.5 9.596 149.6     5.61 .1441 .7607 20.066 .0289 4.035      46.8 19.33  94.9 98.1 45.5

CYCLE   8      DISTANCE = .2085 MI TP   GR/MI   .1159 .3009 374.74 .3005 12.44 0.000
                                ENG  GR/MI   1.814 10.71 382.50 .9502 12.44      21.9 16.75  93.6 97.2 68.4

A 22.0 TP   107.12 173.59 14.08 159.1 .761      .0107 .0349 44.451 .0464 6.093 0.000          8.203 .1174 -.361 5.221 79.60 83.4
      ENG  1482.6 4508.7 13.84 478.0     1.21 .1476 .9055 43.711 .1393 6.093      18.2 15.08  92.8 96.1 66.7

C 19.0 TP   106.31 145.87 14.30 209.8 .558      .0068 .0187 28.826 .0390 3.889 0.000          8.412 .1170 -.557 5.221 79.63 83.4
      ENG  1588.9 4287.1 13.85 508.4     1.18 .1010 .5495 27.909 .0946 3.089      42.2 15.86  93.3 96.6 58.7

D 12.0 TP   99.641 80.163 6.900 44.73 .199      .0030 .0049 6.6071 .0040 1.848 0.000          8.562 .1168 -.254 5.221 79.65 83.5
      ENG  2545.0 3519.2 7.442 49.53     10.2 .0768 .2144 7.1266 .0044 1.848      53.5 26.57  96.1 97.7  9.7
```

```
CYCLE   9      DISTANCE = .2779 MI TP   GR/MI   .0735 .2103 287.47 .3216 11.83 0.000
                                ENG  GR/MI   1.171 6.807 283.38 .8576 11.83       30.0 17.67  93.7 96.5 62.5

I 15.0 TP   98.685 95.147 11.85 12.13 .190      .0022 .0044 8.5359 .0008 1.391 0.000          8.780 .1202 -.054 5.221 79.70 83.5
       ENG  1307.2 6321.9 13.60 10.52      1.30 .0297 .2998 9.8012 .0007 1.391       .280 15.00  92.5 98.5 -15.

A  9.0 TP   102.27 160.10 13.80 164.1 1.02      .0056 .0177 23.969 .0263 3.353 0.000          8.859 .1162 -.452 5.221 79.71 83.5
       ENG  2041.4 5285.5 13.54 593.6      1.43 .1118 .5841 23.518 .0952 3.353       12.1 15.15  95.0 97.0 72.4

D 10.0 TP   95.632 123.43 10.03 194.4 .260      .0022 .0057 7.3006 .0131 1.404 0.000          8.246 .1156 -.305 5.221 79.72 83.5
       ENG  2249.4 3780.5 9.435 323.9      7.87 .0521 .1750 6.8659 .0218 1.404       42.9 21.86  95.8 96.7 46.0

CYCLE  10      DISTANCE = .0690 MI TP   GR/MI   .1454 .4024 576.62 .5021 6.148 0.000
                                ENG  GR/MI   2.005 15.19 582.11 1.705 6.148       14.5 17.09  94.8 97.4 65.9

I  9.0 TP   95.356 78.425 11.33 32.74 .223      .0015 .0026 5.8207 .0016 .9914 0.000          7.805 .1217 -.068 5.221 79.74 83.5
       ENG  1376.8 6980.3 13.39 25.62      1.51 .0223 .2284 6.8766 .0012 .9914       .329 15.20  93.1 98.9 -28.

A 20.0 TP   92.407 164.50 14.09 168.8 .688      .0076 .0273 36.776 .0386 5.037 0.000          7.861 .1103 -.529 5.221 79.78 83.5
       ENG  1528.3 4777.3 13.85 413.5      1.88 .1258 .7932 36.152 .0996 5.037       16.4 14.98  94.0 96.6 61.3

C 17.0 TP   88.955 149.47 14.41 147.6 .547      .0049 .0167 25.365 .0240 3.396 0.000          8.034 .1105 -.551 5.221 79.80 83.5
       ENG  1194.2 4504.1 13.89 321.8      1.24 .0663 .5041 24.443 .0523 3.396       34.3 15.13  92.6 96.7 54.1

D 11.0 TP   92.314 104.26 10.26 61.75 .200      .0018 .0041 6.3032 .0035 1.201 0.000          7.961 .1177 -.018 5.221 79.81 83.5
       ENG  2032.3 4480.6 10.39 102.4      5.99 .0399 .1777 6.4642 .0059 1.201       36.1 19.49  95.5 97.7 39.7

CYCLE  11      DISTANCE = .1941 MI TP   GR/MI   .0811 .2582 379.11 .3449 10.63 0.000
                                ENG  GR/MI   1.296 8.686 377.03 .8189 10.63       22.5 15.93  93.7 97.6 57.5

I 12.0 TP   88.487 129.31 12.40 19.40 .197      .0016 .0047 7.1262 .0018 1.189 0.000          8.760 .1188 .0170 5.221 79.82 83.6
       ENG  1390.4 7246.6 13.55 23.04      1.37 .0245 .2650 7.7912 .0012 1.189       .280 15.88  93.4 98.2 15.8

A 23.0 TP   82.585 167.87 13.36 170.5 .690      .0082 .0378 42.273 .0498 6.105 0.000          9.073 .1169 -.274 5.221 79.85 83.6
       ENG  1907.7 4746.1 12.81 425.7      2.30 .1898 .9551 40.515 .1243 6.105       17.0 15.87  95.7 98.0 60.0

C 23.0 TP   83.543 132.30 14.36 172.2 .728      .0082 .0262 44.639 .0494 5.998 0.000          7.965 .1145 -.522 5.221 79.90 83.6
       ENG  1873.7 4131.3 14.00 422.6      1.85 .1444 .8167 43.521 .1213 5.998       31.7 14.99  94.3 96.8 59.3

D 11.0 TP   77.527 110.82 8.990 165.9 .233      .0020 .0056 7.2030 .0123 1.546 0.000          8.015 .1203 -.444 5.221 79.95 83.6
       ENG  2556.1 3383.1 8.930 282.4      8.37 .0646 .1724 7.1552 .0209 1.546       54.6 22.78  97.0 96.7 41.3

CYCLE  12      DISTANCE = .2912 MI TP   GR/MI   .0686 .2552 347.71 .3864 14.76 0.000
                                ENG  GR/MI   1.454 7.587 339.95 .9194 14.76       24.9 16.54  95.3 96.6 58.0

I 24.0 TP   78.953 76.540 12.12 15.83 .189      .0028 .0055 13.677 .0016 2.179 0.000          8.340 .1168 -.283 5.221 79.98 83.6
       ENG  1398.3 5929.1 13.68 14.57      1.26 .0498 .4257 15.445 .0015 2.179       .275 15.86  94.4 98.7 -8.6

A 14.0 TP   73.990 145.08 14.08 213.1 .842      .0052 .0204 31.134 .0435 4.267 0.000          8.407 .1169 -.494 5.221 80.02 83.6
       ENG  1998.6 4501.8 13.76 552.6      1.25 .1345 .6331 30.415 .1128 4.267       16.2 15.07  96.2 96.8 61.4

D 16.0 TP   80.618 107.55 11.77 117.5 .288      .0028 .0075 12.983 .0120 2.128 0.000          8.550 .1145 -.432 5.221 80.04 83.6
       ENG  1808.3 5106.0 11.38 181.4      5.03 .0657 .3581 12.545 .0185 2.128       44.3 18.26  95.7 97.9 35.2

I  9.0 TP   70.899 72.632 8.692 19.69 .071      .0006 .0012 2.2459 .0005 .4986 0.000          8.464 .1152 -.355 5.221 80.07 83.6
       ENG  1748.6 3544.8 12.57 11.93      2.98 .0142 .0583 3.2407 .0003 .4986       .141 16.50  95.9 98.0 -65.
```

CYCLE 13 DISTANCE = .1244 MI TP GR/MI .0912 .2764 482.57 .1629 9.072 0.000
ENG GR/MI 2.123 11.86 495.55 1.070 9.072 17.1 16.08 95.7 97.7 56.7

COLD STABILIZED MODAL SUMMARY --CONV. EFF.--

GRAMS		HC	CO	CO2	NOX	VOL	D/V	DIST	F/E	A/F			
IDLE	TP	.046	.04	88.	.012	14.2	0.0	.00					
	ENG	.315	3.11	99.	.010	14.2			275.7	15.24	85.5	98.7	-16.
ACCEL	TP	.220	.47	483.	.534	67.0	0.0	.95					
	ENG	1.730	10.78	473.	1.691	67.0			17.45	15.21	87.3	95.6	69.4
CRUISE	TP	.205	.30	474.	.544	66.2	0.0	2.13					
	ENG	1.456	9.11	459.	1.335	66.2			39.92	15.56	85.9	96.7	59.2
DECEL	TP	.086	.10	137.	.149	27.2	0.0	.77					
	ENG	.803	4.07	140.	.263	27.2			49.57	20.70	89.3	97.7	43.5
TOTAL	TP	.557	.90	1182.	1.239	174.6	0.0	3.85					
	ENG	4.303	27.07	1171.	3.299	174.6			28.90	16.52	87.1	96.7	62.4

EQUIVALENT MASS BAG RESULTS
---------GRAMS/MILE----------

TP	.145	.23	307.	.322
ENG	1.117	7.03	304.	.856

ENGINE STOP TIME: 2.49 S

BAG READINGS FOR PHASE 1

UNCORRECTED BAG SNIFF READINGS

HC -2	CO -3	CO2 -1	NOX -2
43.333	300.59	.80472	36.806

ZERO/SPAN CALIBRATION

RANGE	HC 2	CO 3	CO2 1	NOX 2
ZERO CONC	.41165	.16110	.00168	.28667
ZERO SPEC	.62362	-1.465	.00144	-.1502
% OFFSET	.21198	-.1626	-.0244	-.4369
SPAN CONC	107.56	1039.6	1.8704	93.234
SPAN SPEC	108.55	1034.5	1.8704	92.352
% OFFSET	.98923	-.5178	.00362	-.8819

BAG ANALYSIS

	HC	CO	CO2	NOX
SAMPLE	50.897	299.29	.80688	36.974
ST DEV(V)	.00035	.00035	.00053	.00108
BACKGROUND	5.5193	.14803	.02069	-.2406
ST DEV(V)	.00037	.00011	.00033	.00058

BAG READINGS FOR PHASE 2

UNCORRECTED BAG SNIFF READINGS

HC -1	CO -1	CO2 -1	NOX -1
6.2976	4.2407	.50174	14.980

ZERO/SPAN CALIBRATION

	HC	CO	CO2	NOX
RANGE	1	1	1	1
ZERO CONC	.52618	-.0332	.00150	-.1009
ZERO SPEC	.56607	-.3592	.00144	-.0572
% OFFSET	.13276	-.6519	-.0061	.14581
SPAN CONC	32.294	47.081	1.0605	27.443
SPAN SPEC	32.221	46.534	1.0704	27.265
% OFFSET	-.2430	-1.094	.18559	-.5913

BAG ANALYSIS

	HC	CO	CO2	NOX
SAMPLE	6.1567	3.8420	.50241	14.595
ST DEV(V)	.00035	.00129	.00043	.00261
BACKGROUND	5.3524	.21490	.02085	-.2190
ST DEV(V)	.00033	.00131	.00029	.00204

SOAK LENGTH: 574.8 SEC

START TIME: 14: 2:52 CRANK TIME : 1.01 S

	MD	TIME (S)		HC (PPM)	CO (PPM)	CO2 (%)	NOX (PPM)	CO2T (%)	O2 (%)	HC	CO	CO2	NOX	VOL (F^3)	D/V (SFC)	F/E (HPG)	A/F	AUX1 HC	AUX1 CONV EFF (%) CO	AUX1 NOX	AUX2	AUX3	AUX4	AUX5	AUX6
Crank	K	1.3	TP	67.180	21.554	.2455	.4909	.111		.0028	.0018	.31866	.0001	2.505	0.000			7.871	.1061	-.488	5.221	86.86	83.7		
			ENG	1896.4	16665.	2.254	3.082		13.0	.0776	1.376	2.7263	.0004	2.505		.000	42.22		96.5	99.9	84.1				
Idle	I	20.0	TP	401.67	2648.2	8.456	8.747	.152		.0136	.1815	9.1098	.0009	2.079	0.000			8.039	.1116	-.173	5.221	80.88	83.8		
			ENG	1506.8	5244.3	10.80	21.38		2.78	.0512	.3594	11.721	.0021	2.079		.252	16.51		93.3	49.5	58.9				
Accel	A	11.0	TP	75.599	145.78	13.73	199.6	.090		.0045	.0174	25.752	.0346	3.619	0.000			9.577	.1087	-.629	5.221	80.88	83.8		
			ENG	1724.5	4465.8	13.43	512.4		1.58	.1020	.5327	25.177	.0887	3.619		14.4	15.34		95.6	96.7	61.0				
Cruise	C	84.0	TP	59.266	139.22	13.19	205.0	.671		.0213	.1010	150.48	.2159	22.02	0.000			8.478	.1105	-.518	5.221	80.93	83.8		
			ENG	1444.1	3535.6	12.55	426.1		2.55	.5195	2.566	143.17	.4468	22.02		35.2	16.22		95.9	96.1	51.9				
Decel	D	10.0	TP	55.485	102.05	7.760	150.4	.228		.0014	.0053	6.3038	.0113	1.568	0.000			8.661	.1114	-.610	5.221	80.98	83.8		
			ENG	2268.9	3279.4	7.792	160.4		9.99	.0581	.1695	6.3300	.0120	1.568		53.3	25.93		97.6	96.9	6.2				
	CYCLE	1		DISTANCE = .6738 MI				TP	GR/MI	.0647	.4556	284.91	.3899	31.79	0.000										
								ENG	GR/MI	1.200	7.426	280.99	.8194	31.79		30.8	17.21		94.6	93.9	52.4				
	I	38.0	TP	53.111	80.710	11.91	19.58	.181		.0029	.0090	20.770	.0032	3.365	0.000			8.833	.1107	-.134	5.221	81.00	83.9		
			ENG	1212.9	5717.9	13.64	9.526		1.27	.0667	.6341	23.704	.0015	3.365		.266	15.10		95.6	98.6	-106				
✓	A	42.0	TP	70.659	3653.1	13.20	268.3	1.16		.0213	2.221	126.18	.2368	18.45	0.000			8.647	.1083	-.509	5.221	81.07	84.0		
			ENG	1608.1	12236.	12.49	696.8		3.10	.5088	7.440	119.42	.6150	18.45		20.2	16.87		95.8	70.1	61.5				
96	C	95.0	TP	31.009	560.85	14.70	357.2	1.26		.0206	.7522	318.42	.6964	40.75	0.000			8.717	.1109	-.406	5.221	81.19	84.1		
			ENG	1010.9	3618.8	14.29	854.3		.668	.6731	4.861	301.77	1.665	40.75		39.7	14.78		96.9	84.5	58.2				
	D	33.0	TP	23.758	82.868	5.594	73.15	.288		.0026	.0181	19.216	.0232	6.629	0.000			8.895	.1097	-.512	5.221	81.29	84.2		
			ENG	3526.0	3123.2	5.042	112.8		8.26	.3019	.6824	17.319	.0358	6.629		119.	27.97		99.3	97.3	35.2				
	CYCLE	2		DISTANCE = 1.955 MI				TP	GR/MI	.0243	1.535	243.01	.4709	69.19	0.000										
								ENG	GR/MI	.8341	6.966	236.50	1.186	69.19		35.5	17.19		97.1	78.0	58.6				
	I	13.0	TP	25.149	85.179	12.59	10.06	.160		.0004	.0028	6.5404	.0005	1.003	0.000			7.932	.1084	-.391	5.221	81.33	84.2		
			ENG	1194.3	5292.4	13.76	10.31		1.17	.0196	.2080	7.1524	.0005	1.003		.235	15.00		97.9	98.6	2.5				
	A	20.0	TP	28.967	181.68	14.25	255.1	1.17		.0039	.0491	60.530	.1001	8.199	0.000			9.402	.1096	-.366	5.221	81.34	84.2		
			ENG	1663.5	4827.7	13.69	742.3		1.26	.2228	1.305	58.176	.2912	8.199		18.3	15.09		98.3	96.2	65.6				
	C	17.0	TP	23.879	150.48	14.70	273.6	.846		.0019	.0247	37.967	.0652	4.984	0.000			8.313	.1072	-.407	5.221	81.36	84.2		
			ENG	1019.8	3539.4	14.34	534.5		.679	.0831	.5815	37.833	.1275	4.984		39.2	14.80		97.7	95.2	48.8				
	D	14.0	TP	25.337	83.512	6.163	59.30	.214		.0011	.0070	8.1775	.0073	2.560	0.000			8.195	.1091	-.392	5.221	81.38	84.2		
			ENG	2929.8	3963.4	6.492	67.69		10.9	.1225	.3345	8.6144	.0083	2.560		68.4	28.93		99.1	97.9	12.4				
	CYCLE	3		DISTANCE = .3676 MI				TP	GR/MI	.0199	.2277	308.00	.4788	16.75	0.000										
								ENG	GR/MI	1.219	6.607	301.91	1.163	16.75		28.1	18.02		98.4	98.6	59.5				
	I	5.0	TP	23.112	98.724	10.77	14.63	.305		.0003	.0023	4.2092	.0005	.7540	0.000			8.424	.1075	-.366	5.221	81.39	84.2		
			ENG	1354.6	4721.3	13.11	13.83		1.98	.0167	.1173	5.1232	.0005	.7540		.434	15.67		98.3	98.1	-12.				
	A	13.0	TP	32.733	246.29	13.83	222.8	1.13		.0028	.0431	38.102	.0567	5.315	0.000			9.618	.1122	-.391	5.221	81.40	84.2		
			ENG	1792.1	6296.9	13.45	779.8		1.41	.1556	1.103	37.050	.1981	5.315		15.4	15.12		98.2	96.1	71.4				

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D 14.0 TP   25.919 138.32 18.13 141.7 .285      .0089 .0096 11.066 .0143 2.108 0.000          9.336 .1025 -.218 5.221 81.41 84.3
       ENG  2111.8 4874.6 9.888 323.0      7.08 .0727 .3387 10.802 .0326 2.108       55.6 20.78  98.8 97.2 56.1

CYCLE   4      DISTANCE = .1406 MI TP   GR/MI   .0286 .3914 379.74 .5085 8.177 0.000
                                   ENG  GR/MI   1.743 11.09 376.87 1.645 8.177       22.2 17.64  98.4 96.5 69.1

I 18.0 TP   23.790 80.171 11.88 14.37 .210      .0007 .0048 11.128 .0012 1.808 0.000          8.266 .1082 -.294 5.221 81.43 84.3
       ENG  1224.8 5480.7 13.54 14.44      1.40 .0362 .3265 12.681 .0012 1.808       .308 15.20  98.1 98.5   .5

A 17.0 TP   30.952 252.14 14.16 329.1 1.35      .0041 .0669 59.040 .1267 8.049 0.000          9.289 .1070 -.574 5.221 81.44 84.3
       ENG  1578.3 5448.4 13.70 880.9      1.22 .2076 1.445 57.141 .3392 8.049       16.4 15.84  98.0 95.4 62.6

C 27.0 TP   22.738 150.82 14.66 240.7 .780      .0027 .0363 55.847 .0847 7.349 0.000          8.354 .1075 -.490 5.221 81.48 84.3
       ENG  989.35 3808.3 14.34 491.6      .641 .1188 .9225 54.620 .1729 7.349       41.8 14.76  97.7 96.1 51.8

D 14.0 TP   22.502 83.816 5.753 60.36 .206      .0010 .0073 7.8678 .0086 2.639 0.000          9.127 .1071 -.363 5.221 81.51 84.3
       ENG  2951.4 2925.9 6.345 81.59      11.1 .1273 .2545 8.6773 .0103 2.639       64.1 29.83  99.2 97.1 16.2

CYCLE   5      DISTANCE = .4451 MI TP   GR/MI   .0190 .2590 300.77 .4970 19.84 0.000
                                   ENG  GR/MI   1.100 6.625 299.05 1.176 19.84       28.4 17.78  98.3 96.1 57.7


HOT TRANSIENT MODAL SUMMARY                                                  --CONV. EFF.--
GRAMS          HC    CO    CO2   NOX   VOL   D/V   DIST  F/E   A/F

IDLE   TP    .021   .20   52.   .006  11.5  0.0   .00
       ENG   .268  3.02   63.   .006  11.5                 278.5 15.79  92.3 93.3 -1.6
ACCEL  TP    .037  2.40   310.  .555  43.6  0.0   .65
       ENG  1.197 11.83   277.  1.532 43.6                 18.42 15.51  96.9 79.7 63.8
CRUISE TP    .047   .91   555.  1.062 75.1  0.0  2.41
       ENG  1.394  8.93   537.  2.415 75.1                 38.58 15.32  96.7 89.8 56.1
DECEL  TP    .007   .05   53.   .065  15.5  0.0   .52
       ENG   .763  1.78   52.   .099  15.5                 87.11 26.99  99.1 97.3 34.7
TOTAL  TP    .111  3.56   969.  1.638 145.7  0.0  3.58
       ENG  3.622 25.56   949.  4.052 145.7                32.65 17.41  96.9 86.1 58.3

          EQUIVALENT MASS BAG RESULTS
          ----------GRAMS/MILE----------

          TP     .031     .99    271.    .471
          ENG   1.011    7.14    265.   1.131
```

BAG READINGS FOR PHASE 3

UNCORRECTED BAG SNIFF READINGS

HC -1	CO -2	CO2 -1	NOX -2
7.4625	48.106	.72106	31.955

ZERO/SPAN CALIBRATION

RANGE	HC 1	CO 2	CO2 1	NOX 2
ZERO CONC	.53581	-.1232	.00126	-.2441
ZERO SPEC	.56607	.04285	.00144	-.1502
% OFFSET	.10082	.08305	.01831	.09391
SPAN CONC	32.248	186.62	1.8669	92.634
SPAN SPEC	32.221	186.78	1.8704	92.352
% OFFSET	-.0917	.07982	.34459	-.2817

BAG ANALYSIS

	HC	CO	CO2	NOX
SAMPLE	7.6280	49.468	.72146	32.473
ST DEV(V)	.00040	.00048	.00045	.00128
BACKGROUND	5.6625	1.2156	.02151	-.1836
ST DEV(V)	.00027	.00055	.00027	.00062

WEIGHTED TOTAL EQUIVALENT MASS BAG RESULTS FUEL

	HC	CO	CO2	NOX	ECO
	---------GRAMS/MILE---------				
TP	.107	2.00	296.	.410	
PR	1.035	8.19	292.	1.001	28.84

Appendix VI

SAE Clean Air and Fuel Economy Rally Rules and Results.

COPY

SOCIETY OF AUTOMOTIVE ENGINEERS

COLORADO SECTION

1981 Fuel Economy Rally Score Sheet

July 18&19 1981

VEHICLE DATA

Vehicle Rally Number.....10
Name Of Entrant.....Carl MacCarley
Type Of Vehicle.....81 Datsun
Weight..... 3250 Pounds. 3&4 PASSENGER
Fuel Used.....meth

1)FUEL ECONOMY SCORING

Baseline miles per gallon.. 20.00
Distance traveled..... 181.2 miles.
Density of fuel #/gal..... 6.6
Pounds of fuel used..... 46.86
BTU content BTU/pound..... 8470
Fuel used..... 7.10 gallons
Actual fuel economy..... 25.52miles per gallon
BTU adjusted fuel economy.... 54.33miles per gallon
Score for fuel economy...(500 pts max)..... 464 points

2)EMISSIONS SCORING

NOx.. .838 grams per mile..... 63 points
CO... 2.978 grams per mile..... 100 points
HC... .214 grams per mile..... 100 points
Total emissions score...(300 pts max)..... 263 points

3)RALLY COURSE SCORE

Starting time..... 9.5200 A.M.
Time at checkpoint #1..... 10.3828 A.M.
Time at checkpoint #2..... 11.1822 A.M.
Time at checkpoint #3..... 12.2400 P.M.
Checkout time from lunch... 1.1522 P.M.
Time at checkpoint #4..... 1.4931 P.M.
Time at checkpoint #5..... 2.3400 P.M.
Time at finish line..... 3.0731 P.M.

Elapsed time to checkpt. # 1 is .7633 hours
PAT = .7706 hrs; score to checkpt # 1 is... 32 points
Elapsed time to checkpt. # 2 is .6650 hours
PAT = .6083 hrs; score to checkpt # 2 is... 21 points
Elapsed time to checkpt. # 3 is 1.0939 hours
PAT = 1.0419 hrs; score to checkpt # 3 is... 27 points
Elapsed time to checkpt. # 4 is .5692 hours
PAT = .6139 hrs; score to checkpt # 4 is... 24 points
Elapsed time to checkpt. # 5 is .7525 hours
PAT = .7558 hrs; score to checkpt # 5 is... 33 points
Elapsed time to checkpt. # 6 is .5475 hours
PAT = .4988 hrs; score to checkpt # 6 is... 20 points

Lunch break was..... .86 hours

Total rally course score...(200 points max)..... 157 points

GRAND TOTAL SCORE....(1000 points max)..... 884 points

COMPUTER SERVICES DONATED BY:

FAY ENGINEERING
516 ACOMA
DENVER

THE 1981 HIGH ALTIDUE CLEAN AIR AND FUEL ECONOMY RALLY

OF ICIAL RULES AND 'CORING

I. There will be three traditional classes and two new (conditional) classes:
   A. 2 passenger vehicles
   B. 3 to 4 passenger vehicles
   C. 5 and up passenger vehicles
   D. electric vehicles (conditional*)
   E. light duty truck (conditional* and under 8500 pounds GVW)

*dependent upon response

II. There will be 20 trophies awarded to the winners as follows:

   ✓ A. 4 trophies for Best Fuel Economy in Class (all except electric)
   ✓ B. 4 for Best Fuel Economy in Class (normalized for weight) (all except electric)
   ✓ C. 4 for Lowest Emissions in Class (all except electric)
   D. 1 for Best Time and Distance Rally - electric vehicles
   E. 1 for Lowest Emissions Overall
   ✓ F. 1 for Lowest Emissions (renewable fuel vehicles)
   ✓ G. 1 for Highest Fuel Economy (renewable fuel vehicles)
   ✓ H. 1 for Overall Winner Renewable Fuel Vehicles
   I. 1 for Best Overall Time and Distance Rally
   J. 1 for Highest Fuel Economy Overall
   ✓ K. 1 for Rally Champion (highest overall points)

III. Entrance Requirements:

   A. Any one individual or group may enter, providing each team has a minimum of:

      1. A licensed driver.
      2. A licensed observer to ride in a competing vehicle.

   B. The driver is responsible for the vehicle and the conduct of all their passengers. A licensed navigator and driver of a team may switch roles during the rally.

   C. Each driver, along with all passengers and observers will sign a standard release and waiver of liability and indemnity agreement and a SAE endorsement release (sample copy enclosed). Proof of automobile insurance will be required.

IV. Vehicle Requirements:

A. Passenger cars and light duty trucks must have exhaust system integrity.

B. 4 wheel vehicles only.

C. Any fuel may be used, however, the rally committee must be notified in advance of any fuel not easily obtainable and the method of how this special fuel will be handled for the purpose of consumption measurement. Test samples of special fuels may be required before and after the rally.

D. All rally vehicles must be highway legal for operation on Colorado Roads and equipped with restraint systems (e.g. - seatbelts).

E. All rally vehicles must seat a minimum of two (2) people.

V. Vehicle Inspection:

Each vehicle entered must pass technical inspection prior to participating in the rally. Entrants may be required to submit their vehicle to a post-rally inspection. The following items may be checked at the inspection:

Street Legal	Exhaust System Integrity
License Plates	Tire Tread
Brake Lights	General Visual Inspection
Windows (glass)	Fuel Tank Full
Horn	Turn Signals
And Other Items	

VI. Competition and Scoring:

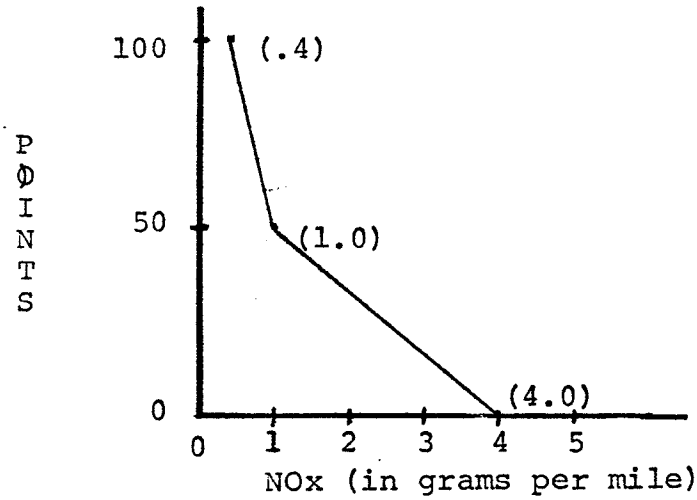
Scoring calculations will be based on a total of 1000 points:

500 for fuel economy
300 for emissions
200 for conformance with rally schedule

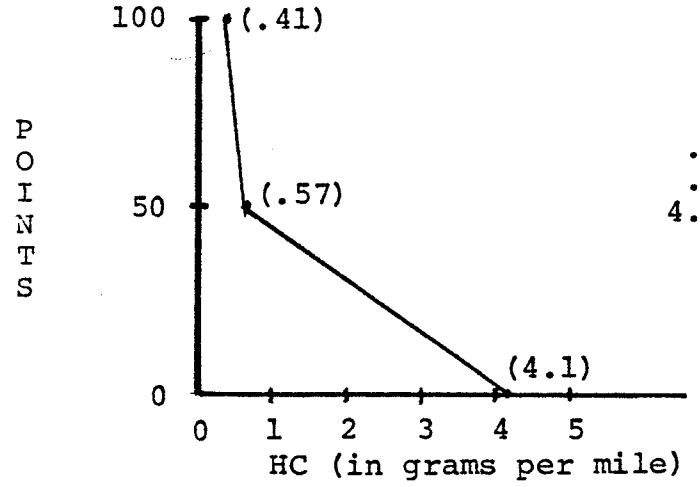
Fuel economy will be expressed in equivalent miles per gallon of regular gas, regardless of fuel used, by computing the lower heating value. Emission tests will measure HC, CO, and NOx. Scores will be determined on the basis of grams per mile of pollutant (diesels will be tested for particulates). Rally scores will be based on the variance of elapsed time from start to the checkpoints.

A. Fuel Economy (maximum 500 points)

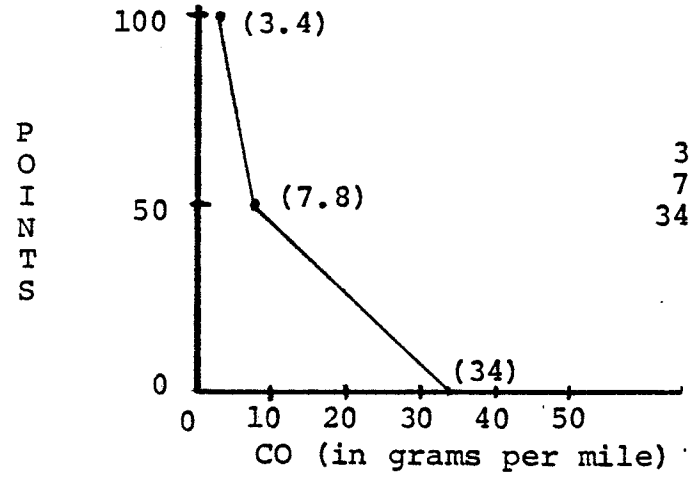
1. Gasoline, diesel and other fueled vehicles will have their fuel tanks filled under committee supervision, at team expense, immediately before and after the rally. The amount of fuel added during the second filling will determine the vehicle's fuel consumption.



.4	Research Goals	100 pts
1.0	'82 High Altitude	50 pts
4.0	10 X Res. Goals	0 pts



.41	Research Goals	100 pts.
.57	'82 High Altitude	50 pts.
4.10	10 X Res. Goals	0 pts.



3.4	Research Goals	100 pts.
7.8	'82 High Altitude	50 pts.
34.0	10 X Res. Goals	0 pts.

C. Rally (maximum 200 points)

1. All non-electric entrants will compete on exactly the same route and will be measured under as near the same conditions as possible. Electric vehicles will have a special course of semi-urban driving approximately 40 miles long.

2. Rally instructions given out before the start of the rally will be straight forward; there will be no trick instructions. Checkpoints will be located at undisclosed points along the route. Additionally, roving observers will be on the route looking for infractions and assisting vehicles in trouble.

3. Each entrant must follow the prescribed course and must be observed at all checkpoints located along the route. The route must be completed in the alloted time.

4. Contestants will be disqualified for the following:
   Unsportsmanlike conduct.
   Coasting with engine off, transmission in neutral, or clutch disengaged.
   Adjusting, repairing, or modifying the entry vehicle after the emissions test.
   Unauthorized re-fueling.

5. Each contestant will be given one set of route instructions. The route instructions will be in the format as shown in the example below:

EXAMPLE

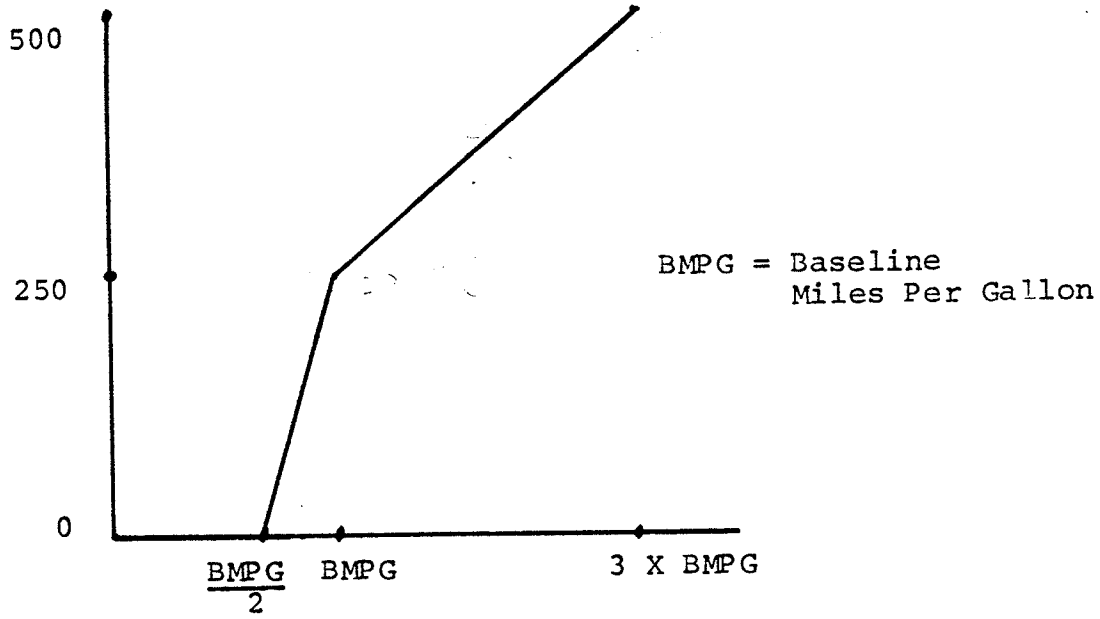
Instruction Number	Mileage (Miles)	Average Speed	Intructions
1	0.00		Start engine;proceed to the start checkpoint
2	.1	33	Right out of parking lot
3	.4		Left at traffic light on Harvest
4	1.2	42.5	Right at stop sign on Central
5	1.9	51	Right on I-475 (north)

6. The elapsed time between the start and finish must not exceed the proper average time by more than 1½ hours, and not more than 25% late between one checkpoint and the next.

2. For vehicles not using gasoline or diesel fuel, contestants must furnish their fuel in a tank that can be weighed. Either a separate tank or the vehicle's fuel tank may be weighed depending on the design of the tank.

3. All contestants will have to pay for thier fuel Gasoline and diesel powered vehicle owners must purchase fuel at the designated station. All fueling operations will be supervised by the rally officials.

4. To allow for driver ability as well as vehicle modifications, the baseline mileage for all vehicles in the rally has been computed using current EPA city fuel economy data. A table is enclosed which gives the baseline miles per gallon as a function of vehicle weight.



B. Emissions (maximum 300 points)

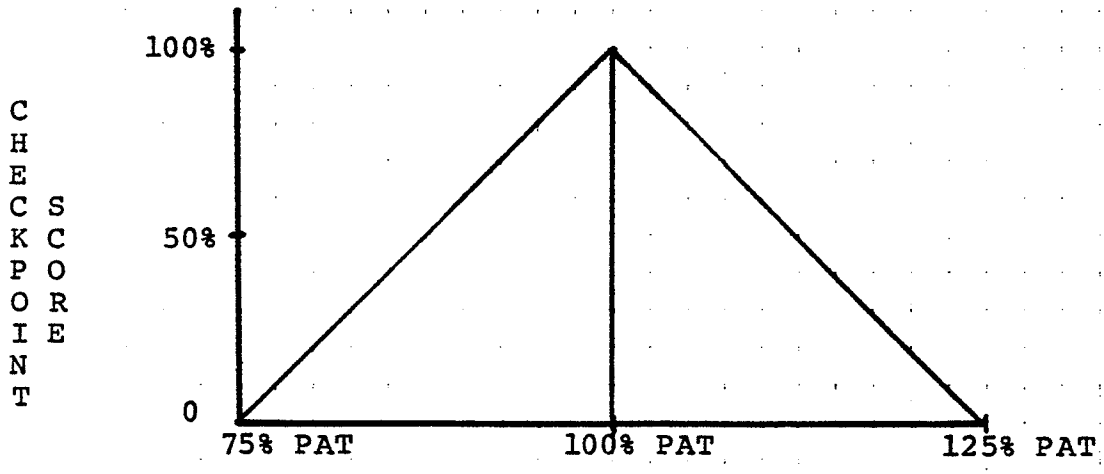
1. The vehicles will be tested using the EPA Urban Driving Cycle (Hot 505), HOT Stabalized Phase (Phase #3). (See Federal Register 8, Appendix 1, page 32989, June, 1977) The vehicles will be tested at operating temperature and the exhaust gas will be continually collected during the test. There is no air pollution standard which must be met, however, lower emissions will result in higher scores (see graphs).

2. The particulate emissions for diesel powered vehicles cannot exceed .6 GPM (grams per mile) or the vehicle will be penalized 50 points on the emission score.

7. The mileage column gives the official mileage where the instruction should be executed. Mileage will be given for each instruction to the nearest 1/10th mile. Official mileage, rather than contestant's indicated mileage, will be used in all scoring calculations. Average speed gives the average speed to the next instruction.

8. The maximum Rally score of 200 points will be divided by the number of checkpoints. Each checkpoint will be scored seperately using the time from the start of one checkpoint to the arrival at the next checkpoint. The last checkpoint is the finish line. Time for lunch will be subtracted. The course will be driven prior to the rally to determine the official proper average time (PAT) for each of the checkpoints.

9. Example: The P.A.T. (Proper Average Time) from the starting line to checkpoint one is 36 minutes, and the P.A.T. from checkpoint one and checkpoint two is 23 minutes. Vehicle #13 leaves the starting line at 10:00, and due to a traffic jam, arrives at checkpoint one eleven minutes late, at 10:47. Vehicle #13 will be penalized for being 30% late from the starting line to checkpoint one, but 10:47 now becomes the starting time from checkpoint one to checkpoint two, still allowing Vehicle #13 twenty-three minutes to get to checkpoint two. See graph below:



10. Rally officials will make the final decision on any disqualifications, classification, or reclassification and may issue supplemental regulations if necessary to properly conduct the event.

11. There will be an observer meeting prior to and at the completion of the rally. The purpose of the observer riding in a competing team vehicle is to insure conformance of rally rules. After the completion of the rally, entrants may be interviewed on special driving techniques, vehicle modifications, and/or driver aids used to obtain improved mileage.

Vehicle Weight	Inertia Class	Power*	Baseline MPG
576-700	1000	4.3	43.5
701-825	1125	4.6	41.9
826-950	1250	4.8	40.3
951-1075	1375	5.1	38.7
1076-1200	1500	5.3	37.2
1201-1325	1625	5.5	35.8
1326-1450	1750	5.8	34.4
1451-1575	1875	6.0	33.0
1576-1700	2000	6.3	31.5
1701-1825	2125	6.5	30.2
1826-1950	2250	6.7	28.9
1951-2075	2375	7.0	27.6
2076-2200	2500	7.2	26.4
2201-2325	2625	7.4	25.3
2326-2450	2750	7.7	24.2
2451-2575	2875	7.9	23.1
2576-2700	3000	8.1	22.0
2701-2825	3125	8.3	21.0
2826-2950	3250	8.6	20.0
2951-3075	3375	8.8	19.0
3076-3200	3500	9.0	18.2
3201-3325	3625	9.2	17.5
3326-3450	3750	9.4	17.0
3451-3575	3875	9.6	16.4
3576-3700	4000	9.8	15.9
3701-3825	4125	10.0	15.4
3826-3950	4250	10.2	14.9
3951-4075	4375	10.4	14.5
4076-4200	4500	10.6	14.1
4201-4325	4625	10.8	13.7
4326-4450	4750	11.0	13.4
4451-4575	4875	11.2	13.0
4576-4700	5000	11.4	12.7
4701-4825	5125	11.6	12.4
4826-4950	5250	11.8	12.1
4951-5075	5375	11.9	11.8
5076-5200	5500	12.1	11.5
5201-5325	5625	12.3	11.3
5326-5450	5750	12.5	11.0
5451-5575	5875	12.6	10.8
5576-5700	6000	12.8	10.6

*Power-Horsepower at 50 MPH for Dyno Testing

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I certify that I have read the above and agree not to utilize the name of SAE or its logo in any way that would imply SAE endorsement.

I, the undersigned, hereby hold the Society of Automotive Engineers, Inc., and its Member Sections harmless for any bodily injury or property liability damage arising out of my participation in the "High Altitude Clean Air and Fuel Economy Rally".

_____ _____

DATE NAME